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TECHNICAL FACULTY "MIHAJLO PUPIN"
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PROCEEDINGS

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Technical treatment and design:
Ivan Tasić, Ph. D, Assistant Professor
Dijana Karuović, Ph. D, Assistant Professor
Marjana Pardanjac, Ph. D, Assistant Professor
Snežana Jokić, Ph. D, Assistant
Erika Eleven, M.Sc, A ssistant
Lecturer:
Erika Tobolka, Ph. D, Professor

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Snežana Babić Kekez, Ph.D, Assistant Professor, Technical Faculty "Mihajlo Pupin" Zrenjanin, Serbia

Vesna Jevtić, Ph.D, Assistant Professor, Technical Faculty "Mihajlo Pupin" Zrenjanin, Serbia

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Marjana Pardanjac, Ph.D, Assistant Professor, Technical Faculty "Mihajlo Pupin" Zrenjanin, Serbia

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INTRODUCTION

This Prodeedings comprises papers from the **International conference on Information technology and development of education** that is held in the "Vojvodina" Hotel in Zrenjanin on June 29th 2012.

The International conference on Information technology and development of education has had a goal to contribute to the development of education in Serbia and in the region, as well as, to gather experts in natural and technical sciences' teaching fields.

The expected scientific-skilled analysis of the accomplishment in the field of the contemporary information and communication technologies, as well as analysis of state, needs and tendencies in education all around the world and in our country have been realized.

The authors and the participans of the Conference have dealt with the following thematic areas:

- Theoretic and methodology questions of contemporary pedagogy
- Personalization and learning styles
- Social networks and their influence on education
- Children security and safety on the Internet
- Curriculum of contemporary teaching
- Methodic questions of natural and technical sciences subject teaching
- Lifelong learning and teachers' professional training
- E-learning
- Education management
- Development and influence of IT on teaching
- Information communication infrastructure in teaching process

All submitted papers have been reviewed at least two independent members of the Science Committee.

The papers presented on the Conference and published in this Proceedings can be useful for teacher while learning and teaching in the fields of informatics, technics and other teaching subjects and activities. Contribution to science and teaching development in this region and wider has been achieved in this way.

The Organizing Committee of the Conference

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CONTENTS

ACADEMIC PERFORMANCE INDEX IN HIGHER EDUCATION - A MODEL IN INDIA

N. Chotaliya*, Lj. Kazi** and M. Bhatt***

*H. & H.B. Kotak Institute of Science, Rajkot, Gujarat, India
**University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia
***University of Mumbai, R.D. National College, Mumbai, India
narendra_chotaliya@yahoo.com, leremic@tfzr.uns.ac.rs, mmbhatt@gmail.com

Abstract – In this paper academic performance index in higher education applied in India is presented. Academic performance index is quantitative approach to measurement quality of teaching staff, i.e. their competence level. According to academic performance index that is applied at whole India level, at Gujarat Indian state for each teaching staff member there is self-appraisal form to be used for reporting.

I. INTRODUCTION

Financing of higher education institutions in India is organized within three modalities:

- Funded by University Grants Commission (UGC) and maintained by the State Governments
- Co-financed by University Grants Commission and partly self-financed
- Completely self-financed (privately held)

University Grants Commission established regulations regarding qualifications for appointment of teachers and other academic staff in universities and colleges since year 1956 from Ministry of Finance and later in year 2000 and revised in year 2008. Current version is applied since year 2010 [1]. These regulations explain qualifications for candidates' eligibility to promotion to teaching positions in employment and under Career Advancement Scheme. These qualifications are related to teaching staff (university and college teachers) as well as principals (directors of educational institutions) and librarians.

These regulations have special concern regarding specific scientific and professional disciplines within UGC regulations [1] and within separate regulations:

- For teachers in the Faculties of Agriculture and Veterinary Science, the norms /Regulations of Indian Council of Agricultural Research;
- For Faculty of Medicine, Dentistry, Nursing and AYUSH, the norms/Regulations of Ministry of Health and Family Welfare, Government of India;
- For Faculty of Education, the norms/Regulations formulated in consultations with National Council of Teacher Education;
- For Engineering and Technology, Pharmacy and Management/Business Administration, the norms/Regulations formulated in consultations with All India Council for Technical Education

Within regulations regarding qualifications for appointment of higher education institutions' employees, a quantitative approach is established for competence level measurement - Academic performance Index (API). Academic performance index is measurement scheme for presenting academic qualifications and work results in aim to measure quality of teaching staff. There are several areas of work that is measured and presented by this index. This way each member of teaching staff's work is evaluated and therefore it is considered during academic career with employment and promotion to higher academic positions [1]. According to academic performance index that is applied at whole India level, at Gujarat Indian state there is special self-appraisal form [2] that each teaching staff member should use for reporting to education authorities and could use for self-evaluation of academic work quality.

II. RECRUITMENT AND QUALIFICATIONS

"The minimum qualifications required for the post of Assistant Professors, Associate Professors, Professors, Principals, Assistant Directors of Physical Education and Sports, Deputy Directors of Physical Education and Sports, Directors of Physical Education and Sports, Assistant Librarians, Deputy Librarians, Librarians will be those as prescribed by the UGC in these Regulations.

The direct recruitment to the posts of Assistant Professors, Associate Professors and Professors in the Universities and Colleges shall be on the basis of merit through all India advertisement and selections by the duly constituted Selection Committees as per the provisions made under these Regulations to be incorporated under the Statutes/Ordinances of the concerned university. The composition of such committees should be as prescribed by the UGC in these Regulations.

Subject to the availability of vacant positions and fitness, teachers such as Assistant Professor, Associate Professor and Professor only, may be re-employed on contract appointment beyond the age of superannuation, as applicable to the concerned University, college and Institution, up to the age of seventy years." [1]

A. Assistant professor

"The minimum requirements of a good academic record, 55% marks (or an equivalent grade in a point scale wherever grading system is followed) at the master's level and qualifying in the National Eligibility Test (NET), or an accredited test (State Level Eligibility Test - SLET/SET), shall remain for the appointment of Assistant Professors. NET/SLET/SET shall remain the minimum eligibility condition for recruitment and appointment of Assistant Professors in Universities / Colleges / Institutions. *Provided* however, that candidates, who are or have been awarded a Ph. D. Degree in accordance with the University Grants Commission (Minimum Standards and Procedure for Award of Ph.D. Degree) Regulations, 2009, shall be exempted from the requirement of the minimum eligibility condition of NET/SLET/SET for recruitment and appointment of Assistant Professor or equivalent positions in Universities / Colleges / Institutions. NET/SLET/SET shall not be required for such Masters Degree Programmes in disciplines for which NET/SLET/SET accredited test is not conducted. A minimum of 55% marks (or an equivalent grade in a point scale wherever grading system is followed) will be required at the Master's level for those recruited as teachers at any level from industries and research institutions and at the entry level of Assistant Professors, Assistant Librarians, Assistant Directors of Physical Education and Sports. A relaxation of 5% may be provided at the graduate and master's level for the Scheduled Caste/Scheduled Tribe/Differently-abled (Physically and visually differently-abled) categories for the purpose of eligibility and for assessing good academic record during direct recruitment to teaching positions. The eligibility marks of 55% marks (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible, based on only the qualifying marks without including any grace mark procedures. A relaxation of 5% may be provided, from 55% to 50% of the marks to the Ph.D. Degree holders, who have obtained their Master's Degree prior to 19 September, 1991. Relevant grade which is regarded as equivalent of 55% wherever the grading system is followed by a recognized university shall also be considered eligible. The Ph.D. Degree shall be a mandatory qualification for the appointment of Professors and for promotion as Professors. The Ph.D. Degree shall be a mandatory qualification for all candidates to be appointed as Associate Professor through direct recruitment. The period of time taken by candidates to acquire M.Phil. and/or Ph.D. Degree shall not be considered as teaching/ research experience to be claimed for appointment to the teaching positions." [1]

B. Associate professor

Requirements for promotion to position of associate professor are: "Good academic record with a Ph.D. Degree in the concerned /allied/ relevant disciplines. A Master's Degree with at least 55% marks (or an equivalent grade in a point scale wherever grading system is followed). A minimum of eight years of experience of teaching and/or research in an academic/research position equivalent to that of Assistant Professor in a University, College or Accredited Research Institution/industry excluding the period of Ph.D. Research with evidence of published work and a minimum of 5 publications as books and/or research/policy papers. Contribution to educational innovation, design of new curricula and courses, and technology – mediated teaching learning process with evidence of having guided doctoral candidates and research students. A minimum score as stipulated in the Academic Performance Indicator (API) based Performance Based Appraisal System (PBAS)."

C. Professor

Requirements for promotion to position of professor are:

"An eminent scholar with Ph.D. qualification(s) in the concerned/allied/relevant discipline and published work of high quality, actively engaged in research with evidence of published work with a minimum of 10 publications as books and/or research/policy papers. A minimum of ten years of teaching experience in university/college, and/or experience in research at the University/National level institutions/industries, including experience of guiding candidates for research at doctoral level. Contribution to educational innovation, design of new curricula and courses, and technology – mediated teaching learning process. A minimum score as stipulated in the Academic Performance Indicator (API) based Performance Based Appraisal System (PBAS)." [1]

Or:

An outstanding professional, with established reputation in the relevant field, who has made significant contributions to the knowledge in the concerned/allied/relevant discipline, to be substantiated by credentials.

D. Principal

Requirements for promotion to position of principal (director of educational institution) are "A Master's Degree with at least 55% marks (or an equivalent grade in a point scale wherever grading system is followed) by a recognized University. A Ph.D. Degree in concerned/allied/relevant discipline(s) in the institution concerned with evidence of published work and research guidance. Associate Professor/Professor with a total experience of fifteen years of teaching/research/administration in Universities, Colleges and other institutions of higher education. A minimum score as stipulated in the Academic Performance Indicator (API) based Performance Based Appraisal System (PBAS)." [1]

III. CODE OF PROFESSIONAL ETHICS

A. Teachers and their responsibilities

"Whoever adopts teaching as a profession assumes the obligation to conduct himself / herself in accordance with the ideal of the profession. A teacher is constantly under the scrutiny of his students and the society at large. Therefore, every teacher should see that there is no incompatibility between his precepts and practice. The national ideals of education which have already been set forth and which he/she should seek to inculcate among students must be his/her own ideals. The profession further requires that the teachers should be calm, patient and communicative by temperament and amiable in disposition.

Teachers should: (i) Adhere to a responsible pattern of conduct and demeanour expected of them by the community; (ii) Manage their private affairs in a manner consistent with the dignity of the profession; (iii) Seek to make professional growth continuous through study and research; (iv) Express free and frank opinion by participation at professional meetings, seminars, conferences etc. towards the contribution of knowledge; (v) Maintain active membership of professional organizations and strive to improve education and profession through them; (vi) Perform their duties in the form of teaching, tutorial, practical, seminar and research work conscientiously and with dedication; (vii) Co-operate and assist in carrying out functions relating to the educational responsibilities of the college and the university such as: assisting in appraising applications for admission, advising and counseling students as well as assisting the conduct of university and college examinations, including supervision, invigilation and evaluation; and (viii) Participate in extension, co-curricular and extra-curricular activities including community service." [1]

B. Teachers and the students

"Teachers should: (i) Respect the right and dignity of the student in expressing his/her opinion; (ii) Deal justly and impartially with students regardless of their religion, caste, political, economic, social and physical characteristics; (ii) Recognize the difference in aptitude and capabilities among students and strive to meet their individual needs; (iv) Encourage students to improve their attainments, develop their personalities and at the same time contribute to community welfare; (v) Inculcate among students scientific outlook and respect for physical labour and ideals of democracy, patriotism and peace; (vi) Be affectionate to the students and not behave in a vindictive manner towards any of them for any reason; (vii) Pay attention to only the attainment of the student in the assessment of merit; (viii) Make themselves available to the students even beyond their class hours and help and guide students without any remuneration or reward; (ix) Aid students to develop an understanding of our national heritage and national goals; and (x) Refrain from inciting students against other students, colleagues or administration." [1]

C. Teachers and colleagues

"Teachers should: (i) Treat other members of the profession in the same manner as they themselves wish to be treated; (ii) Speak respectfully of other teachers and render assistance for professional betterment; (iii) Refrain from lodging unsubstantiated allegations against colleagues to higher authorities; and (iv) Refrain from allowing considerations of caste, creed, religion, race or sex in their professional endeavour." [1]

D. Teachers and authorities

"Teachers should: (i) Discharge their professional responsibilities according to the existing rules and adhere to procedures and methods consistent with their profession in initiating steps through their own institutional bodies and/or professional organizations for change of any such rule detrimental to the professional interest; (ii) Refrain from undertaking any other employment and commitment including private tuitions and coaching classes which are likely to interfere with their professional responsibilities; (iii) Co-operate in the formulation of policies of the institution by accepting various offices and discharge responsibilities which such offices may demand; (iv) Co-operate through their organizations in the formulation of policies of the other institutions and accept offices; (v) Co-operate with the authorities for the betterment of the institutions keeping in view the interest and in conformity with dignity of the profession; (vi) Should adhere to the conditions of contract; (vii) Give and expect due notice before a change of position is made; and (viii) Refrain from availing themselves of leave except on unavoidable grounds and as far as practicable with prior intimation, keeping in view their particular responsibility for completion of academic schedule." [1]

E. Teachers and non-teaching staff

"Teachers should: (i) treat the non-teaching staff as colleagues and equal partners in a cooperative undertaking, within every educational institution; and (ii) help in the function of joint staff-councils covering both teachers and the non-teaching staff." [1]

F. Teachers and guardians

"Teachers should:(i) Try to see through teachers' bodies and organizations, that institutions maintain contact with the guardians, their students, send reports of their performance to the guardians whenever necessary and meet the guardians in meetings convened for the purpose for mutual exchange of ideas and for the benefit of the institution." [1]

G. Teachers and society

" Teachers should:(i) Recognize that education is a public service and strive to keep the public informed of the educational programmes which are being provided; (ii) Work to improve education in the community and strengthen the community's moral and intellectual life; (iii) Be aware of social problems and take part in such activities as would be conducive to the progress of society and hence the country as a whole; (iv) Perform the duties of citizenship, participate in community activities and shoulder responsibilities of public offices;

(v) Refrain from taking part in or subscribing to or assisting in any way activities which tend to promote feeling of hatred or enmity among different communities, religions or linguistic groups but actively work for National Integration." [1]

IV. TEACHING DAYS AND WORKLOAD

Within University Grants Commission regulations [1] there is prescribed many other aspects of teaching work and activities, as well as regulations regarding payment and leave (off-duty times) causes (like attendance to symposium, child care etc.) and allowed number of days.

A. Teaching days

"The Universities/Colleges must adopt at least 180 working days, i.e. there should be a minimum of 30 weeks of actual teaching in a 6-day week. Of the remaining period, 12 weeks may be devoted to admission and examination activities, and non-instructional days for co-curricular, sports, college day, etc., 8 weeks for vacations and 2 weeks may be attributed to various public holidays. If the University adopts a 5 day week pattern, then the number of weeks should be increased correspondingly to ensure equivalent of 30 weeks of actual teaching with a 6 day week." [1]

TABLE I. TEACHING DAYS IN INDIA, ACCORDING TO UGC [1]

	Number of weeks: 6 day a week pattern		Number of weeks: 5 day a week pattern	
Categorization	**University**	**College**	**University**	**College**
Teaching and Learning Process	30 (180 days) weeks	30 (180 days) weeks	36 (180 days) weeks	36 (180 days) weeks
Admissions/Examinations preparation for Examination	12	10	8	8
Vacation	8	10	6	6
Public Holidays (to increase and adjust teaching days accordingly)	2	2	2	2
Total	**52**	**52**	**52**	**52**

B. Workload

"The workload of the teachers in full employment should not be less than 40 hours a week for 30 working weeks (180 teaching days) in an academic year. It should be necessary for the teacher to be available for at least 5 hours daily in the University/College for which necessary space and infrastructure should be provided by the University/College. Direct teaching-learning process hours should be as follows:

- Assistant Professor 16 hours
- Associate Professor and Professor 14 hours

A relaxation of two hours in the workload may, however, be given to Professors who are actively involved in extension activities and administration. A minimum of 6 hours per week may have to be allocated for research activities of a teacher." [1]

V. ACADEMIC PERFORMANCE INDEX

Based on the teacher's self-assessment, academic performance indicators (APIs) are proposed in recruitments and career advancement scheme (CAS) promotions of university / college teachers and is organized in three categories:

- Category I - teaching, learning and evaluation related activities
- Category II - co-curricular, extension and professional development related activities.
- Category III - research and academic contributions.

The minimum API score required by teachers is different depending on categories, levels of promotion and between university and college. The self-assessment score is based on verifiable criteria and is finalized by the screening/selection committee.

TABLE II. CATEGORY I ACTIVITIES AND API SCORES

S. No.	Nature of Activity	Maximum Score
1	Lectures, seminars, tutorials, practicals, contact hours undertaken taken as percentage of lectures allocated[a]	50
2	Lectures or other teaching duties in excess of the UGC norms	10
3	Preparation and Imparting of knowledge / instruction as per curriculum; syllabus enrichment by providing additional resources to students	20
4	Use of participatory and innovative teaching-learning methodologies; updating of subject content, course improvement etc.	20
5	Examination duties (Invigilation; question paper setting, evaluation/assessment of answer scripts) as per allotment.	25
	Total Score	**125**
	Minimum API Score Required	**75**

TABLE III. CATEGORY II ACTIVITIES AND API SCORES

S. No.	Nature of Activity	Maximum Score
1	Student related co-curricular, extension and field based activities (such as extension work through NSS/NCC and other channels, cultural activities, subject related events, advisement and counseling)	20
2	Contribution to Corporate life and management of the department and institution through participation in academic and administrative committees and responsibilities.	15
3	Professional Development activities (such as participation in seminars, conferences, short term, training courses, talks, lectures, membership of associations, dissemination and general articles, not covered in Category III below)	15
	Minimum API Score Required	**15**

Category III - research and academic contributions have several subcategories:

- Research publications
- Research projects
- Research guidance
- Training courses / Conference papers

TABLE IV. CATEGORY III -RESEARCH PUBLICATIONS [1]

S No.	APIs	Engineering/Agriculture/ Veterinary Science/Sciences/Medical Sciences	Faculties of Languages Arts/Humanities/Social Sciences/Library/ Physical education/Management	Max. points for University and college teacher position
III A	Research Papers published in:	Refereed Journals *	Refereed Journals*	15 / publication
		Non-refereed but recognized and reputable journals and periodicals, having ISBN/ISSN numbers.	Non-refereed but recognized and reputable journals and periodicals, having ISBN/ISSN numbers.	10 / Publication
		Conference proceedings as full papers, etc. (Abstracts not to be included)	Conference proceedings as full papers, etc. (Abstracts not to be included)	10/ publication
III (B)	Research Publications (books, chapters in books, other than refereed journal articles)	Text or Reference Books Published by International Publishers with an established peer review system	Text or Reference Books Published by International Publishers with an established peer review system	50 /sole author; 10 /chapter in an edited book
		Subjects Books by National level publishers/State and Central Govt. Publications with ISBN/ISSN numbers.	Subject Books by / national level publishers/State and Central Govt. Publications with ISBN/ISSN numbers.	25 /sole author, and 5/ chapter in edited books
		Subject Books by Other local publishers with ISBN/ISSN numbers.	Subject Books by Other local publishers with ISBN/ISSN numbers.	15 / sole author, and 3 / chapter in edited books
		Chapters contributed to edited knowledge based volumes published by International Publishers	Chapters contributed to edited knowledge based volumes published by International Publishers	10 /Chapter
		Chapters in knowledge based volumes by Indian/National level publishers with ISBN/ISSN numbers and with numbers of national and international directories	Chapters in knowledge based volumes in Indian/National level publishers with ISBN /ISSN numbers and with numbers of national and international directories	5 / Chapter

TABLE V. CATEGORY III - RESEARCH PROJECTS AND GUIDANCE [1]

III (C)	RESEARCH PROJECTS			
III (C) (i)	Sponsored Projects carried out/ ongoing	(a) Major Projects amount mobilized with grants above 30.0 lakhs	Major Projects amount mobilized with grants above 5.0 lakhs	20 /each Project
		(b) Major Projects amount mobilized with grants above 5.0 lakhs up to 30.00 lakhs	Major Projects Amount mobilized with minimum of Rs. 3.00 lakhs up to Rs. 5.00 lakhs	15 /each Project
		(c) Minor Projects (Amount mobilized with grants above Rs. 50,000 up to Rs. 5 lakh)	Minor Projects (Amount mobilized with grants above Rs. 25,000 up to Rs. 3 lakh)	10/each Project
III (C) (ii)	Consultancy Projects	Amount mobilized with	Amount mobilized with	10 per every
	carried out / ongoing	minimum of Rs.10.00 lakh	minimum of Rs. 2.0 lakhs	Rs.10.0 lakhs and Rs.2.0 lakhs, respectively
III (C) (iii)	Completed projects : Quality Evaluation	Completed project Report (Acceptance from funding agency)	Completed project report (Accepted by funding agency)	20 /each major project and 10 / each minor project
III (C) (iv)	Projects Outcome / Outputs	Patent/Technology transfer/ Product/Process	Major Policy document of Govt. Bodies at Central and State level	30 / each national level output or patent /50 /each for International level,
III (D)	RESEARCH GUIDANCE			
III (D) (i)	M.Phil.	Degree awarded only	Degree awarded only	3 /each candidate
III (D) (ii)	Ph.D	Degree awarded	Degree awarded	10 /each candidate
		Thesis submitted	Thesis submitted	7 /each candidate

TABLE VI. CATEGORY III - COURSES AND CONFERENCE PAPERS[1]

III(E)	TRAINING COURSES AND CONFERENCE /SEMINAR/WORKSHOP PAPERS			
III(E) (i)	Refresher courses, Methodology workshops, Training, Teaching-Learning-Evaluation Technology Programmes, Soft Skills development Programmes, Faculty Development Programmes (Max: 30 points)	(a) Not less than two weeks duration	(a) Not less than two weeks duration	20/each
		(b) One week duration	(b) One week duration	10/each
III(E) (ii)	Papers in Conferences/ Seminars/ workshops etc.**	Participation and Presentation of research papers (oral/poster) in	Participation and Presentation of research papers (oral/poster) in	
		a) International conference	a) International conference	10 each
		b) National	b) National	7.5 / each
		c) Regional/State level	c) Regional/State level	5 /each
		d) Local –University/College level	d) Local –University/College level	3 / each
III(E) (iv)	Invited lectures or presentations for conferences/ / symposia	(a) International	(a) International	10 /each
		(b) National level	(b) National level	5

It is important to mention few rules:

- "The API for joint publications will have to be calculated in the following manner: Of the total score for the relevant category of publication by the concerned teacher, the first/Principal author and the corresponding author/supervisor/mentor of the teacher would share equally 60% of the total points and the remaining 40% would be shared equally by all other authors." [1]
- For university and college teachers, they "may score 10 points from either Category I or Category II to achieve the minimum score required under Category I + II". [1]

VI. REQUIRED API SCORE POINTS FOR UNIVERSITY AND COLLEGE TEACHERS PROMOTION

Table VII presents minimum points per year or appointment period for university teachers, while Table VIII presents minimum points per year or appointment period for college teachers.

TABLE VII. API MINIMUM SCORE FOR UNIVERSITY TEACHERS [1]

APPENDIX – III TABLE – II (A)
MINIMUM APIS AS PROVIDED IN APPENDIX – III TABLE I TO BE APPLIED FOR THE PROMOTION OF TEACHERS UNDER CAREER ADVANCEMENT SCHEME (CAS) IN UNIVERSITY DEPARTMENTS, AND WEIGHTAGES FOR EXPERT ASSESSMENT

		Assistant Professor/ equivalent cadres: (Stage 1 to Stage 2)	Assistant Professor/ equivalent cadres: (Stage 2 to Stage 3)	Assistant Professor (Stage 3) to Associate Professor/ equivalent cadres (Stage 4)	Associate Professor (Stage 4) to Professor/ equivalent cadres (Stage 5)	Professor (Stage 5) to Professor (Stage 6)
I	Teaching-learning, Evaluation Related Activities (category I)	75/Year	75/year	75/year	75/year	75/year
II	Co-curricular, Extension and Profession related activities (Category II)	15/Year	15/Year	15/Year	15/Year	15/Year
III	Minimum total average annual Score under Categories I and II*	100/Year	100/Year	100/Year	100/Year	100/Year
IV	Research and Academic Contribution (Category III) –	10/Year (40/assessment period)	20/Year (100/assessment Period)	30/Year (90/assessment period)	40/Year (120/assessment period)	50/Year (500/assessment period)
	Expert Assessment System	Screening Committee	Screening Committee	Selection Committee	Selection Committee	Expert Committee
V	Percentage Distribution of Weightage Points in the Expert Assessment (Total weightage = 100. Minimum required for promotion is 50)	No separate points. Screening committee to verify API scores	No separate points. Screening committee to verify API scores	30% - Contribution to Research 50% - Assessment of domain knowledge and teaching practices. 20 % - Interview performance	50% - Contribution to Research. 30 % - Assessment of domain knowledge and teaching practices. 20 % - Interview performance	50% - research. 50 % - Performance evaluation and other credential by referral procedure

TABLE VIII. API MINIMUM SCORE FOR COLLEGE TEACHERS [1]

APPENDIX – III TABLE – II (B)
MINIMUM POINT NORMS OF THE APIS AS PROVIDED IN TABLE I AND WEIGHTAGES FOR EXPERT ASSESSMENT TO BE APPLIED FOR THE PROMOTION OF TEACHERS, IN COLLEGES (UG AND PG) UNDER CAREER ADVANCEMENT SCHEME (CAS)

		Assistant Professor/ equivalent cadres Stage 1 to Stage 2:	Assistant Professor/ equivalent cadres: Stage 2 to Stage 3	Assistant Professor (Stage 3) to Associate Professor/ equivalent cadre (Stage 4)	Associate Professor to Professor Promotion in Colleges (Stage 5) as per assigned posts
I	Teaching-learning, Evaluation Related Activities (Category – I)	75/Year	75/Year	75/year	75/year
II	Co-curricular, Extension and Profession related activities (Category – II)	15/Year	15/Year	15/Year	15/Year
III	Minimum total average annual Score under Categories I and II*	100/Year	100/Year	100/Year	100/Year
IV	Research and Academic Contribution (Category III)	5/Year (20/assessment period)	10/Year (50/assessment period)	15/Year (45/assessment period)	20/Year (60/assessment period)
	Expert Assessment System	Screening Committee	Screening Committee	Selection Committee	Selection Committee
V	Percentage Distribution of Weightage Points in the Expert Assessment (Total weightage = 100. Minimum required for promotion is 50)	No separate points. Screening committee to verify API scores	No separate points. Screening committee to verify API scores	20% - Contribution to Research 60% - Assessment of domain knowledge and teaching practices. 20 % - Interview performance	30% - Contribution to Research. 50% - Assessment of domain knowledge and teaching practices. 20 % - Interview performance

VII. CONCLUSION

In this paper we presented regulations from University Grant Commision of India regarding qualifications requirements for recruitment and career advancement of higher education institution staff (teachers, principals, librarians etc.). We presented other important aspects of quality of teaching staff work, such as code of professional ethics. Important factor that influence quality of teaching staff work is teaching days organization and workload.

Quality of employees at higher education in India is measured by API (Academic Performance Index) score. We presented the model of API score points calculation. We also described minimum requirements regarding API points for each of three categories (teaching, professional work and research) for university and college teachers in India. Some rules are presented regarding minimum scores for category I and II and joint work score calculation in category III.

It has been shown that API score is calculated for each year and for each assessment period. For university and college teachers first and second category are not mandatory, i.e. score for category I and II are calculated together and minimum of 10 points is needed for this sum. This shows that teacher could be engaged in teaching, but also in professional and administrative work which also is appropriately counted. Still, majority of points is related to teaching activities. Regarding research activities, they are mandatory and minimum of 10/20/30 points is needed is for assistant teacher for each year.

Final conclusion is that great majority of API points is related to teaching engagement. Additional administrative and professional work is not mandatory, but is considered for API points. It is also possible for teaching staff member not to be engaged in teaching process, but in professional and administrative work. Still, research work is mandatory for any type of work engagements.

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EVOLUTION OF EDUCATION: PRODUCING SMARTER INDIVIDUALS FASTER

S. Stankovic
Snoqualmie, WA, USA
sonjadstankovic@yahoo.com

Abstract – Current education is providing batches of students with small % of "exceptional" students, small % of "bad" students, and majority of students in the middle. Learning process is modeled for the class as a whole, and it's not accommodating individual needs of students. Education is evolving to accommodate needs of increasing % of successful students faster than in traditional settings. Evolution is happening towards making education more personalized, tailored towards the need of individual student, and providing optimal conditions for acquiring knowledge.

I. INTRODUCTION

The fast-pacing way of life is speeding up even more, and it's impacting education as well. Current system of education is evolving in order to accommodate the need to produce smarter people faster.

System of education which involves one teacher talking to 30+ students in the classroom, and delivering information to all of them at the same time, in the same manner is becoming obsolete.

Each student has its own way of learning, some are more visual, some are more audio oriented; some students can understand the topic and move on to next one faster, some need more explanations, sometimes in a different way; some students can do research and learn on their own, while others need more guidance and tutoring. All these different types of students are not being accommodated in current system of education that most of the schools are practicing.

Approach where collective is put in front of individuality of each student is not working; people are recognizing that nurturing individuality of each student (child) is what makes them successful in life.

II. TRADITIONAL EDUCATION

Based on observation so far, in majority of schools, we can tell that there are in every classroom few students "on the top" of the class, and few "on the bottom" of the class, while majority of students is somewhere in the middle with grades just enough not to raise flags as very good or as bad performers. So, what makes student be in the top % of the class? There are several points that are common, and one that stands out is: support system. Good students have supportive families, friends, teachers, tutors, and overall they live in environment which provides support, encourages studying and good performance in the school, which includes providing alternative ways of acquiring knowledge.

No one wants to be a bad student. Students have bad grades because they don't understand the topic. In this paper I want to focus on students who are successful in their education, and how education is evolving to accommodate needs of making bad students good/better, and good students raise to level of "top performers".

III. CURRENT EDUCATIONAL CHOICES

Goal of education is to produce knowledgeable individuals who are ready for the path waiting ahead of them. In traditional education we use grades to distinguish level of success in education, and we are all aware that good grades are not going to provide students with good job, and life in the future. This system overall seems flawed. Students are wondering: why should I study and get a good grade, what will that provide me in the future? No one gets a job because they scored 100% on a math test. People are realizing that education is not only a matter of getting good grades, but to learn relevant knowledge and skills for the future.

For hundreds of years, education was transferring information from one person to another. We listened and/or read it, memorized it, took a test and moved on to another topic. Now education is becoming more flexible, and more individual. Knowledge is not tied to textbooks any more, but it's available on online blogs, sites as Wikipedia, YouTube, iTunes, Amazon, etc. Information is exponentially increasing in volume, and is available as text, images, audio, music,

video, etc. People are acknowledging that gaining knowledge is not something that is tied to the classic educational system, classrooms and lectures, but it's available to anyone, anytime.

Education is becoming more flexible in order to accommodate needs of the current fast pacing culture. We can identify several points which are driving education, and that is individual approach to the student, education that offers knowledge in different forms where students can learn at their own pace, and at a time that is convenient for them. Many schools are combining several ways of delivering knowledge, like: some of courses to be taken in the classrooms, while other to be via distance education.

There are several projects that showed that students in smaller class sizes (e.g. 13 to 17) performed better than students in "regular" class size (e.g. 22 to 25) [1]. The smaller the class size, the better is performance of students in the group. Many acknowledge that working with smaller groups of students is allowing teacher to know his students better, and to spend more individual time with each of them. This also provides opportunity for students to have more time with teachers, and gain more information which leads to more knowledge and better grades. Obstacle to implementing this in a public system is increased cost of building additional classrooms, hiring more teachers, and training teachers to work with smaller groups of students. In private schools the picture is different. There are private schools who have small class sizes with 10 to 15 students, and focus is on education of each student, instead of whole classroom [2]. Attending these private schools is reserved to students who can afford the tuition which comes with all benefits that these schools are offering.

Distance education is becoming more popular as an individual and affordable way of education. Lectures are delivered online in forms of webcasts, live meetings, or recorded on media such as DVDs. Students can attend classes in person, or from the comfort of their home, at a time that is convenient for them. Students have option to stop/pause the lecture when needed, and to rewind and listen/watch to some specific part that they want to see again. Teachers are providing guidance via live meetings, instant messaging, phone, skype, email, etc. Information related to courses can be found online, e.g. on web sites created for the course. Besides lectures, students can gain information via educational software prepared by teacher and school. Students can cooperate through online media, and they create email groups, and facebook pages where they share their observations and experiences. Tests and quizzes can be taken online and/or in libraries where proctors provide services of watching over students at examinations, and after exam is complete they mail exam papers to the school for grading.

Distance education offers opportunity to students to be more actively involved, since they need to learn and to proactively do research on their own, instead of in traditional environment strictly guided by teachers.

Another way of education which is gaining in popularity is homeschooling. Homeschooling is legal in many countries, however there is still large number of countries who don't acknowledge any other form of education outside of public education system as a valid one [3]. Homeschooled students don't attend any public or private accredited school; instead they learn mostly at home and usually parents are the ones who are making sure that students are accomplishing their tasks in a timely manner.

United States is one of countries where homeschooling is legal form of education, and there are many resources available for families who decide to homeschool their children in form of curriculums, text books, online forums, groups, etc. From 2007-2008, approximately 2 million children were homeschooled [4] in US. Homeschooled students are gaining school-related information from their parents, hired tutors, distance education, text books, online resources, experiments, road-trips, television, group activities, etc.

Families who decide to homeschool their children usually do that for one or more reasons, but most common are:

1. School environment – parents are worried about safety, drugs, social pressure, bad influences, etc.
2. Religious or moral – some parents want to have education of their children more focused on nurturing religious or moral values.
3. Academics – parents are dissatisfied with the level of academic instructions provided in schools, and with educational system overall.
4. Health related issues – various health conditions might impact ability of student to perform in traditional educational system; and schools are not accommodating their needs.

In US there was a study released in 1997 about homeschooled students, and statistics showed that

on average, homeschooled students outperformed their counterparts in the public schools by 30 to 37% in all subjects [5]. What this and many other studies are showing is success of flexible education focused on individual vs. non-flexible education focused on group/classroom.

Families that homeschool their kids report that it takes them 2-3 hours on average to go over course materials which students in public systems take 5-6 hours to complete. Based on these numbers we see that focus on delivering information to an individual student is producing results faster than in environment where information is delivered to a group.

Increased number of families interested in homeschooling is one of factors impacting the fact that there is a significant increase in online learning resources which offer online courses where students can get information, contact teachers, take tests/quizzes and get feedback on their performance. These resources are not limited to only homeschooled students; they are available to any student, even the ones who attend public schools as supplemental source of information. These courses are gaining in popularity, since they provide several benefits, and some of them are that they are available 24/7, 365 days per year, so students can take them anytime that is convenient for them.

IV. ROLE OF TECHERS IN THE FUTURE

Internet provides us with large amount of information, and with all this information available, how will the role of teachers change? Teachers are becoming guides, coaches, and tutors. Their focus will be to help students research, and learn on their own, instead of being source of information itself [6].

Information is available for everyone, including teachers. There are many online resources for teachers who are interested in learning more about the topic they are teaching, and about alternate ways to deliver information and engage students. Teachers will need to improve their skills and to be more creative during lectures in order to engage students and to help them develop the skills needed to think critically about the information they are consuming through electronic media.

Teachers will also be organizing activities like field trips, or study camps where students can gain more in-depth knowledge about the topic, such as via performing various experiments in an environment that was designed and made safe by the teacher.

V. CONCLUSION

Learning opportunities are increasing, and providing students with new choices when they think of their education.

With increased number of educational choices, education as we know it is forced to evolve, to be more flexible and to offer optimal conditions for each student to be successful.

Teachers are going to adapt to changes by taking over new roles, and be creative when delivering knowledge to students. Simple delivering information to passive students is not sufficient for today's needs; teachers need to accept that students are becoming active participants in their education, and that role of a teacher is not only to deliver knowledge, but to enable students to learn how to learn, so that they can continue that process even after their course completed.

Today's environment demands that people learn, and improve through life if they want to be successful. Knowledge gained in school 5 years ago can be obsolete, and students need to continue gaining knowledge even after phase of their school life is completed, and they join the work force.

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SEVEN STREAMS IN ENCOURAGING GROWTH OF STUDENTS' PERSONALITY POTENTIALS - SAPTADHARA INITIATIVE

N. Chotaliya
H. & H.B. Kotak Institute of Science, Rajkot, Gujarat, India
narendra_chotaliya@yahoo.com

Abstract – Activities within celebrating Golden Jubilee year in Gujarat include Saptadhara initiative in colleges of the state and different government and non-government departments, organizations and people. Government introduced different bands of Saptadhara initiative with various activities for all round development of college students with long-term vision. In this paper Saptadhara initiative activities are described.

I. INTRODUCTION

The aim of education - in the fullest and deepest sense of the word - is in keeping with the nature of the human personality or 'human nature'. Human nature is defined in terms of the cultivation and development of perceptive intelligence based on experience i.e. 'creative intelligence'. Creative intelligence or 'intuition' combines reason of understanding with wisdom of compassion. It depends on human 'awakening' or 'enlightenment'. Aim of education is to cultivate creative intelligence required for adaptation to changes in the social environment i.e. 'adaptability'.

Saptadhara initiative's mission is to uplift the life of the students through activities at college level, i.e. the future citizens of Gujarat. It tries to reveal the hidden potential of the students and develop their external personalities. Every human being gets birth with some special ability & potential.

II. GOLDEN GUJARAT CELEBRATION

One of the Indian State Gujarat is celebrating Golden Gujarat Celebration [1] as a grand festival that celebrates its 50th years since the establishment of the state.

It is not just in business and entrepreneurship that Indian State Gujarat has led the way. The land also gave birth to Mahatma Gandhi, apostle of non-violence, who initiated a new lineage to the philosophy of social reform and political struggles world over through his weapon of “Non Violence”. The land also gave birth to leaders like Sardar Patel, Shyamji Kishan Verma, Morarji Desai, Dr. Vikram Sarabhai, Shri Tribhovandas, Dadabhai Naoroji, Dhirubhai Ambani, Poet Narmad, Sarla Tai, Javerchand Meghani and Thakkarbapa to name a few.

Within celebrating Golden Jubilee, Chief Minister sent message: “In this grand festival of Golden Jubilee of Gujarat, I am experiencing that the state is being depicted in the bright Rainbow colours. The atmosphere is filled with fervor and zeal.” Hon’ble Chief Minister Shri Narendra Modi said [2]: " pledges of 55 million Gujaratis may be howsoever small. Come and join in this movement, take a pledge. Every pledge and every contribution counts. It counts for the vision of Golden Gujarat that all of us dream of."

There are more than 40 prominent event celebrations within celebrating Golden Gujarat with many organizing commitee members from state administration [3]. It was effectively celebrated in all the educational institutes of Gujarat. One of initiatives within celebration is Saptadhara initiative [4].

III. SAPTADHARA INITIATIVE

Saptadhara is the word made of two words: Sapta & Dhara. Here Sapta means Seven (7). And Dhara means stream, the stream of energy/potential developed through the different activities done by students. It means there is a goal to develop hidden potential in student through concern activities. Here we have used the word BAND for DHARA. The verb BAND has 2 senses:

1. Bind or tie together, as with a band and
2. Attach a ring to the foot of, in order to identify

Principal aim of the Saptadhara is “to make maximum students" participate in co-curricular activities.

A. Vision

The 21st century is indeed an era of Knowledge.. The world has almost become a ‘Global Village’. Global image of Gujarat follows our practices in science, technology, research, education, trade and commerce, proper administration and our traditions. In the light of this scenario that the Higher Education of State emphasizes new policies and action plans to infuse and instill within the youth of Gujarat the spirit of global competition and to encourage them to display their talents to meet challenges of the newer changing order of the world.

B. Mission

Swarnim Gujarat Mission for Excellence coincides with Gujarat celebrating its 50th years since the establishment of the state. The Government plans to launch Swarnim Gujarat Mission for Excellence to

celebrate this milestone. By 2010, the State proposes to induce renewed spirit and to introduce newer action plans encompassing all walks of life for the betterment of the society by. Under the auspices of Mission for Excellence, the colleges and universities across Gujarat will have to focus various areas of education, art and knowledge for the manifold progress of the youth.

These areas of focus are known as Band / Cluster/ Spectrum/ Continuum/ Symphony of Activities:

a. Knowledge Band
b. Creative Expression Band
c. Fine Arts Band
d. Theatre Band
e. Music and Dance Band
f. Yoga and Sports Band
g. Community/Social Service Band.

IV. SAPTADHARA BANDS

A. Knowledge Band

Colleges have to see to it that students take part in the process of acquiring knowledge as active learners. To lead an accomplished life, every one of us should find answers to the following questions. Young students need to be part of this process of inquisition to make their life worthy of higher goals. The colleges should celebrate Swami Vivekanand Jayanti on the 12th January as the 'Yuva Jayanti and Gyan Jayanti'. On this day, teachers and students will share their knowledge and experience of various spheres of learning. Colleges can also organize 'Gyanotsav: Knowledge Forum' wherein students can participate in debate, elocution and essay competitions.

B. Creative Expression Band

Under this cluster, skills for elocution, debate, creative writing and translation have to be inculcated into the students. Elocution or debate is not merely a matter of fluency or oratory. It actually means the pursuit of truth and is practiced to express truth. The search for truth yields qualities of patience, courage and strength. Resultant effect is the real skill of elocution or debate.

C. Fine Arts Band

This cluster aims at inspiring students to explore their faculty of imagination in the pursuit of absolute beauty through colors and shapes. Under this cluster, colleges will conduct activities in Fine Arts painting in particular. At an advanced level, we can also establish productive and constructive rapport between Fine Arts and industry to promote traditional fine arts as small-scale industry. The artists will hugely be benefited out of such tie-ups.

D. Theatre Band

Theatrical activities to be organized under this cluster will expose the students to the intricacies of the theatre as a form of art and ultimately lead them to the path of knowledge of inner-consciousness. The scripts for enactment will be based on Sanskrit plays, standard translations of great plays from other languages of the world and scripts that heighten the level of consciousness of the students.

E. Music and Dance Band

Under this cluster, it is essential to include fundamental values and practices of Music and Poetry through which one can attain the Knowledge of Soul. However, the modern youth of India need to know the origin, history and development of it. The main objective of this cluster would be that of making students understand the innate and deeper meaning of music and enabling them to enjoy the spirit and sense of music from the depth of heart. Colleges can arrange musical events for students so that they can develop their skill.

F. Yoga and Sports Band

Yoga is the best medium to experience the characteristics of the Sthitapragya or the one who has steadfast intellect as expressed in Indian culture. This cluster aims at imparting upon the students true knowledge of physical education as it is distinctly related with the mental and spiritual processes. The prayer, too, has high significance for our inner development.

G. Community/Social Service Band

Having its majority of people living in villages, it is necessary for a country like India to make her students aware of the realities of rural India. Rural development is the right parameter of our progress. Eradication of rural problems has been our priority. We have to aim at maximizing students' participation in activities under this cluster. Following activities/efforts can be taken up:

1) Students should have firsthand experience of the life in villages.
2) They should visit the villages with constructive messages.
3) They will carry out survey on geographic, educational, economic and social aspects of people in rural India.
4) Students should be educated on the developmental work/plan for rural welfare with the help of machineries for rural welfare.

V. SAPTADHARA AT COLLEGE LEVEL

A. Structure

Every institution has to form committees for each of the above activities. Following programmes and activities have to be carried out in accordance with the abovementioned clusters:

1) Every student of the college will have to be a part of any one of the seven clusters.
2) Every student, if so desires, can take part in more than one activity.
3) The college will form steering committees for each of the seven clusters under the guidance of the principal. Each committee will consist of

one teacher and two students- one boy and one girl as its members.

4) Every student will have to fill up the Admission Form for his/her participation under above cluster/s. After due acceptance of the same by the teacher concerned can be the student a part of a particular cluster/s.
5) Every teacher will also be a part of any one of the above clusters as per his/her own interest/expertise in the respective fields. Two students will invariably be included in each of the committees as student representatives. The principal will keep interest/expertise of teachers as well as students while selecting them under above clusters.
6) Teachers can be part of more than one cluster if they have interest/expertise in respective clusters.
7) Each cluster will be managed by the respective Steering Committee. However, the college will have an Executive Committee consisting of the principal as the Head of the committee and the in-charge teacher of College NSS Unit and General Secretary of the Student Union of the college as its members.
8) Every college is supposed to introduce a chapter on SPIC MACAY (Society for the Promotion of Indian Classical Music & Culture Amongst Youth). Through this activity, students will have better exposure to the Indian Classical Musis, Dance and its Maestros.
9) Colleges have to submit detailed report on all programmes and activities carried out under the Mission for Excellence to their respective university and the Commissioner of Higher Education. College will also have to include the same report in their Annual Magazine and will have to display the same on their websites for easier documentation of these activities across the State.
10) Colleges are supposed to plan out their Academic Calendar in such a manner that they carry out activities and implement practices under the aforesaid seven clusters.

B. Aim

The ultimate aim of this mission is to make our students enable to experience the joy of aesthetic pleasure and to learn from our great traditions of knowledge by way of taking up activities of Sapta Dhara. We have to create such an ambience that students find it easier to explore the beauty of knowledge and existence through the path of wisdom and various forms of arts.

C. Strategy and method

The main function of the Mission Mode Implementation is TO PLAN, IMPLEMENT, MONITOR AND REGULATE all State Government initiatives in an efficient and effective manner. There are nearly 900 colleges and for smooth functioning of the Saptdhara programme they are divided in to certain categories such as clusters, districts and zones. One cluster consists of five colleges and there are about 180 clusters. A group of 5 clusters constitutes one district and there are about 36 districts. Sapt-Tara activities are carried first at college level and the students, which are selected at this level, participate at cluster level and the same way students selected at cluster level participate at district level.

We hope that such a mission of Saptdhara will ensure that along with higher education, our students will also attain higher goals with multisided development. The intention of Saptdhara is a mass and maximum participation of students and not only competition.

VI. RESULTS AND GOALS

A fifteen week programmed manual for various activities of each dhara has been designed and sent to all colleges of Gujarat state. Each student of the college has to participate at least in one of the dharas. In the academic year 2009-10 a competitive programme was held at college, district, zone and state level successfully. State level activities were held during 27th January to 30th January at Vallabhvidyanagar, Anand, in which nearly 1300 students participated. This will be followed every year.

A. Short Term Goals

The academic year 2010-11 was the second year of the implementation of Saptdhara activities. Last year yielded about 50% success as out of around 900 colleges almost 400 colleges participated in Saptdhara activities. In the current year, Sapthdara activities at the college level and cluster level are already completed.

B. Medium Term Goals

By the end of the month January 2011, activities at district level, zonal level and state level were planned to be completed.

C. Long terms Goal

At present only Granted and Grant - in –Aid colleges are actively participating for Saptdhara activities. The response of self-financed colleges is extremely poor. We will put efforts in the coming year to see that all colleges of the state participate.

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INTERPERSONAL COMMUNICATION - CONDITION FOR SUCCESSFUL TEACHING

K. Cackov*, D. Sivevska**
* Faculty of education, University "Goce Delcev" Stip, Macedonia
** Faculty of education, University "Goce Delcev" Stip, Macedonia
despina@sivevska@ugd.edu.mk, kiril.cackov@ugd.edu.mk

Abstract - Successful education in family and school largely depends on exactly the quality and successful communication is established and exercised by all participants in the teaching process. Communication is the basis for education, the foundation for the successful conduct of the teaching process and all interpersonal relationships. Communication is the basis for all interpersonal relation, so the relations in education, family and school. Conversation between students and teachers, among students and teachers is the foundation for successful teaching. Many problems in the family and the school incurs due to inadequate and failed communication due to false perception of the feelings and inadequate response to them. Therefore the teacher must seek in everyday teaching creates successful communication, able to train students to recognize their own and others' feelings and know how to adequately respond to them.

I. INTRODUCTION

Communication is a fundamental element of life, for understanding between people in a particular social community. The main goal of communication is that it enriches our lives and gives more sense. The same applies to the system of education, where the main goal is not just a meeting of minds but the process of meeting people [1].

Often, communication is defined as a mutual exchange of meaning between people, or exchange ideas and experiences between individuals. Sometimes communication is define as a transfer some effect from one place to another. However, for existing the communication, it is important: 1) to exist relationship, interaction among individuals, which can be people or animals, 2) to at least one individual broadcast signal, and the other to act on them, to receive and accordingly modify their way of conduct [2].

Communication is always interaction. What is the relationship between communication and interaction depends on the determination of both notions. Term interaction is understood as a current relationship between two or more individuals where one affected on the behavior of the other. Therefore, the communication is understood as a relationship between individuals by means of signs. Hence we can say that communication is a kind of interaction, where the signs emitted by one individual comes to reaction with the other entity.

Until recently, interpersonal communication is defined depending on the situation in that place - the number of participants, the physical distance between them, the possibility of feedback, etc. .. According to the new definitions are made attempts term interpersonal communication to get rid of these situational components. Miller and Steinberg (according Readon, 1998) show that these situation definitions treat interpersonal communication in a static way, as events without change and development. According to them, communication becomes interpersonal, through mutual understanding of participants, that interpersonal communication develops parallel to the better mutual understanding of partners. [3]

Pedagogical form of communication, as a special kind of communication, requires consistent adherence to certain pedagogical principles. This means that it should contribute to achieving specific educational goals and develop social competence and other aspects of personality. Also, pedagogical communication should contribute to establishing a balance, wholeness, harmony and intregriranost in personality development among cognitive, affective and conative dimensions of personality, including knowledge, skill and action, between individual and prosocial features and more. Through education activities that take place in school, using appropriate communication may contribute to the development of good socialization. And because children in school

spend a significant part of their lives, can freely say that it has an important role in the process of socialization [3].

The success of purposely directed and organized communication depends on several conditions. It takes the teacher to have a good knowledge of the specifics of the social, psychological, adult, individual development of children, to understand their emotional state at the time of communication. The content of communication becomes pedagogical justified, develops, spiritually enriching children stimulates their interest and stimulate their work. Pedagogical communication completely to fulfill its functions if the child is not in itself a passive object but an active and creative person who has knowledge, takes the position, is gifted with the ability for independent thinking and inner spiritual willingness (Lihachev, 2000, according Ljajich, 2007).

II. INTERPERSONAL COMMUNICATION

The entire educational process add up to communication. The teacher communicates with students, students communicate with the teacher and among themselves. Forms of communication, depending on the organ used, divided into verbal, nonverbal and visual communication. Man communicates with the environment in order to better understand and using this understanding to change and adapt to them. The process of learning, essentially present a communication in which man acquires knowledge and develops their skills that could successfully act in the environment in which it lives. The teaching process is often the interaction between teacher and student and among students themselves, and the same time there is interaction between teacher and didactical media, as well as between students and the textbook or other teaching media [1].

For existing of positive and quality communication between teacher and pupils, also it is necessary to exit certain relationships between them. Numerous studies show that samoprifakjanjeto, acceptance by others and by their peers are quite related. Also, the positive behavior of teachers, which means warm emotional relationship, open communication and adequately address the conflicts affecting the better adjustment of children in school (Ladd, 1981). Teacher with his behavior affects the development of motivation among students so that students are provided with conditions to increase their sense of competence and performance in school (Brophy, 1987; Deci et al., 1991; Woolfolk, 1995). Respect for each student in class is the basis for good communication. The teacher should endeavour every student to highlight what is good, what is valuable, and the authentic value out before other students. At the same time it was important that each student experience a sense of personal value. And this is especially important for students who achieve success in school. Well in that case the teacher should endeavor to highlight their success in any other active.

Creating a positive climate in the classroom is one of the most important conditions and criteria for establishing successful communication between teacher and student. It is determined that good relations in the classroom depend on the ability of teachers to establish a good relationship with students, accepting the emotional ability to understand their needs, problems, desires. The good classroom climate and school climate depends on the nature of relationships that exist among students. Until now greater attention is devoted to the impact of teacher relationships with students, and neglecting the influence of culture and opinion of their peers in the overall situation of learning and behavior in the classroom and in school.

Acceptance of the pupils by the teacher is important, but insufficient condition for their adjustment in school. For the pupils is necessary to be accepted by peers. Studies show that self-accepted and acceptance by others, are closely interrelated.

Also, the personal characteristics of the teacher, his personal values and patterns of his general temperament, largely determine the quality of experience that students have acquired in their grade. The teacher as a model of behavior through which students identify the following behavior, words and behavior in everyday work, acts of acceptance of certain forms of pro social behavior. Teachers daily must strive to create situations in which students will have opportunities to help others in performing duties. Most studies confirm the fact that students are more like those teachers who have an understanding of young people and their personal problems, which respect the opinion of students, those teachers who can talk for problems unrelated to teaching, facts that indicate the need for good quality communication between students and teacher.

The good climate in the classroom is the result of conscious effort by teachers and by students.

Anderson and colleagues [8] found that the behavior of teachers tends to reflect the behavior of members of the class. When the teacher's behavior is dominant, that type of behavior can be observed among students. When the teacher's behavior interactively, it works so the behavior of students going in that direction.

Results provided form empirical research shows that there is depending between the climate in the classroom and the characteristics of communication between students and teachers, as well as communication between students. Analysis of nonverbal communication on the classes using Flanders system of categories showed that teachers mainly used indirectly forms of communication create favorable socio-emotional climate, often accept and apply the ideas and proposals of students in teaching, frequently used compliments and encourage emotional response of students, while teachers who apply mostly direct style of behavior have more problems with discipline in the classroom [4].

In order to successfully realize its educational work each teacher is necessary to work on developing their communicative skills. Teachers in their educational work most paid attention to how students understood curriculum content, and less attention is paid to whether students are satisfied or not, whether in teaching communication develop attitudes and whether it comes to enriching the interpersonal relations.

Therefore it is very important that young teachers, since the period of preparation for the teaching profession, to learn the ways of establishing interaction with students, as with all other factors which are important for building a favourable socio-emotional atmosphere in the classroom. It is important to point out that teachers in the course of their education should be able to self-analysis, concerning to become more aware of their "pros and cons" and make appropriate self-assessment of their work. If the teacher has such an important role in developing the personality of the student and his school achievement, then every program for evaluation of school and teaching practice should include evaluation of the teacher [8].

III. CONCLUSION

One of the conditions for successful teaching and creating a positive climate in the school and classroom is the existence of successful pedagogical communication between the main participants in the educational process, between students and teacher and among students. Communication between participants in the teaching process is an important indicator and a factor for the creation and existence of a positive climate in the classroom. The existence of good interpersonal relationships between students and teachers are the most common changes that students require from school, as they would feel comfortable in it and how it attained better results.

Existence of a positive climate in the classroom especially is important to work on improving the communication competence of teachers and future teachers and students to create a climate of confidence where everyone will feel safe and accepted. At the same time such atmosphere will affect the greater involvement of teachers in order to better realize the set educational goals, better academic achievement among students, building a positive self image, positive attitudes toward school, learning and education in general and creating better interpersonal relationships.

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RELATION BETWEEN CONTEMPORARY PHILOSOPHY AND PEDAGOGY

A. Maksić
Martin Buber University, Faculty of Philosophy, Rolduc, Kerkade, Netherlands
filozofesa@hotmail.com

Abstract - In a world of rapid changes and increasing diversity, the need for an active, informed and responsible education is greater than ever. The role of philosophy, as the cradle of all sciences, in creating such an education is almost universally acknowledged. Philosophy of education is a field of both philosophy and education. It is based in the history of philosophy in the famous concepts of Socrates, Plato's, Aristotle's, Kant's, Hegel's philosophy. The aim of this work is to introduce the concept of critical pedagogy which is a teaching approach that is based in the discourse of understanding the way power operates in educational institutions and the constant cultivation of the intellect

I. PAIDEIA AS CULTURAL HERITAGE FROM PHILOSOPHY

Philosophy is the cradle of all sciences especially for pedagogy, psychology and sociology, because they are new, young social sciences and their history is the history of philosophy. In XIX century, razing of positivism and scientism pushed away philosophy and its historical and cultural role for the civilization and the human knowledge. It was metaphysical knowledge that was not useful, not pragmatic enough for technological world of industrialization. The history of philosophy is a place where researchers of education can always look for ideas, normative concepts and where questions about real purpose and the essence of education can be raised. The beginning about thinking of what education can be is in the V c.b.Ch. in anthropological period when Socrates gave the base of ethics in the famous identification of virtue and knowledge. Unlike sophists, Socrates was trying to reach the base principle of true, as "aletheia", not just the victory in the dialogue. The aim of education is to find out how to be more perfect in intellectual and ethical sense. Knowledge is Good, a virtue, and evil is ignorance, and the teacher have to show student how to get better. Education is a part of practical Greek life in which ethics, economic and politics, "bios praktikos", have form of a unity with theoretical and poetic ways of living. Education is not individual matter, but the very important task for community, it is changed with its developing and its inner destiny and material and spiritual progress. Education is not possible without this normative concept of ideal of what people should be, Greek ideal is "kalokagatia", synthesis of esthetics and ethics, senses and reason. Since democracy was important to the Greeks, paideia, combined with ethos, habits, made a man good and made him capable for entering the society. This step was not about learning mechanical tasks, but was about training for liberty of individual possibilities, freedom of thinking and nobility of the beautiful. Education for political life is an obligation of every free citizen in old Greece, politics and ethics are unique form of "fronesis" as rational intellectual skill.

Philosophy of education is the area of "paideia", [1] παιδεία as way for performing education by finding and learning about virtue, "arete" άρετε. This task couldn't be fulfilled without ethics in two different senses; as a branch of philosophy, theoretical knowledge which describes practical behavior and gives normative concept of virtue and good and evil. It was possible only in the synthesis of ethical, economic and political life in the concept of practical science in Aristotle's classification of sciences. Also as a kind of experience that can be reached only by practical role-model example. The teacher is teaching by theoretical presumptions, initiating the critical thinking in pupil's intellect, but also showing him how to express rhetorical skills, how to communicate with the others, how to make difference between good and bad choices. Greek paideia is the idea of perfection, of excellence. Paideia was very close to religion, and teaching about the way to achieve ethical consequences from it. This ideal was guided by the concept of Greek Gods; they were so close to humans, they fall in love with humans, fight, they envy, and they are so imperfect, and in the same time they are Gods. People can even see the mountain of their existence, and the message is clear, you can be more perfect, as you look at the ideal form of mankind, the God's form as an ideal. Religion is a

powerful force for a young being to receive values of one society together with the moral norms. Religion, culture and politics are the natural forms of Greek "habitus", and if we analyze the reasons why Socrates was accused for spoiling the youth, we can see that the main allegation is disrespect of the Greek official Gods. Paideia is the cultural heritage that is continued through the generations, and Greek foundation of civilization is the base for complete European culture in a way that we feel like we are at homeland of our origin. It does not mean that we should consider European culture as the only valid culture, but rather to see all the cultures of the world as connected, influenced, and authentic. The culture is the history of borrow, the history of intercultural communication as a "map of mutual relationships between real and productive traffic of nations, states, groups and identities". [2] As culture is a kind of highest values of one civilization, and education is a form of culture as cultivation of young souls, it is very important to see the differences in goals in various philosophical concepts. Good examples for this cultural need of systematic knowledge and teaching about it in Greek philosophy are Academy and Lyceum. [3] They are considered as first universities because of organized exploration of different areas of natural and social life, and the foundation of the first great library of ancient world. The foundation of Plato's and Aristotle's theory of education is possible only if we consider the meaning of Socratic principles for pedagogy. Socratic ideal pedagogical assumption is that student always knows, the teacher needs to help in giving and releasing understanding of complex world. The aim of dialectics in Socrates philosophy of education is to make the inner change, to improve in ethical and intellectual sense. Reaching the perfection is a cardinal Greek ideal; it is possible by knowledge of the virtue.

II. NEW TEACHING APPROACH IN CRITICAL PEDAGOGY

Critical pedagogy, as a part of philosophy of education, is a teaching approach that removes dominant myths in education, challenge domination presented in the role that teacher have. It is a theory and practice of helping students to break traditional clichés and achieve critical consciousness. Who are the architects of critical pedagogy today? Paulo Freire [4], the most celebrated critical educator [5], Ira Shor [6], with his "student centered" [7] pedagogy, Joe L. Kincheloe [8] with the concept of multicultural education, Peter Mc Laren [9] as the agent of radical hope etc. Those authors are connected with the idea that praxis of education involves engaging in a cycle of theory, social context, and the politics. Education is never a neutral process; it is an instrument for forming obedience, oppression and apology for the present system. There is a lot of Marx ideas in this critical views in a way that critic of global capitalism is getting modern again as the result of the crises. The need for transformation of the world, formulated in "11.Thesis of Feurbach" is asking philosophers not just to interpret the world, but to change it. [10] In his "White Terror and Oppositional Agency" Peter Mc Larren implies that educators need to examine critically the development of pedagogical discourses that demonize Others who are different (through transforming them into absence or deviance). Critical multiculturalism calls serious attention to the dominant meaning systems readily available to students and teachers, most of which are ideologically stitched into the fabric of Western imperialism and patriarchy. It challenges meaning systems that impose attributes on the Other under the direction of sovereign signifiers and tropes. White groups need to examine their own ethnic histories so that they are less likely to judge their own cultural norms as neutral and universal. Critical pedagogy needs to hold a nonreductionist view of the social order that is society needs to be seen as an irreducible indeterminacy. The social field is always open and we must explore its fissures, fault-lines, gaps and sciences. Power relations may not always have a conscious design, but they have unintended consequences which define deep structural aspects of oppression even though every ideological totalization of the social designed to fail. Resistance to such domination means deconstructing the social by means of a reflexive intersubjective consciousness – what Freire terms "conscientization" [11]. It is a beginning of a revolutionary praxis. We also need to create new narratives, new border narratives, in order to reauthor the discourses of oppression in politically subversive ways as well as create sites of possibility and enablement. Critical social theory as a form of multicultural resistance must be wary of locating libratory praxis in the realm of a diachronic as something to be resolved in transforming the educators to agents of radical hope [12].

Curriculum reform requires teachers to interrogate the discursive presuppositions which points at their curriculum practices with respect to

race, gender, class and sexual orientation. Curriculum reform means recognizing that groups are differentially situated in the production of the Western high-status knowledge. Educators would do well to follow hooks in dehegemonizing racist discourses, affirming the voices of oppressed. Students must be encouraged to produce their own oppositional readings of curriculum content. Lastly, curriculum reform must recognize the importance of encouraging spaces for the multiplicity voices in classrooms and creating a dialogical pedagogy in which subjects see others as subjects and not objects. Inherent superiority of the West and whiteness is something that needs to be displaced. The main aim of this strategy in critical philosophical pedagogy is to provide the possibility for students to construct border identities. They are intersubjective spaces of cultural transition – linguistically multivalanced spaces of intercultural dialogue.

Joe L. Kincheloe helps us understand the central dynamics of critical pedagogy: “Advocates of critical pedagogy are aware that every minute of every hour that teacher teaches, they are faced with complex decisions concerning justice, democracy, and competing ethical claims. While they have to make individual determinations of what to do in these particular circumstances, they must concurrently deal with what John Goodlad calls the surrounding institutional morality. A central tenet of critical pedagogy maintains that the classroom, curricular, school structures teachers enter are not neutral sites waiting to be shaped by educational professionals. While such professionals do possess agency, this prerogative is not completely free and independent of decisions made previously by people operating with different values and shaped by the ideologies and cultural assumptions of their historical contexts. These contexts are shaped in the same ways language and knowledge is constructed, as historical power makes particular practices seem natural—as if they could have been constructed in no other way." [13]

Kincheloe lists the basic concerns of critical pedagogy; all education is inherently political and all pedagogy must be aware of this condition. A social and educational vision of justice and equality should ground all education. Issues of race, class, gender, sexuality, religion, and physical ability are all important domains of oppression and critical anti-hegemonic action. The alleviation of oppression and human suffering is a key dimension of educational purpose, and that’s why schools must not humiliate students and blame them for their failures. School should be the place where student can question all positions, including critical pedagogy itself. The professionalism of teachers must be respected and part of the role of any educator involves becoming a scholar and a researcher. The politics of knowledge and issues of epistemology are central to understanding the way power operates in educational institutions to perpetuate privilege and to subjugate the marginalized. Scientific knowledge can often be used as a basis of oppression as it is produced without an appreciation of how dominant power and culture shape it. Education often reflects the interests and needs of new modes of colonialism and empire. Such dynamics must be exposed, understood, and acted upon as part of critical transformative praxis.

III. CONCLUSION

In a world of rapid changes and increasing diversity, the need for an active, informed and responsible education is greater than ever. In recent years, events experienced and changes taking place across the world has challenged both, educational theory and philosophy of education. What is required are new forms of education that prepare learners for actual involvement in society. Forms of education have to be practical and theoretical, rooted in real life issues, affecting learners and their communities, and taught through participation in community life as well as trough the formal curriculum. The need to provide such teaching presents important challenges for the teaching profession. It means learning new forms of knowledge, developing new teaching methods, finding new ways of working and creating new forms of professional relationship – both with colleagues and with learners. It emphasizes teaching based on current affairs over the understanding of historical systems, critical thinking and skills teaching as well as knowledge transmission, cooperative and collaborative working rather than isolated preparation, professional autonomy instead of dependence on central diktat. It requires a change in how we perceive learning, from an ideal of learning as teacher-centered to learning through experience, participation, research and sharing. A didactic, teacher-led, textbook-dominated, knowledge-based orientation has to be replaced by one emphasizing learner involvement, a broader range of teaching methods and a more skills-based approach.

Critical pedagogy requires a list of skills, knowledge and values both for teachers and students. The list of those competences is already built in the tradition of human and social sciences, especially in the history of philosophy. Skills as critical thinking, problem solving, decision-making, intercultural sensitivity are the tools for a new critical pedagogy. It is important that student learn how to make judgments and form arguments, see the problem, articulate it and solve it, not leave it, to negotiate collective decisions, to see issues from other people's point of view with empathy. Teachers, together with students in a Socratic dialogue, should research facts not as taken for granted, but always developed in different points of views, with evaluation in self-critical reflection. Knowledge becomes the process, not the power, as Bacon referred. Information always has to be opened for questioning in order to avoid dogmatic concepts. Critical pedagogy is a philosophical movement that assumes knowledge as a development in which students see the history of ideas as a whole system of constant changes and the impacts of those to social and political life. All those values, openness, respect for cultural and social differences, trust and honesty, commitment to truth, respect for self and others, tolerance, assertiveness, teamwork and co-operation, equality, freedom, justice, are the foundation of philosophical ideas and virtues. These normative ideas of critical pedagogy have also some challenges in the factual world of today. We have to face up to the greatest tensions and, still better, overcome them. While these tensions are not new, they will be of core importance for the problems of the future. The tensions concern the following issues; between global and local, general and individual, long and short term thinking, the traditional and the modern, the spiritual and the material etc. It's important that people become world citizens without losing their local roots. Besides economic globalization, there are some good points of cultural globalization as an opportunity to answer the question of the validity of the dominant Europocentric myth. Culture is becoming increasingly globalized, it is important to keep full potential of tradition and to affirm local, marginalized voices. We are living in a world that is overflowing with short-lived news and emotions which serve in providing a permanent illustration of the current problems. Public pressure is for fast answers and ready-made solutions. This is not good circumstance for education of young people, they begin to think superficially, they don't have time to read anymore, they have no patience to listen, reflect and think. Challenges of new technologies makes young people more different then the young's of the last century. Teachers should adapt to those changes cultivating autonomy of thinking, and at the same time, development of deep, reflected thoughts. Incredible expansion of knowledge and the capacity of people to learn, new areas of knowledge are permanent challenges for self-knowledge, for physical and mental well-being and for developing better understanding of the natural environment. Main objective of education today is to encourage everyone to take action in accordance with their traditions and convictions, to respect pluralism. People today are in a state of confusion and feel torn between globalization, the effects of which they can see and sometimes are forced to bear, and the search for their roots. Critical pedagogy must rise to this challenge more then ever before. Education is at the core of personal development and the community. Its task is to make it possible for each and everyone of us to develop our talents to the full and to reach our creative potential. These examples of educational ideas from the field of history of philosophy make the possibility for a philosophy of education as a new branch of philosophy grounded in our own past, in the history of our civilization. This research tried to present the possibilities and challenges for philosophy of education today with the look back to history of philosophy and famous theories of education and in some aspects of critical pedagogy today. Philosophers of education have the purpose of fostering dialogue and to support exchange of ideas, information and experience which will expose the use of critical and reflective intelligence in the search for solutions to crucial problems in education and culture. Philosophy is always open for free exchange of ideas, not just as a closed system of finished knowledge with unchangeable borders with beginning and with the end, but as an attempt to reach indefinite diversity of human understanding.

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[1] The term *paideia* is well-known through its use in the word encyclopedia which is a combination of the Greek terms *enkyklios*, or "complete system/circle", and *paideia*as the knowledge. The main aim with this etymology is to reach complete knowledge, as it was possible in those times.

[2] Said E."Culture and Imperialism", 13, Belgrade circle 2002.

[3] The similar aim is in paideia to teach about theoretical, practical and poetical human experiences as unique and total.

[4] Paulo Reglus Neves Freire (Recife, Brazil, September 19, 1921-May 2 1970.)

[5] UNESCO 1986 Prize for Education for Peace

[6] Ira Shor (1945.) is a professor at the city University of New York, where he teaches composition and rhetoric. In collaboration with Paulo Friere, he is one of the leading exponents of critical pedagogy

[7] Kierkegaard discovered this orientation insisting that teacher should always understand the student's way of reception. To be a teacher means to see in the way that student thinks, feels and understands.

[8] Joe lyons Kincheloe (December 14, 1959 – December 19, 2008) was a professor and Canada Reasercher Chair at the Faculty of Education, Mc Gill University in montreal, Quebec, Canada. He founded The Paulo and Nita Freire International Project for Critical Pedagogy. Under his leadership this project is creating a global community of reaserchers and cultural workers in critical pedagogy

[9] Peter Mc Laren (1948) is internationally recognized as one of the leading architects of critical pedagogy and known for his writings on critical literacy and Marxist theory. He is currently Professor of Education, Graduate School of Education and Information Studies, University of California, Los Angeles

[10] One of the consequences of multicultural education in critical pedagogy is activism which is defined as emancipator change with the synergistic cultivation of theory and intellect

[11] One of the consequences of multicultural education in critical pedagogy is activism which is defined as emancipator change with the synergistic cultivation of theory and intellect

[12] The concept of radical hope is based in E. Bloch's "Principle of Hope" which calls an utopian to be a true guideline. Without that spirit of utopian the dream about tomorrow wouldn't be universal. It is for the future as the thought which represents the very essence of being. It is the component of the structure of human being which transcendence the presence. To be, means to be by the determination of the future which is open

[13] Kincheloe J.L.:"Critical pedagogy", p.23, second edtition,NY Petar Lang

USING CONJOINT ANALYSIS TO ELICIT STUDENTS' PREFERENCES TOWARDS VARIOUS ASPECTS OF UNIVERSITY TEACHING

M. Kuzmanović, M. Popović and G. Savić
University of Belgrade, Faculty of Organizational Sciences, Belgrade, Serbia
marija.kuzmanovic@fon.bg.ac.rs

Abstract - Students' evaluations of teaching are increasingly used by universities to evaluate teaching performance. Accordingly, the results are used to make judgments about teaching quality, career advancement and the funding of teaching. However, these evaluations are controversial mainly due to fact that students value various aspects of teaching differently. Thus, it is important to elicit students' preferences toward various teaching features and to determine whether students' preferences are homogenous or not. For that purpose in this paper we used multivariate technique known as conjoint analysis. We conducted a survey among the student population at the University of Belgrade, Faculty of Organizational Sciences, and we have presented the main results and conclusions.

I. INTRODUCTION

Students' evaluations of educational effectiveness are widely used to evaluate teaching effectiveness and educational quality in many countries across the world. These evaluations are important as feedback to students, teachers, departments, university administrators, governmental policymakers, and researchers. Hence, it is not surprising that substantive and methodological studies in this area have resulted in a huge research literature. The vast majority of these researches are based on the traditional approach to students' evaluations of teaching, in which students in a specific course taught by a specific teacher evaluate the teaching effectiveness of their teacher, typically near the end of the term [1]. Ratings by all students within the course are aggregated to form course-average ratings that are used as feedback to teachers to improve their effectiveness; the ratings are sometimes also used for personnel decisions by administrators, coursework selection by students, and research [2].

There are many ways of evaluating educational activity and therefore the teaching staff. Berk [3], in a recent review, describes up to 12 varieties of evaluation. Most evaluations are represented by a Likert-format scale consisting of items that have been designed to assess some aspect of teaching. Responses to these items are then averaged to produce a mean teaching performance score. This average is then used as an index of teaching effectiveness and used for formative and/or summative evaluation.

However, some questions arise to be answered. First, whether all the aspects of teaching are equally important for students and whether students' attitudes are homogeneous, i.e. what is the structure of their preferences toward different aspects of teaching? Second, if there is heterogeneity of preferences, in which way and to what extent it influences the overall evaluation of teachers.

To find answer to these questions, in this paper we used conjoint analysis, as an appropriate technique to elicit students' preferences. Conjoint analysis is a multivariate technique used to determine how people value different features that make up an individual product or service. The objective of conjoint analysis is to determine what combination of a limited number of attributes is most influential on respondent choice or decision making.

However, only few studies have used the conjoint analysis within the education, but none of them deal with elicit students' preferences toward various aspects of teaching. Soutar and Turner [4] used conjoint analysis and cluster analysis to suggest a better university education system for students. In their paper, conjoint analysis was used to find out which kind of university was most desirable among students. Hur and Pak [5] attempted to identify the preferred subjects for an after-school computer education course in elementary schools. Sohn and Ju [6] used conjoint analysis to find the way to assign the weights of those four components to effectively recruit the science high school students who have a high quality. Kim et al. [7] used conjoint analysis to

determine the most influential attributes of English Medium Instruction (EMI) classes, and followed this with cluster analysis and regression analysis to develop a customized EMI class system for university students whose mother tongue is not English.

II. METHOD

Conjoint analysis is a multivariate technique that can be used to understand how an individual's preferences are developed. It originated in mathematical psychology [8], and was first introduced in marketing research to evaluate consumer preferences for hypothetical products and services [9]. Green and Krieger [10] pointed out the potential usefulness of Conjoint analysis to deal with some marketing problems, in particular to develop new multi-attribute products with optimal utility levels over other competitive products, to estimate market shares in alternative competitive scenarios, to benefit segmentation, and to design promotion strategies, among other uses.

The technique is based on the assumption that complex decisions are made not based on a single factor or criterion, but on several factors CONsidered JOINTly, hence the term conjoint. Conjoint analysis enables the investigator to better understand the interrelationship of multiple factors as they contribute to preferences.

Conjoint experiments involve individuals being asked to express their preference for various experimentally designed, real or hypothetical alternatives. These hypothetical alternatives are descriptions of potential real-world alternatives in terms of their most relevant quantitative and qualitative features, criteria or attributes; hence, they are multi-attribute alternatives. Typically, the set of relevant attributes is generated by expert opinions, reviewing the research literature and performing pilot research with techniques such as focus groups, factor listings, or repertory grids. In addition to picking out the most relevant attributes, the performance levels for every attribute have to be determined. A majority of studies have used 2-4 levels for every attribute. Two principles are usually kept in mind when choosing the attributes and their performance levels [11]: (1) The attribute levels should describe as closely as possible the real-life situation; (2) It is worthwhile to include factors which are considered to be company's key competencies in gaining a competitive edge.

The performance levels are combined to create different alternatives called profiles. The experimental procedure involves profiles being presented to respondents who are invited to express their preference by rating or ranking these profiles. Preference functions are estimated from these data, using ordinary least squares regression for rating the data, and ordinal techniques when the rankings are obtained. These functions assume preference, or utility, to be a linear-in-parameters function of the attributes that are included in the profiles.

Having collected the information on individual preference, the responses need to be analyzed. To determine the relative importance of different attributes to respondents, the trade-offs that individuals make between these attributes, as well as the overall benefit taking into account these trade-offs, a relationship must be specified between the attributes' utility and the rated responses. The simplest and most commonly used model is the linear additive model. This model assumes that the overall utility derived from any combination of attributes of a given good or service is obtained from the sum of the separate part-worths of the attributes. Thus, respondent *i*'s predicted conjoint utility for profile j can be specified as follows:

$$U_{ij} = \sum_{k=1}^{K} \sum_{l=1}^{L_k} \beta_{ikl} x_{jkl} + \varepsilon_{ij}, \; i = 1,...,I, \;\; j = 1,...,J, \qquad (1)$$

where I is the number of respondents; J is the number of profiles; K is the number of attributes; L_k is the number of levels of attribute k. β_{ikl} is respondent i's utility with respect to level l of attribute k. x_{jkl} is such a (0,1) variable that it equals 1 if profile j has attribute k at level l, otherwise it equals 0. ε_{ij} is a stochastic error term.

The parameters β_{ikl} are estimated by a regression analysis. These beta coefficients, also known as part-worth utilities, can be used to establish a number of things. Firstly, the value of these coefficients indicates the amount of any effect that an attribute has on overall utility of the profiles– the larger the coefficient, the greater the impact. Secondly, part-worths can be used to calculate the relative importance of each attribute, also known as an importance value. These values are calculated by taking the utility range for each attribute separately, and then dividing it by the sum of the utility ranges for all of the attributes. Thus the relative importance that ith respondent $(i = 1,...,I)$ assigned to the attribute k $(k = 1,...,K)$ is given by

$$W_{ik} = \frac{\max\{\beta_{ik1},...,\beta_{ikL_k}\} - \min\{\beta_{ik1},...,\beta_{ikL_k}\}}{\sum_{k=1}^{K}\left(\max\{\beta_{ik1},...,\beta_{ikL_k}\} - \min\{\beta_{ik1},...,\beta_{ikL_k}\}\right)} \qquad (2)$$

These individual level impedances are then averaged to include all of the respondents:

$$W_k = \sum_{i=1}^{I} W_{ik} \Big/ I, \quad k = 1,...,K. \tag{3}$$

Given that part worth utilities are calculated at the individual level, if preference heterogeneity is present, the researcher can find it. Therefore, part-worths can be used for preference-based segmentation. Respondents who place similar value to the various attribute levels will be grouped together into a segment. Segmentation of conjoint part-worths produces true "benefit segments". Widely used method for preference-based segmentation across industries is *k*-means cluster procedure [12], [13].

Additionally, overall utility scores can be estimated for profiles with different combination of attribute levels by inserting the appropriate part-worths into equation 1. These utility scores can be further used as overall mark of certain teacher.

III. EMPIRICAL STUDY

A. Research Objectives

The aforementioned motivation for this research is the student teaching evaluation at the University of Belgrade. Recently, regular survey among students has been conduced twice a year. The students are asked to rate teaching ability for each of their teachers on a Likert scale of 1-5 according to each of eight criteria that are pre-set by university representatives. Responses to these items are then averaged to produce a mean teaching performance score However, the question is whether all criteria are equally important to students. Thus, the aim of this study is to determine the criteria importance from the students' point of view using conjoint analysis.

B. Survey Design

The first stage in the conjoint analysis is the selection of the key attributes (here are denoted as criteria). In this study, the nine criteria are used. Eight of them were pre-set by representatives of University of Belgrade, Serbia, while one criterion (Availability of teacher at the consultation or via e-mail), was not included in regular surveys so far, but we include it as a pilot study showed that it is important for students to some extent. Nine selected criteria and levels assigned to them for the purpose of this study are shown in Table 1.

Once criteria and criteria levels are selected, they must be combined to form different hypothetical teacher profiles. But, the number of possible profiles made as combination of all criteria and their levels gave rise to 1152 (=2×2×3×2×2×2×2×2×3). Therefore, a component of the statistical package SPSS 16.0 (Orthoplan) is used to reduce the possible number of profiles to a manageable level, while still allowing the preferences to be inferred for all of the combinations of criteria levels. Through the use of this design, the 11520 possible profiles were reduced to 16. Two control profiles (holdout tasks) were added to the given design. These 2 profiles were not used by the conjoint procedure for estimating the utilities. Instead, the conjoint procedure calculates correlations between the observed and predicted rank orders for these profiles, as a check of the validity of the utilities.

Conjoint analysis tasks are cognitively challenging, and even the most attentive subjects with well-behaved preferences may report some inconsistent responses. Thus, the challenge is to evaluate whether the consistency failures are serious enough to invalidate the welfare-theoretic validity of a subject's responses. In this study, two approaches to measuring validity were used: (1) internal consistency of preferences, and (2) consistency with theoretical predictions.

Internal consistency was measured in three ways. Firstly, in order to provide measures of the correlation between the observed and estimated preferences, Pearson's R and Kendall's tau statistics were used. Secondly, to check the validity of the utilities for just the holdout profiles, Kendall's tau were used. Thirdly, a test of monotonicity was used which postulates that a subject should prefer more, rather than less, of any given good. For example, it can be assumed, all other things being equal, that respondents prefer methodical and systematic approach to teaching also characterized by a distinct clarity. Theoretical validity was explored by examining the sign of the parameter estimates.

In order to elicit the preferences for the various profiles in this study, a rating approach is employed. The respondents expressed their preferences for 18 particular teacher profiles on a scale of 1 to 9, where 1 stands for absolutely undesirable, and 9 stands for absolutely desirable. The conjoint survey is conducted among the undergraduate students of University of Belgrade, Faculty of Organizational Sciences in November 2010. In total, 154 students completed the questionnaire. However, 11 questionnaires (7 %) were eliminated since those students filled in the questionnaire with a monotonous pattern (e.g. marking all profiles as 9 or 1), or left some items

TABLE I. CRITERIA, CORRESPONDING LEVELS AND AVERAGED PART-WORTH UTILITIES

No	Criteria (Attribute)	Attribute levels	Part-worth utilities	Std. Error
A1	Clear and understandable presentation	Yes	0.836	0.199
		No	-0.836	0.199
A2	Methodical and systematic approach	Yes	0.692	0.199
		No	-0.692	0.199
A3	Tempo of lectures	Moderate	0.446	0.266
		Too fast	-0.123	0.312
		Too slow	-0.324	0.312
A4	Preparedness for a lecture	Good	0.279	0.199
		Poor	-0.279	0.199
A5	The accuracy of arrival to the lecture	On time	0.309	0.199
		Late	-0.309	0.199
A6	Encouraging students to participate in classes	Yes	0.316	0.199
		No	-0.316	0.199
A7	Informing students about their work	Yes	0.335	0.199
		No	-0.335	0.199
A8	Considering students' comments and questions	Yes	0.316	0.199
		No	-0.316	0.199
A9	Availability (at the consultation or via e-mail)	Always available	0.220	0.266
		Mostly available	0.041	0.312
		Mostly unavailable	-0.261	0.312
Constant			4.078	0.221
Correlations between observed and estimated preferences				
		Value	Sig.	
Pearson's R		0.959	0.000	
Kendall's tau		0.912	0.000	
Kendall's tau for Holdouts		1.000	.	

empty, or filled in their personal information form but left other items empty. After this elimination, the number of valid questionnaires was 143 (93 %), giving a total 2288 observations. Of these students, 84 (58.7 %) were females and 59 (41.3 %) were males. Slightly more than half of the participants were students of Information systems and technology Department (50.3%), while the remaining 49.7% were students from the Department of Management. Of all 143 participants, 118 (82.5%) were students who do not pay tuition fees, while only 25 students studied in self-financing mode.

C. Aggregate Level Analysis

To estimate conjoint parameters, the statistical package SPSS 16.0 (conjoint procedure) is used. The parameters are estimated for each respondent in the sample individually (individual preferences), as well as for the total sample (averaged preferences). The averaged part-worth utilities are shown in the Table 1.

The signs of the regression coefficients were in line with the a priori expectations. For example, a negative sign both for too slow and for too fast tempo of lectures indicates that students prefer only moderate tempo. Respondents showed expected

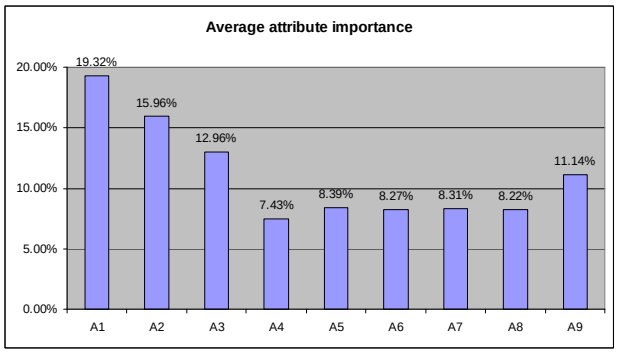

Figure 1. Average criteria importance

preferences for all other criteria, with the best level having the highest utility. These results can be regarded as an indication of the theoretical validity of the questionnaire, i.e. the extent to which the results conform to the a priori expectations.

The goodness of fit statistics for the estimated models is reported in last four rows in the Table 2. A high value of the Pearson coefficient, 0.959, confirms the high level of significance of the obtained results. Similarly, a high value of the Kendall correlation coefficient, 0.912, indicates a high level of correlation between the observed and estimated preferences. The Kendall coefficient for two holdout profiles has a value of 1.000, which is an additional indicator of the high quality of the obtained data.

Conjoint data given in Table 1 indicate different importance of the criteria considered in the study. Fig. 1 is the graph description of the criteria importance calculated using equation (1). It can be notice that the most important criterion is A1 (Clear and understandable presentation), followed by A2 (Methodical and systematic approach), A3 (Tempo of lectures) and A9 (Teacher availability). These four criteria cover almost 60% of the total importance. However, the question is whether the obtained results reflect the student preferences truly.

D. Preference Based Segmentation

A more detailed analysis of part-worth utilities at the individual level revealed heterogeneity in student preferences. Therefore, a cluster analysis was performed to classify respondents into more homogeneous preference groups. These part-worths are then used as input for cluster analysis. This approach has been conducted by various researchers across industries, in order to determine customer segments based on distinct preference profiles [12], [13], [14], [15].

The k-means cluster procedure in SPSS 16.0 was used to perform the segmentation. Based on

TABLE II. SEGMENT LEVEL PART-WORTH UTILITIES

No	Criteria (Attribute)	Attribute levels	Part-worth utilities	
			Segment 1 n=53 (37%)	Segment 2 n=90 (63%)
A1	Clear and understandable presentation	Yes	0.46	1.05
		No	-0.46	-1.05
A2	Methodical and systematic approach	Yes	0.46	0.83
		No	-0.46	-0.83
A3	Tempo of lectures	Moderate	0.32	0.52
		Too fast	-0.26	-0.04
		Too slow	-0.06	-0.48
A4	Preparedness for a lecture	Good	0.14	0.36
		Poor	-0.14	-0.36
A5	The accuracy of arrival to the lecture	On time	0.32	0.30
		Late	-0.32	-0.30
A6	Encouraging students to participate in classes	Yes	0.54	0.18
		No	-0.54	-0.18
A7	Informing students about their work	Yes	0.28	0.37
		No	-0.28	-0.37
A8	Considering students' comments and questions	Yes	0.46	0.23
		No	-0.46	-0.23
A9	Availability (at the consultation or via e-mail)	Always available	0.31	0.17
		Mostly available	-0.19	0.18
		Mostly unavailable	-0.11	-0.35

the sample size, the solutions were searched in two and three clusters. The 3-cluster solution resulted in one segment that was very small in size and could not be statistically reliable ($n < 15$). A 2-cluster solution was chosen due to the size of the segments and statistical significance. An analysis of variance revealed that the segments in the 2-cluster solution differed significantly from each other, with respect to their part-worths generated by the conjoint analysis.

The mean part-worths for each of the levels of the attributes of the two segments are given in Table 2, while the importance scores are shown on Fig. 2.

Characteristics of Segment 1. The first and smaller segment consists of 53 respondents (37%). The most important attribute to them is A6 (Encouraging students to participate in classes) with importance value of 16.88%, followed by three equally important attributes, A1, A2 and A8 (importance value = 14.38%). Least important attribute in this group of student is A4 (Preparedness for a lecture) with importance value of just 4.38%. It can be observed that the members of this segment are those students that focus on communication between the teacher and student and therefore prefer those teachers who devote attention to these aspects.

Characteristics of Segment 2. The second, larger segment consists of 90 respondents (63%). The attribute with the greatest importance in this

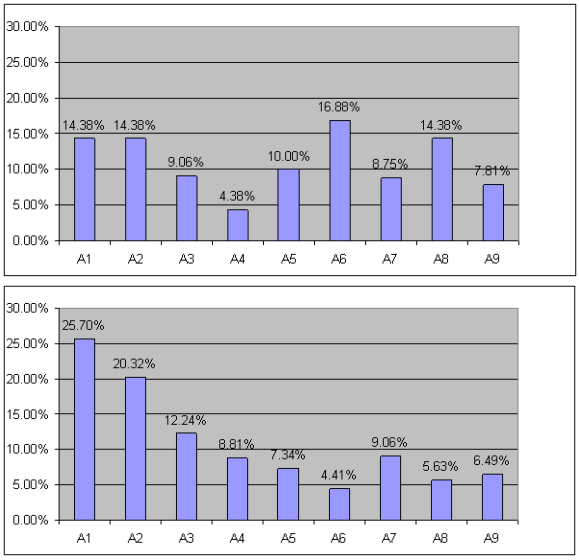

Figure 2. Criteria importance for identified segments.

segment is A1 (Clear and understandable presentation) with importance value of 25.7%, followed by the attribute A2 (Methodical and systematic approach) with an importance value of 20.32%. Other attributes are much less important. It is interesting that the attribute with the highest importance value in the first segment, A6, is by far in last place (importance value = 4.41%) in this (second) segment. It can be further observed that the members of this segment are students that are prefer those teachers who are heavily focused on the methodological and systematic approach in teaching, characterized also by clarity and efficiency.

Particularly interesting are the findings related to segment level part-worth utilities of attributes A3 and A9 (see Fig. 3).

Let us consider first the attribute A3, which occupies a high third place in second segment. Although in both segments students mostly prefer moderate tempo of lecture (the only one with a positive part-worth utility), members of the segment 2 prefer too fast compared to too slow tempo. In the case of segment 1, the situation is reversed, students prefer the slower than faster tempo of lecture.

In the case of attribute A9, members of segment 2 prefer approximately equally the constant availability of teacher (positive part-worth utility), but they are very unsatisfied when teacher is not available (negative part-worth utility). In segment 1 it is vice versa; students are satisfied only if the teacher is always available, while the other two levels reduce their overall preference (negative part-worth utility).

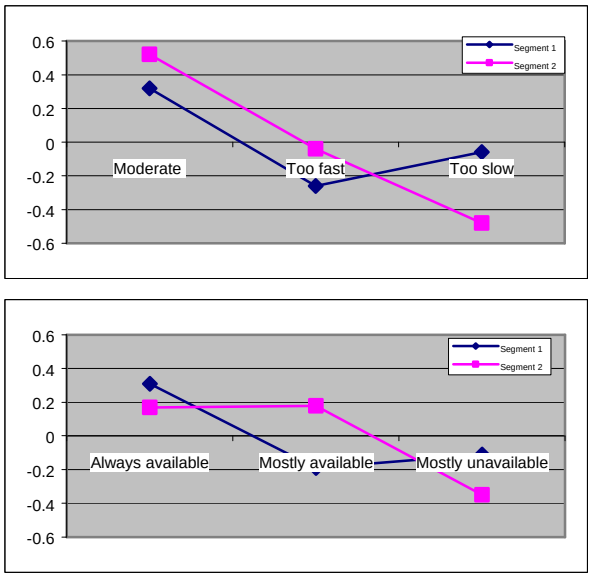

Figure 3. Segment level part-worths for criteria A3 and A9.

IV. CONCLUSION

The paper presents a measurement of student preferences for different aspects of university teaching. For this purpose conjoint analysis is applied. It is a decomposition method that is widely used in practice to determine the structure of preferences. The initial set of attributes in the survey consisted of the aspects defined by the Representatives of University of Belgrade, supplemented with one more criterion: availability of teachers in the period of consultation or through mail. The reason for adding of this criterion is the fact (shown in the preliminary research) it could have a significant impact on the overall preferences of students, and by the time of the research it was not included in the analysis.

Survey results indicate different importance of the criteria considered in the study. The most important criterion at the aggregate level is the one related to the clarity of presentation (A1), followed by the one related to methodical and systematic approach to teaching (A2). Tempo of lectures is also quite important attribute. However, quite interesting information is that attribute "Teacher availability" is in fourth place of importance, the one attribute that was not represented in official evaluations by the University at the time of the survey.

However, detailed analysis showed that the preferences of students to different aspects of teaching are not homogeneous, but it is possible to isolate two groups of students of similar preferences. For the first, lower segment, it could be said those were students who value the relationship between student and teacher a lot. Second, larger segment, prefers by far characteristics of those teachers that are related to his teaching style and clarity, organization and efficiency.

This study points out the need to take into account the preferences of students when applying evaluation and that results should be incorporated into teachers' overall score.

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ICT COMPETENCIES OF STUDENTS

T. Marušić, I. Visković
Faculty of Mathematics and Science Education, University of Mostar, BIH
tonco.marusic@gmail.com, viskovicivana@gmail.com

Abstract - This paper is a review of testing the experiences and attitudes of students of educational science of their ICT competencies and their achievements in the field of ICT in formal academic education. In this paper are compared students' ICT competence of the study group of pedagogy and study group of pre-school education studies at the Faculty of Natural Science and Education at University of Mostar. It is percived that students are well informed and that they frequent use computers and the Internet. The lack of ICT competencies of students in the use of certain computer programs and Internet search are evident. The research results are useful to us as curricular guidelines.

I. INTRODUCTION

The European Council at Lisbon conference in 2000, has set a strategic goal for the European Union: to become the most competent and most dynamic economy in the world based on knowledge and capable of sustainable economic growth. The report "The concrete future objectives of education and training" (Stockholm, 2001.) indicates the three strategic objectives: quality, accessibility and openness of the education system. Work Programme "Education and Training 2010." (Barcelona, 2002.) included the information and communication competence in a list of basic competencies. At the EU level is expected to implement such generic competencies outlined in the national curricula.

Modern educational curricula[1], which are developmental, humanistic and open, as expected learning outcomes introduces core competencies, including informatical and communication competence, ie, digital literacy as a generic competence as a prerequisite for lifelong learning.

The concept of competence based on an integrative approach, the individual features seen as a dynamic combination of knowledge, understanding, attitudes, and affirmative action. The process of teaching and learning that the expected outcome of a competency must be accompanied by appropriate evaluation criteria.

Information literacy is a prerequisite for informatical literacy, which involves the confident and critical use of Informatical Communication Technology (ICT) in professional work, free time and everyday, and communication in general. At the most basic level involves the use of multimedia technology to locate, access, storage, production, presentation and exchange of information and communication and participation in the Internet network. It is associated with critical thinking and application skills in the use of information communication.

The concept of lifelong learning implies different forms of learning using ICT. ICT is being introduced in educational institutions in various forms, and simultaneously allows the networking of educational institutions at all levels - both vertically and horizontally - to exchange information, continuous monitoring, bought students and staff, co-teaching personnel, and employees in these institutions , is included in national and international exchange of experiences, research results, etc. Therefore, learning in the learning society, in the context of ICT requires a holistic interdisciplinary approach.

In the context of globalization, ICT competencies have a special place. Complex and controversial process of building the world as a whole by creating a global institutional structure and global cultural forms, makes the ICT competencies necessary. Globalization as a process of democratic unification requires the written communication to the citizen (responsibility) decides according to available information which he knows how to (de) code.

Digital competence implies having the affirmative attitude, professional knowledge and skills to use ICT and to understanding and (de)coding the information. ICT competencies are necessary in a daily networked world and indispensable in a lifelong professional education. To developed ICT competencies, on individulanoj and social level, it is necessary to create a "learning space" (Learning Spaces) as a supportive environment that enables interactive content and relationships of participants. Learning spaces represent a kind of interactive mosaic that respects the uniqueness of the individual in the digital

networked world, respects their needs and provides an opportunity for continuous learning by using computers.

In a society that learns (and the academic community is applied to that instance) anything can be the source and content of learning, all have the opportunity to learn and apply their knowledge and learning is not confined to formal education. E. Jensen states that "... for employees who deal with knowledge, education refer constantly to improve their knowledge, develop skills and abilities, finding a place for themselves in the global market that is changing, and commitment to lifelong learning. Their ability to learn will be their biggest advantage."[11]

Universities, as a place of formal academic education in making the curriculum as a starting point take the actual situation: past experiences and achievements of students, and as expected outcomes, require quality of students competence. This paper explores the initial state and guidelines for future action.

II. RESEARCH METHODOLOGY

The objective of this study is to determine the experiences, attitudes and achievements of students of pedagogy and preschool education in the field of ICT, Faculty of Mathematics and Science Education - University of Mostar.

This study included 303 randomly selected students: 195 students of pedagogy and 108 preschool students, undergraduate study. Taking into account the likelihood that patients enter the study sample, it has the features: a convenient, deliberate and stratified. Questionnaires were completed anonymously with the assistant who is not ICT courses teacher so students in the statements had a greater sense of personal freedom.

Survey method was used to examine the attitudes and opinions of students on the application of ICT in the study of pedagogy and the importance of ICT competencies for their study commitments and later professional activities. As an instrument a questionnaire of open and closed-type answers was used, and a five-point Likert scale.

Statistical analysis was performed in R (version R-2.10.1 for Windows). All tests (χ_2 – testovi)were conducted at significance level 0.05 (5%).

In this work we look only at data that clearly depict the experiences, attitudes and achievements of students of pedagogy and Preschool Education, Faculty of Natural Sci ence and Education, University of Mostar.

III. RESULTS AND DISCUSSION

A. H1 : Students pre-school pedagogy and use the Internet significantly more than the average population

Asked how much they use the computer and the internet, students have responded in the class "regular" (daily), "sometimes" (per week) and "never" / Table 1. If you group the classes "regular" and "sometimes" in a class of "use", as the number of those students of pedagogy that use computer and Internet, it follows that 87.69% students of pedagogy use the computer and the Internet, while 12.31% of students of pedagogy does not use a computer and the Internet. In the group of students of preschool 100% of them claim they use computers and the Internet. At the level of all questioned students, 279 of them, of a total of 303, use computer and Internet, or 92.21%.

TABLE I.

	Regulary	Sometimes	Never
Pedagogy	115	56	24
Pre-school	97	11	0

At FMSE, Mostar, depending on study year and study group, 34% to 60% of students are from Croatia. In comparison with the available data on Internet use in the population in Bosnia and Herzegovina (54%) and Croatia (66%, N = 1000 people older than 15 years) we see that our faculty, students use computers significantly more than the average population of states in which they reside and study.

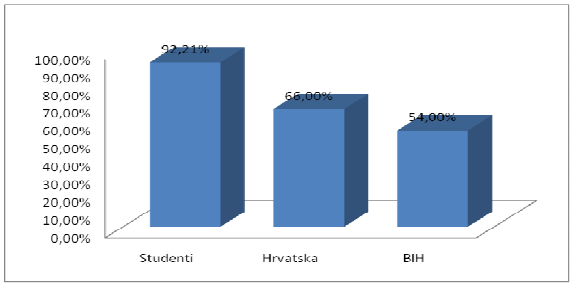


Figure 1. Showing students using the Internet both Croatian citizens and citizens of Bosnia and Herzegovina

and this has proved the hypothesis that the student use the Internet significantly more than the average population and it can be interpreted as formal education and the inclusion of courses in ICT program of study and the thesis about "digital natives" (Prensky). Specifically, in evaluating of young people competence there is the term "digital natives" which is commonly used for the generation born in the post industrial developed technology society.They grow up with digital technology available, although their primary interest is often focused on computer games and communication. Repeated use induces logical thinking and develop digital literacy. At the same time encourages the development of divergent thinking, specific social skills and ways of evaluation. Involvement in the process of formal education 'digital natives' are developing ICT competence is sometimes quicker than the formal system provides. Complete information about the use of ICT and youth in our areas are not avilable.

International Studies (Pisa, 2009.) indicate that the educational result are affected by many factors, particulary environments in which students (and students) live and it is undeniable that economic status affects the availability of ICTA and therefore the results of these studies.

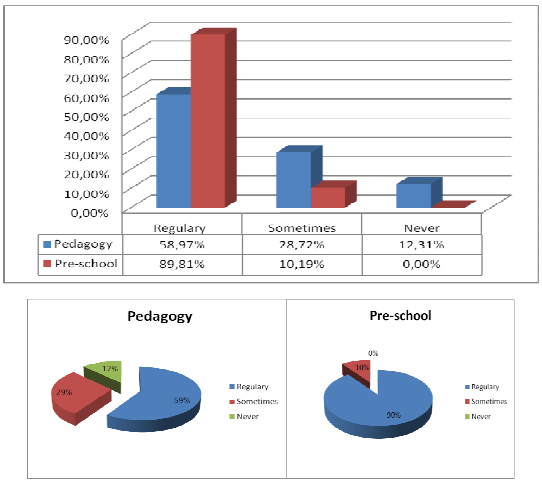


Figure 2. Using computers and the Internet

Differences in frequency of use of computers and the Internet between students of different departments can be, probably, clarified according to the place they live (for students who does not live in Mostar). It is worrying that 12% of pedagogy students claimed that they do not use any computer or internet.

B. H2 There is no statistically significant difference among the students of the pedagogy and preschool education in the evaluation of the importance of ICT competencies for (future) professional work

$\chi_2 - testom$ we tested for a statistically significant difference in the evaluation of ICT competencies for (future) professional work among students and pre-school pedagogy and found that there are significant differences, and we rejected the initial hypothesis. The reasons for such significant differences in the attitudes of students are not explored, but it could be a result of differently focused study obligations.

TABLE II. Attitudes of students - THE IMPORTANCE OF ICT COMPETENCIES FOR A PROFESSIONAL WORK

$\chi_2 - test$	**Very important**	**Important**	**Unimportant**	**Total**
Pedagogy	138	45	12	195
Pre-school	41	67	0	108
Total	179	112	12	303

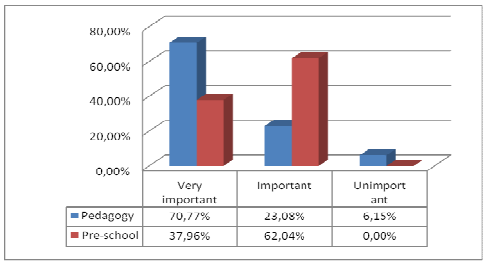


Figure 3. Differences in the attitudes of students of pedagogy and preschool education in the importance of ICT competence judgments

C. Purpose of Internet use of students of pedagogy and preschool education (ranked responses)

Students are offered the rank the order of using the Internet.

TABLE III. PURPOSE OF THE USE OF INTERNET

	PG	***PS***		
1. Information related studies (information)	163	106	83,59%	98,15%
2. Personal communication	122	106	62,56%	98,15%
3. Search the Internet to personal insterests	117	74	60,00%	68,52%
4. Internet search related study obligations	105	90	53,85%	83,33%
5. Communication with teaching staff	39	106	20,00%	98,15%
	195	108		

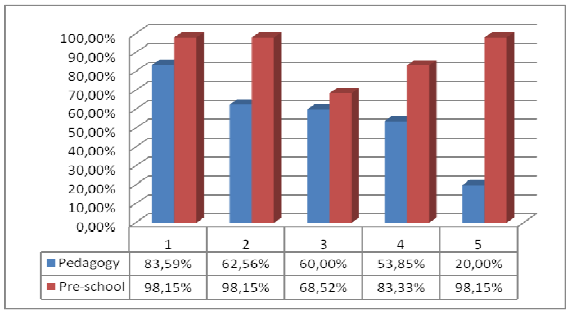


Figure 4. The purpose of the usage of ICTA

Comparing the purposes of using the Internet, it is clear that more students of preschool education, as many as 98% use the Internet to communicate with staff. We did not investigate the reasons so we can not say whether the teachers physically (not) available at the faculty or the Internet. Comparing data of a personal communication via the Internet, we can conclude that preschool education are more disposed to this form of communication. At the same time pre-school students are more inclined to search the Internet to do the academic obligations, but students of pedagogy. Unfortunately, the flies showed that the standard search engines are synonym for scientific resources for students.

D. Using the Internet Services / Browser students of pedagogy and preschool

TABLE IV. THE MOST COMMONLY USED INTERNET SERVICES / SEARCH ENGINE

	Students answers	PG	PO
.	Standard searching engine (Google,yahoo)	171	108
.	Specialized serching engine (Scholar)	2	0
.	Information (librarist)	2	9

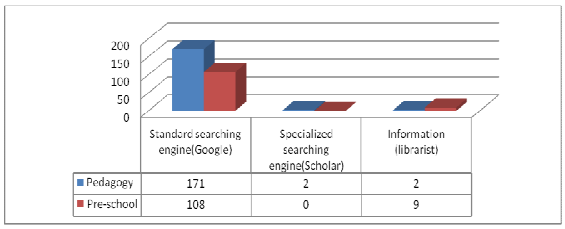


Figure 5. The most commonly used Internet services / search engine

As might be expected, students are usually used to conventional search engines (98.97%) while only 1.53% of the respondents used a specialized search engines and search technical information, mainly on higher study years. The problem which was noticed on most courses is that students use Google and Yahoo as a synonym for (scientific) and search, the testimony of Professor, uncritically accept information available.

At the same time this information was used as a guideline in developing curricula. Using specialized search engines for information and access to scientific resources is becoming so interdisciplinary themes, and an example of how ICT competencies are reflected in education.

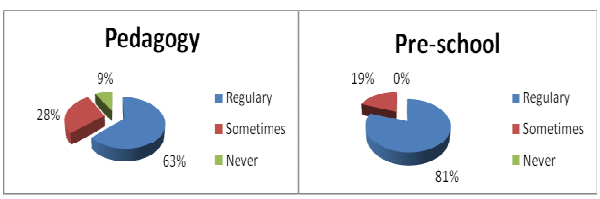
E. H3 There is no statistically significant difference between the pedagogy and preschool education students in the frequency of use of computer programs.

TABLE V. COMPUTER PROGRAMS USAGE FOR STUDING

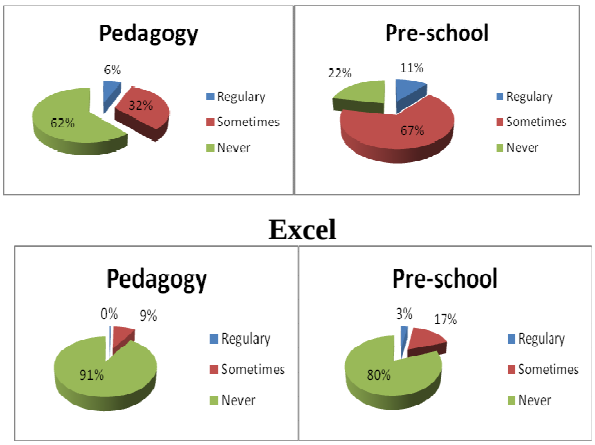
Answers of preschool students (N=108)	**Regulary**	**Sometimes**	**Never**
Word	87	21	0
Power Point	12	72	24
Excel	3	18	87
Answers of pedagogy students (N=195)	**Regulary**	**Sometimes**	**Never**
Word	124	54	17
Power Point	12	63	120
Excel	1	17	177

For each of these computer programs are individually $\chi_2 - testom$ tested for a statistically significant difference in frequency of use of a computer program observed among students of pedagogy and preschool education. In all three cases there was a statistically significant difference, and we must reject the initial hypothesis.

Word



Power Point



Graph 6. Showing the use of computer programs for study groups

When it comes to the use of computer programs, students, participants of the study using mainly Word and Power Point, and at least Excel, and it is possible coused by requirements of studies and ICT competencies of students.

F. H4 : There are significant differences in the evaluation of the ICT competencies of students in pedagogy and preschool studentsin self evaluating and evaluating teachers

H5 : There is no statistically significant differences ICT competencies of pedagogy students and pre-school students

Students of pedagogy and preschool education are encouraged to self evaluation of their ICT competence and the statements compared with the evaluation of the teaching staff of the ICT competencies of students and their achievements (grades) in the exams. Experience of teaching staff indicates that students often very subjectively assess their competence and we were testing (formal exams) actual knowledge and skills and we got worse results. This information for further used for constructing of curriculum and programs development. In testing students' opinions (self evaluation) test in the fall at grade "excellent".

Neither student of any study group did not evaluate their competence as "inadequate" and even those students who do not use the internet. The survey data were processed according to results of their the exams.

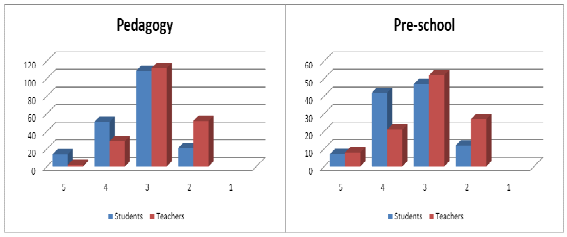
For both study groups, we conducted a test at a significance level 0.05 (5%) and established the existence of differences. In both cases there was a statistically significant difference in the opinion of students on personal ICT competencies and the actual evaluation of their competence (exams).

TABLE VI. EVALUATION AND SELF-EVALUATION OF ICT COMPETENCE OF STUDENTS

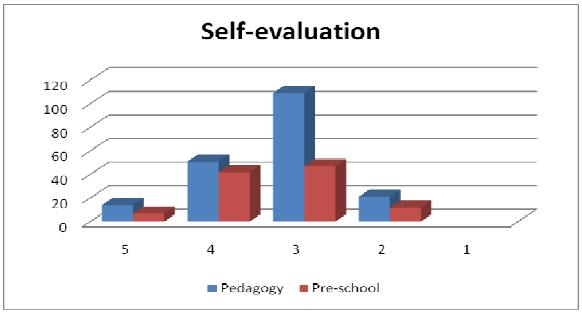
Pedagogy	**5**	**4**	**3**	**2**	**1**	**Total**
Students	14	51	109	21	0	195
Teachers	2	29	112	52	0	195
Total	16	80	221	73	0	390
PS	**5**	**4**	**3**	**2**	**1**	**Total**
Students	7	42	47	12	0	108
Teachers	8	21	52	27	0	108
Total	15	63	99	39	0	216

We also tested a statistically significant difference in the opinion of students of pedagogy and students of preschool education. We can not reject the hypothesis that there was no statistically significant difference between their opinions (they are equally valued). The results show however that the actual achievements differ. Testing is not a statistically significant difference of the results of students of pedagogy and students of preschool education, there are statistics differences and reject the initial hypothesis that there is no difference.

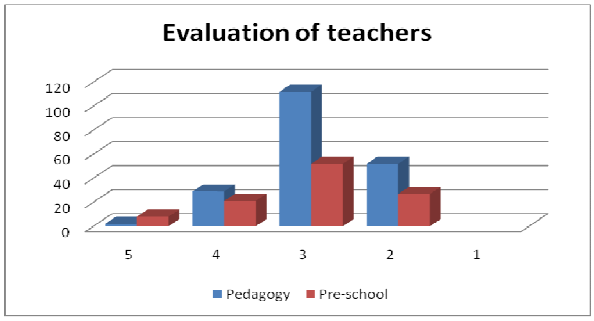
Average self-evaluation of students of pedagogy is 3:30 and the actual average score was 2.90. Average self-evaluation of pre-school students' is 3:41 and the actual average was 3.09. The important differences in grades "very good" and "sufficient". Comparing the evaluation it is obvious that students evaluate their performance more positively than teachers.



Graph 7. Showing self-evaluation and evaluation of ICT competencies of students



Graph 8. Self-evaluation of students' personal ICT competencies



Graph 9. Evaluation of teachers ICT competencies of students (test results)

IV. CONCLUSION

ICT competencies are an important part of the educational process as well as the expected outcome of the formal, non-formal and informal education. Through the ongoing process of (self) evaluation and interaction of students and teachers ICT competencies are developed and students, as subjects of the processes involved in sub-constructing program. We can conclude:

- ICT competencies as core competencies must be integrated as an interdisciplinary competencies field
- ICT competencies should be expected learning outcomes
- Students are active subjects of their own knowledge, and learning becomes aligned with its capabilities
- aims, objectives and strategies for ICT in higher education should be complementary with the general guidelines and trends of the educational curriculum of each country individually taking into account the guidelines of the EU
- The process of introducing ICT in the (higher) education to evaluate and revise a year, and strategy and associated implementation programs to revise and modify the authentic level of individual institutions (respecting specificity)
- teaching staff in the process of education must necessarily develop ICT competencies (entry into the EU, all civil servants should have passed a basic office package)

The university curriculum development it is necessary to consider the specific cultural community, material environment and socio-economic student status and ICT competence of teachers. The curriculum changes are already reflected in the syllabus of the course as well as particular forms of learning and communication methods of all factors of the educational process. Research conducted at the Faculty of Natural Sciences, Mathematics and Science Education at the University of Mostar (Mostar, 2009/10. And 2010/11:) indicates the awareness of students of Educational Sciences of the possible applications of ICT. We think it is necessary to increase the representation of ICT on study programs and to provide conditions that will enable students to develop ICT skills.

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HIGHER EDUCATION OF TECHNICAL ENGINEERS IN LINE WITH THE BOLOGNA PROCESS

E. Desnica, D. Letić, Lj. Radovanović and J. Pekez
University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
desnica@tfzr.uns.ac.rs

Abstract - The Bologna Declaration is a document that the European countries use to accord higher education programs of study in order to successfully compete and compare with other regions and to prevent lagging behind in research and development. The paper presents a review of contemporary European experience in high education area as guidelines for redesigning innovations in programs of study of future technical engineers regarding Bologna Process and High Education Law in Serbia.

I. INTRODUCTION

On 25 May 1998, the Ministers in charge of higher education in France, Germany, Italy and the UK signed the Sorbonne declaration on harmonization of the architecture of the European higher education system, a document preceding the Bologna declaration.

The Bologna process was launched after 29 Education Ministers signed a Declaration in Bologna in June 1999 to reform the structures of their higher education systems. Each signatory country committed itself to reform its own higher education system in order to create overall convergence at European level.

The process originates from the recognition that in spite of their valuable differences, European higher education systems are facing common internal and external challenges related to the growth and diversification of higher education, the employability of graduates, the shortage of skills in key areas or the expansion of private and transnational education.

The Bologna process has grown from 29 countries in 1999 to over 50 countries today. Current members include all EU member states (Belgium includes Flanders & French Community), Albania, Andorra, Armenia, Azerbaijan, Bosnia & Herzegovina, Croatia, Georgia, Holy See, Iceland, Liechtenstein, Moldova, Montenegro, Norway, FYROM, Russia, Serbia, Switzerland, Turkey, Ukraine.

The process is steered by bi-annual Bologna ministerial conferences, which take stock of the progress done since 1999 and set priorities for the following years. [1,2,3]

II. THE EUROPEAN HIGHER EDUCATION AREA (EHEA) – BOLOGNA DECLARATION

A. Joint declaration of the European Ministers of Education (The Bologna Declaration of 19 June 1999) [4,5]

A Europe of Knowledge is now widely recognized as an irreplaceable factor for social and human growth and as an indispensable component to consolidate and enrich the European citizenship, capable of giving its citizens the necessary competences to face the challenges of the new millennium, together with an awareness of shared values and belonging to a common social and cultural space.

The Sorbonne declaration of 25th of May 1998, which was underpinned by these considerations, stressed the Universities' central role in developing European cultural dimensions. It emphasized the creation of the European area of higher education as a key way to promote citizens' mobility and employability and the European Higher Education Area Continent's overall development.

Several European countries have accepted the invitation to commit themselves to achieving the objectives set out in the declaration, by signing it or expressing their agreement in principle. The direction taken by several higher education reforms launched in the meantime in Europe has proved many Governments' determination to act.

European higher education institutions, for their part, have accepted the challenge and taken up a main role in constructing the European area of higher education, also in the wake of the fundamental principles laid down in the Bologna

Magna Charta Universitatum of 1988. This is of the highest importance, given that Universities' independence and autonomy ensure that higher education and research systems continuously adapt to changing needs, society's demands and advances in scientific knowledge.

While affirming our support to the general principles laid down in the Sorbonne declaration, we engage in co-ordinating our policies to reach in the short term, and in any case within the first decade of the third millennium, the following objectives, which we consider to be of primary relevance in order to establish the European area of higher education and to promote the European system of higher education world-wide:

- Adoption of a system of **easily readable and comparable degrees**, also through the implementation of the Diploma Supplement, in order to promote European citizens employability and the international competitiveness of the European higher education system;
- Adoption of a system essentially based on **two main cycles**, undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years. The degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification. The second cycle should lead to the master and/or doctorate degree as in many European countries;
- Establishment of a **system of credits** - such as in the ECTS system – as a proper means of promoting the most widespread student mobility. Credits could also be acquired in non-higher education contexts, including lifelong learning, provided they are recognized by receiving Universities concerned;
- Promotion of **mobility** by overcoming obstacles to the effective exercise of free movement with particular attention to: for students, access to study and training opportunities and to related services; for teachers, researchers and administrative staff, recognition and valorization of periods spent in a European context researching, teaching and training, without prejudicing their statutory rights;
- Promotion of **European co-operation in quality assurance** with a view to developing comparable criteria and methodologies;
- Promotion of the **necessary European dimensions in higher education**, particularly with regards to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research.

We hereby undertake to attain these objectives - within the framework of our institutional competences and taking full respect of the diversity of cultures, languages, national education systems and of University autonomy – to consolidate the European area of higher education. To that end, we will pursue the ways of intergovernmental co-operation, together with those of non-governmental European organizations with competence on higher education. We expect Universities again to respond promptly and positively and to contribute actively to the success of our endeavor.

III. HIGHER EDUCATION SYSTEM IN SERBIA

From the year 2000 higher education institutions in Serbia became involved in the European trends of reforms and harmonization in the field of higher education known as Bologna process. Considerable reformatory activities have been launched since Serbia signed Bologna declaration in September 2003. The Law on Higher Education (LHE, 2005) provides a legal basis for full implementation of the Bologna Declaration and the Lisbon Convention. [6]

A. The three-cycle structure

The implementation of the Bologna Process was actually put formally in place from the academic year 2006/2007 on. The three-cycle structure prescribed by LHE is established in all university higher education institutions. The percentage of the total number of all students below doctoral level enrolled in two cycle degree system in academic year 2008/2009 is 89%. The second cycle of academic qualifications gives a direct access to the third cycle. The third-cycle programmes (PhD) started in 2006/2007 in many university institutions. In order to gain entry to the doctoral level programmes, students must have accumulated at least 300 ECTS (European Credit Transfer System) credits for most study programmes and at least 360 credits for medical sciences. Within the doctoral programmes, students must earn a minimum of 180 credits to obtain the degree. Doctoral programmes include

obligatory course work and individual research. The doctoral dissertation is the final part of the study program at the doctoral studies, except doctors of arts, which is an artistic program. Accomplished scientific contributions are graded according to the number of the scientific publications, patents or technical innovations.

B. The ECTS system

The Law on Higher Education introduces ECTS as the mandatory credit system to be used by all higher education institutions in all degree programmes, for both credit transfer and accumulation. The ECTS system is fully implemented in all HEIs. The study program contains the elements specified in the LHE. Every study program covers precise description of the courses and the number of ECTS. ECTS credits are based on the workload students need in order to achieve expected learning outcomes. 60 ECTS credits are attached to the workload of a full-time year of formal learning (academic year) and the associated learning outcomes. A proper implementation of ECTS based on student workload and learning outcomes still remains a priority. Developing, describing and implementing learning outcomes is one of the main task. Within the TEMPUS framework there have been several projects involving many HE institutions, where the application of ECTS was widely discussed. The Commission for Accreditation and Quality Assessment (CAQA) also provides continuously actions to assist HE staff in applying ECTS system.

C. National implementation of the standards and guidelines for quality assurance

Serbia operates an integrated national quality assurance system complying with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). At national level a fully functioning quality assurance system is in operation. The QA system which includes internal, external quality assurance and accreditation is required by the LHE. The Commission for Accreditation and Quality Assessment (CAQA) is legally responsible for organizing and monitoring the quality assurance scheme for all HEIs in Serbia. CAQA is formed (June 2006) as an independent expert body of the National Council for Higher Education (NCHE). CAQA designs standards, protocols and guidelines for the NCHE's approval and publication as bylaws and helps institutions in creating their respective quality management systems. CAQA carries out quality assurance processes in forms of accreditation and external quality assurance of all higher educational institutions and study programmes according to LHE. During the development of the QA system, the ESG document was utilized as the main source of information. Therefore, the existing accreditation standards, which do include QA topics, fully comply with the ESG.

The HEIs have the legal obligation to develop internal quality assurance systems. The implementation of the standards for internal quality assurance is in the first place the responsibility of the institutions. Internal quality assurance is one of the themes in the accreditation frameworks. Important elements on which programmes will be assessed for accreditation are whether there is a coherent system of internal quality assurance with clear goals and regular monitoring which leads to continuous improvement. The self-assessment report is an obligatory document in the accreditation file of any HEI. Students are involved in the preparation of self-assessment reports and in the follow-up procedures.

The external quality assurance system operates at the national level; only accredited higher education institutions and study programmes are entitled to award bachelor, master and doctoral - PhD degrees.

D. Recognition of degrees and study periods

The Diploma Supplement

The Law on Higher Education also introduces the Diploma Supplement as a mandatory document to be issued by all higher education institutions, for all programmes. The DS is issued automatically and free of charge in Serbian and English and the language in which the study programme was carried out (if different from Serbian and English). NCHE approved the form of the Diploma Supplement proposed by a special commission nominated within MoE, which is in agreement with the EU/CoE/UNESCO format. Traditionally, the communication tool towards the labor market has been the title of the qualification itself.

Joint degrees

The Law on Higher Education allows for joint study programmes organized by more than one licensed higher education institutions. A joint degree can be issued upon approval from all

higher education institutions involved. Some higher education institutions in Serbia currently carry out joint degree programmes with local and foreign partners. The percentage of the HEIs which are involved in joint degree programmes is less than 20%. Future challenges should include increasing number of joint degree programmes, especially PhD programmes.

Mobility

In order to increase student and staff mobility, several actions have been undertaken at both the national and the institutional levels, so that all major universities participate in mobility programmes. A great number of mobilities has been realized through research projects supported by the Ministry of Science and Technological Development. There are also some bilateral agreements on student and staff mobility. Part of the mobilities is also carried out through various international students' associations (of medicine, economy, pharmacy students, students of technical sciences). Since Serbia participates in Erasmus Mundus External Cooperation Window, Erasmus Mundus and Tempus programmes, students and staff have better opportunities for mobilities. Financial support to mobilities is provided by these programmes. Also, there are some system mechanisms for colleagues from other countries to come to HE institutions in Serbia. Still there are some obstacles related to financial support and visa issues.

National structures which oversee the implementation of Bologna Process in Serbia are in line of major Bologna trends. All the institutions: The National Council for Higher Education (NCHE), The Conference of Serbian Research Universities, The Conference of Serbian Universities of Professional Studies, The National Team of Higher Education Reform Experts – HERE continuously supervise the implementation of the Bologna Process, and the Ministry of Education is going to re-establish the national BFUG in the near future.

The progress has been made towards the development of national quality assurance system, the implementation of three-cycle structure and of ECTS, but much more effort is required for the development of qualifications frameworks and the recognition of qualifications.

Serbia plans measures to improve the active participation in BFUG and cooperation with consultative BFUG members: European University Association (EUA) European Association of Institutions in Higher Education (EURASHE), European Students' Union (ESU), Council of Europe, UNESCO European Centre for Higher Education (UNESCO-CEPES), European Association for Quality Assurance in Higher Education (ENQA).

IV. CHANGES IN THE EDUCATION OF TECHNICAL ENGINEERS

The need for a fruitful collaboration between university and industry is a necessity. Universities are currently facing a deep restructuring process, as a result of the European integration, with the goal of creating the European Higher Education Area. On the other hand, enterprises need knowledge for immediate use in practice, for the purpose of meeting the market needs, increasing the competitiveness and generating the profit. Higher education is expected to serve the knowledge economy of the 21st century and should consider corresponding technical environment, tools and functionalities.

Universities need to cooperate with the industry and build relationships to develop joint actions. Universities need to demonstrate their willingness to play the key role, together with industrialists and local authorities. In numerous contacts with representatives from industry and small local enterprises we have concluded that increased interest to involve information technologies in the production systems and to introduce the economic based approach in the engineering decisions do exist.

The cooperation between the Universities and the enterprises should bring mutual benefits and better outcomes for all partners, in terms of improving the quality of graduated students, in terms of their preparation for today's and tomorrow's market. The cooperation should enable development of high quality training materials in advanced technologies areas, adapting to the changing needs of the society/economy and ensuring a more effective link between the fundamental and applied research and its transfer into enterprises. [7]

CA technologies are one of the greatest engineering achievements in the 20th century. Development of information technologies, especially computers and corresponding software systems that made an important support to a engineer-designer during designing process, conditioned a new way of thinking in designing process. Today engineers-designers have a

powerful tool that assures selection of the best solution in all steps of designing process at a particular time and in the particular conditions. [8]

Computer methods and technologies of the CAD/CAE type have contributed to an essentially new approach to the process of designing and engineering designing in recent years. The use of computers shortens this process in many ways enabling a considerably shorter development of products along with an immediate saving of time. Computers can be used for all kinds of calculations in constructing, for graphic representation of the results of work and indirectly, for managing mechanical systems, e.g. CNC(computer numerically control), DNC (direct numerically control), including robotics and FTM (flexible manufacturing system). [9]

The complexity of many of current mechanical systems has been growing exponentially. Unfortunately, it can be said that, generally, the Serbian higher education system has not kept pace with these needs. Existing undergraduate and graduate science and engineering programs need to incorporate more material on engineering educational software.

The issue of quality assurance and control of education is one of the key issues of modern educational process. In Western Europe there is a long tradition of evaluation of educational institutions, caused primarily market forces operating.

Standards of accreditation can be used for development and evaluation of programs in all fields of engineering and the different profiles. They are reported as program results (outcomes of the program) that describe the skills that should have graduates of accredited programs first and second cycles, as required by the European Qualifications Framework. [10]

The concept of engineering education at the Department of Industrial Engineering at the Technical Faculty “Mihajlo Pupin”, Zrenjanin, University of Novi Sad, the basic idea is treated exactly usable knowledge.

Knowledge and competencies acquired in this study program are: basic techniques and technologies in the areas of production, process engineering, energy engineering, maintenance of technical systems, environmental engineering, basic economic discipline required to manage business enterprises; mastering information and communication technologies required for modern business and Management. In the period from 2006 to 2009 he continued to carry out the system of 3 +2 (3 years undergraduate and 2 years of master). Since 2010, teaching is done by utilizing 4 (240 ECST) +1 (60 ECST) - 4 years of undergraduate and master 1 year.

Innovated curricula in the field of engineering at the Technical Faculty "Mihajlo Pupin, a step forward towards the idea of education of industrial engineers who will work in an environment changed under the influence of structural and technological changes, which speaks in favor of a large number of new cases that follow the new trends of the concept.

The objects that make up this study can be divided into the following groups:

- group objects from basic engineering disciplines (mathematics, electrical engineering, fundamentals of mechanical engineering, basics of mechanical materials, technical drawing with computer graphics, computer aided design, automatic control),
- group objects from mechanical engineering (engineering and innovation, thermal techniques with energy, mechanics, hydraulics and pneumatics, principles of machine design, production technologies, engineering materials, assembly technology, reliability of machinery, technology maintenance, design and technological systems),
- group of objects that give access to the system (systems theory, operations research),
- group management of cases (maintenance management, electronic business, management methods and decision, management of technology development, project management),
- group objects to which education in industrial engineering embodies (tribology and lubrication, chemical engineering principles to protect the environment, instrumentation, cadastre and monitoring, machinery and appliances, gas stoves and process systems, solid and hazardous waste, process plant, technical diagnostics, air conditioning heating cooling, environmental projects, protection and decontamination of the land).

All items one semester and carry the appropriate number of credits. A large number of

these cases has the status of the election, which is another example of harmonization with the Bologna Declaration. This allows the students according to their interests during the process of education specialize in certain aspects, which represents a major shift since the current curriculum did not contain subjects and students have their own narrow interests could express it only after five years of study and passed all examination, the selection of topics for graduate work. This approach will certainly more clearly define the degree of industrial engineering at the Technical Faculty "Mihajlo Pupin", which is formally protected through the issuance of the Diploma Supplement after graduation.

Considering the above, the main advantage of the innovated teaching process for the education of industrial engineer at the Technical Faculty «Mihajlo Pupin» are:

- clearly define the outputs of the program of study,
- harmonization with European levels of education (elementary studies - BSc, 4 years, graduate studies - MSc, 1 year) and the introduction of ECTS,
- education in accordance with the interests of - a number of electives subjects,
- mobility of students and teachers, international cooperation - the Diploma Supplement.

V. CONCLUSION

The Bologna Declaration insists on development of education and advances in scientific knowledge, acceptance of European standards while at the same time we need to reform and adjust our education system. The reformed education is expected to increase professional and creational efficiency of studies, to decrease the duration of studying, increase mobility of students towards higher levels and forms of education and advancement, to assure that the students keep up with development of science and master the skills and thus provide accordance of qualifications with work demands imposed by a particular profession.

Improvement of quality of teaching is an important task of any teacher in an educational institution. The aim of the Bologna Process is to assure the qualitative studies everywhere in Europe.

The actual programs of study in universities in Serbia can prepare engineers for challenges they will face in an economy in transition, while companies have confidence in engineers who are educated in our higher education institutions.

Implementation of the Bologna concept study confirms the readiness of our University of continually working to improve the quality of higher education, assess the results achieved and that basis create the following activities. The more understanding the relationship between educational needs and opportunities should be a continuos process of monitoring, interpreting and understanding various aspects of the theory and practice of education and teaching.

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INFORMATION OVERLOAD IN POWERPOINT PRESENTATIONS

J. Adamov, S. Olić and M. Segedinac
Faculty of Sciences, Department of Chemistry, Biochemistry and Environmental Protection, University of Novi Sad, Novi Sad, Serbia
jasna.adamov@dh.uns.ac.rs

Abstract - There are many articles today which stress the benefits of using PowerPoint and slide presentations in the classroom. Many authors believe that PowerPoint slide show presentation programs provide an effective approach to both student work and classroom instruction. However, there is little consistent evidence to show that teaching with PowerPoint leads to significantly better learning and significantly better grades than teaching by more conventional methods. The explanation may lie in the fact that authors of presentations build too much information into the slides. In such cases students face the challenge of information overload: meaningful learning requires that the learner engage in substantial cognitive processing during learning, but the learner's capacity for cognitive processing is severely limited. Instructional designers have come to recognize the need for multimedia instruction that is sensitive to information load. In designing a PowerPoint presentation teachers should apply principles for information off-loading, listed in this paper.

I. INTRODUCTION

PowerPoint should be recognized as a new communication medium that is fundamentally changing the nature and dynamic of how we teach. In 2002, it was estimated that more than 400 million copies of PowerPoint were in circulation and that "somewhere between 20 and 30 million PowerPoint-based presentations are given around the globe each day" [1]. Those numbers seem likely to have grown exponentially since then. Indeed, Parker [2] alleged that to "appear at a meeting without PowerPoint would be unwelcome and vaguely pretentious, like wearing no shoes". In the past three decades there has been a decisive shift in the media that have been used to communicate messages in educational settings. We have gone from the era of "chalk-and-talk" and occasional flip-charts to overhead transparencies and to PowerPoint slides.

II. ADVANTAGES AND DISADVANTAGES OF POWERPOINT PRESENTATIONS

Using PowerPoint and slide shows to teach offers benefits to both students and teachers. Technology surrounds students. To reach them, teachers must use the language they understand: technology. Using PowerPoint and slide shows, you can integrate multiple sources in your classroom presentations. PowerPoint and slide presentations hold student attention through the use of video, graphics and music. Because students today are so technologically advanced, tools that involve technology such as slide shows increase student involvement and interaction.

The usual advantages of PowerPoint presentations are listed as follows [3]:

1. PowerPoint is fun to watch and fun to make.
2. Used correctly, PowerPoint can accommodate all learners' needs.
3. It motivates students when used in moderation.
4. PowerPoint allows you to reflect on your lesson and correct any needed changes.
5. You are able to print out what you did in class for students that were absent. Better yet, turn the accountability on to students and post your presentations on-line.
6. PowerPoint is not hard to learn. It is rated "B+" for ease of use. It should take about one hour to learn the basics
7. You can easily input images, media and recordings.
8. Templates are built in for different appearances.
9. You can add notes pages.
10. They are more exciting than a simple word document or hand written presentation.
11. Master slides make presentations consistent.

However, Powerpoint presentations also have a number of disadvantages [3]:

1. File size can become quite large on medium to large presentations
2. Some of the features can be quite complicated to use and even the simple features require some getting used to
3. When at work, you can't rely on someone else's computer or laptop to run your presentation, there are too many software conflicts and disk space barriers.

4. It takes quite a bit of time to create a complete presentation
5. Some features such as animations and backgrounds can distract the audience from the actual information in the presentation

III. EFFECTIVENESS OF POWERPOINT PRESENTATIONS

Most users of PowerPoint appear to conceive their goals as educators to involve merely a one-way transmission of knowledge, rather than to promote the construction of knowledge and the analysis and synthesis of knowledge [4].

Given the widespread adoption of PowerPoint, the small number of studies of its effectiveness is surprising [5,6]. Journal articles indicate that students like to be taught using PowerPoint and think that PowerPoint presentations are entertaining, that they enhance clarity, and aid recall of subject matter ([7,8,9,10]. Several studies point to the idea that graphics improve student recall [6,11,12,13]. There is little consistent evidence, however, to show that teaching with PowerPoint leads to significantly better learning and significantly better grades than teaching by more conventional methods. A majority of studies shows that use of PowerPoint is not associated with a significant improvement in student grades [6,9,10,14]. In fact, one study demonstrated a decrease in student performance when the instructor switched from transparencies to PowerPoint [15].

PPT have a greta potential to help teachers in delivering educational content; however, if used inappropriately, they present a barrier between teachers and students. Many times, students leave lectures taking only a small percentage of information that teachers have presented in a class. This is because some presentations contain too much information presented in a short time – too many pictures, large blocks of text, multicoloured backgrounds, animation effects... In fact, many characteristics of PPT presentations are in collision with the way the human brain works. Design of a PowerPoint presentation should be harmonized with the learning habits of human brain.

IV. HOW HUMAN BRAIN WORKS

The human brain is a complicated, creative information-processing system. Information processing starts with input from the sensory organs, which transform physical stimuli such as touch, heat, sound waves, or photons of light into electrochemical signals. Once information is processed, an attention filter decides how important the signal is and which cognitive processes it should be made available to. For example, although your brain processes every blade of grass when you look down at your shoes, a healthy attention filter prevents you from noticing them individually. In contrast, you might pick out your name, even when spoken in a noisy room. There are many stages of processing, and the results of processing are modulated by attention repeatedly. In order for the brain to process information, it must first be stored. There are multiple types of memory, including sensory, working, and long-term (Figure 1).

First, information is encoded. There are types of encoding specific to each type of sensory stimuli. For example, verbal input can be encoded structurally, referring to what the printed word looks like, phonemically, referring to what the word sounds like, or semantically, referring to what the word means. Once information is stored, it must be maintained. Some animal studies suggest that working memory, which stores information for roughly 20 seconds, is maintained by an electrical signal looping through a particular series of neurons for a short period of time. Information in long-term memory is hypothesized to be maintained in the structure of certain types of proteins.

Learning is defined as a permanent change of a human long-term memory. Our capability to process information is a multi-step process which comprises: perception, attention, selection, organization and integration of information. Students are able to understand and memorize the presented material only when they organize information into a coherent mental structure and integrate them with previous knowledge.

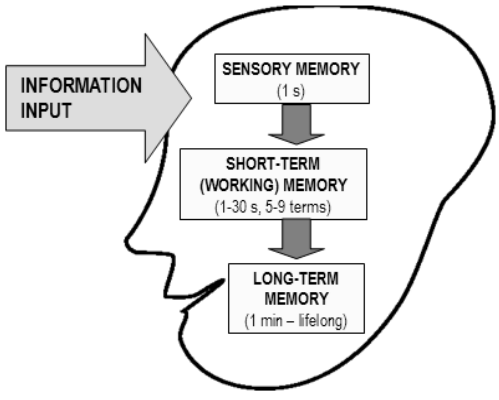

Figure 1. How human brain stores information

V. WORKING MEMORY CAPACITY

Sensory and long-term memory have infinite capacity. However, capacity of working memory is very limited. Human brain is capable of processing only a few terms simultaneously - a few words or a few images or sounds. In his article, Miller [16] discussed a coincidence between the limits of one-dimensional absolute judgment and the limits of short-term memory. Performance is nearly perfect up to 5 or 6 different stimuli but declines as the number of different stimuli is increased. In order to store sensory information into long-term memory of our listeners, it is necessary to „squeeze“ it through a narrow channel - working memory (Figure 2).

In design of a PowerPoint presentation it is necessary to take into account the limited capacity of a brain's working memory, thus minimizing the possibility of overload of a cognitive system [17].

Cognitive theory offers theory-based assumptions about how people learn from words and pictures. *Dual channels* is the concept that the human cognitive system consists of two distinct channels for representing and manipulating knowledge: a visual-pictorial channel and an auditory-verbal channel. The visual channel handles information presented to the eyes (such as illustrations, animation, video, or on-screen text). The verbal channel handles information presented to the ears (such as narration or nonverbal sounds).

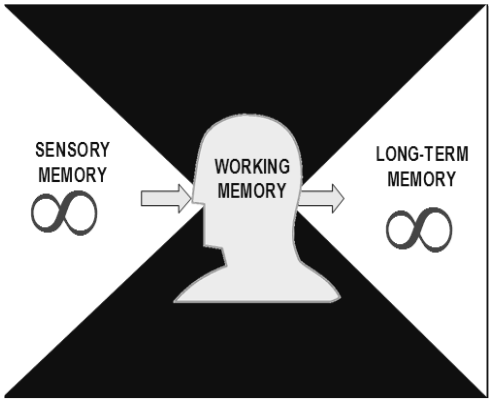

Figure 2. Working memory has a very limited capacity

VI. INFORMATION OVERLOAD

Typically you choose to use PowerPoint in your presentation for several reasons:

1. To help your audience to **understand**.
2. To help your audience to **learn**.
3. To help you to get your **message** across.

But have you ever thought about what happens when you build too much information into your slides?

When members of your audience become confused they switch off. Their working memories have become overloaded and they have become frustrated. As a presenter, it's not the reaction you want.

A growing body of research explains the science behind PowerPoint overload, and lays out recommendations to reduce the load. In light of the science, it is up to us to make a fundamental shift in our thinking. We have to change our PowerPoint habits to align with the way people learn

In designing a PowerPoint presentation, one should have in mind the following rules:

1. PPT slide shows should contain both visual and verbal forms of presentation,
2. too many objects on a slide cause the overload of a human cognitive system,
3. presentation should be made in a such way to provide students with an opportunity to select, organize and integrate the presented information.

Mayer et al [18] have been conducting dozens of research studies on multimedia learning – the potential of using words and pictures together to promote human understanding. The studies have resulted in a substantial body of research with clear recommendations for multimedia design principles.

Five specific PowerPoint techniques lay out a pathway for reducing PowerPoint overload, each of which applies a research-based principle [18]:

1. The Signaling Principle,
2. The Segmenting Principle,
3. The Modality Principle,
4. The Multimedia Principle,
5. The Coherence Principle.

The signaling principle

The usual way of creating a PPT slide is to start with a title in the upper part of a slide. However, the title itself does not explain the main idea of a slide. Instead of writing a title, write a *headline* that explains the main idea of every slide (Figure 3). Write your headlines in active voice, with a subject and verb. This process of writing a headline will help you distill and clarify your own thinking about your topic.

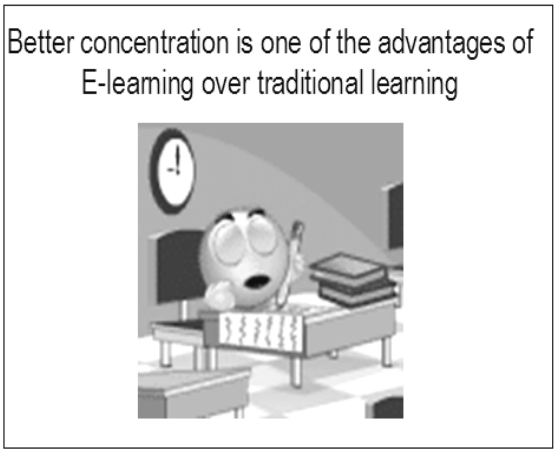

Figure 3. Illustration of the signaling principle

The segmenting principle

The "Normal" view of the PPT slide is the place where you design individual slides. But when you focus on a single slide, it's easy to pile on the information which only serves to shut down understanding. You should break up information through your presentation by referring frequently to the Slide Sorter view (Figure 4). From this perspective, you can read the headlines you've written and see how your story flows.

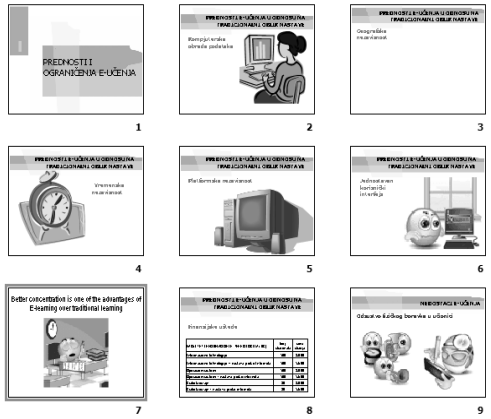

Figure 4. Illustration of the segmenting principle

The modality principle

Visual overload can be removed by moving text off-screen, and shifting the processing to the auditory channel by narrating the content instead. Mayer et al have established that listening only to words and simultaneously watching the graphics on slides leads to 28% higher retention of information than reading the text along with watching graphic. The elegant way to accomplish this in PowerPoint is to use the Notes Page view (Figure 5).

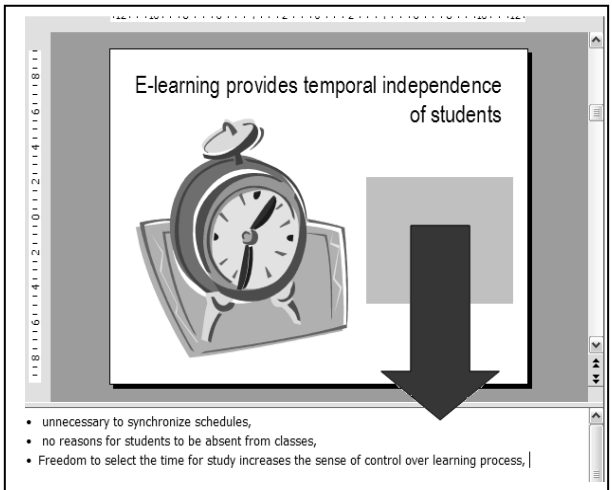

Figure 5. Illustration of the modality principle

The multimedia principle

People learn better from words and pictures than from words alone [19]. In a presentation, it is common to see a series of PowerPoint slides filled with bullet points and no visuals besides a logo and a colored background. There are a number of reasons we put bullets alone on a slide: they are easier to produce than graphics and they remind us of what we want to say when we speak. But for whatever reasons we use bullets, text alone on a screen is simply not effective [18]. Instead of text, use graphics, which have a far larger capacity of describing phenomena than bulleted text.

The coherence principle

When we put everything we know on a topic to a slide in a PPT presentation with an aim to impress our listeners, we are actually doing the opposite. Too much redundant information stops their cognitive ability to process information. One of the hardest things to do is to keep things simple. When making a slide, cut out everything that does not support your main idea – text that you will narrate, logos, fancy animations and complex, multicoloured backgrounds that have no connection with the slide context (Figure 6).

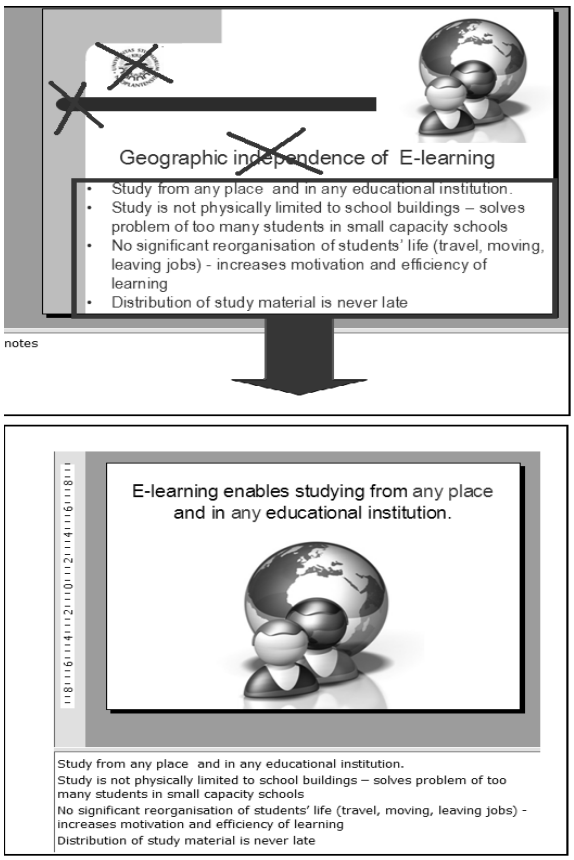

Figure 6. Illustration of the coherence principle

VII. CONCLUSION

Nowadays, PowerPoint presentations (which should enrich the educational message) are becoming THE message, resulting in reduction of an audience's attention applied to a teacher's discussion of relevant content. Audience has a problem when it tries to assimilate the same information from two different sources at the same time. Thus, minimizing of information overload in a PowerPoint presentation should be a central consideration in the design of multimedia instruction.

ACKNOWLEDGEMENTS

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HEURISTIC MODEL OF EDUCATION AND MOBILE COMMUNICATION IN EMERGENCY SITUATIONS

K. Beres*, P. Beres**

* University "Politehnica", Computers and Information Technology, Timisoara. ("Politehnica" University of Timisoara, Faculty of Automation and Computers Department for Computer and Information Technology, Timisoara) Romaniakristian

**Regional Society for Technical Education and Information Zrenjanin, Serbia
beres@gmail.com, paunberes@gmail.com

Abstract - The aim of this paper is to present education as a heuristic model of methodical innovation with special emphasis on training of team members to work in emergency situations, where each team member must be aware of the importance of their work, must know and apply a methodology for finding the best solutions and feel satisfaction with the results as an individual and as part of that team.

Heuristic approach to the problems of teaching in emergency situations should allow team members to come up with the creative process of acquiring knowledge, to learn to think and develop skills for education. It is, therefore, such an approach that is not based on passive observation of phenomena and impersonation performed by a teacher, but establishes an active relationship to phenomena of thought and introduces the team members in their own research of the heuristic concept problems (ie problems with the range of solutions - in this case, " Digital Communications - a program of operational functions of mobile phones "), the function of emergency.

I. INTRODUCTION

The contemporary world of the future (post-industrial, technological, informational, global) needs people trained, ready and able to use the new complex tools, quickly and efficiently acquire, build and apply knowledge of diverse, active and responsible participation in complex social and economic relationships and processes in everyday life, especially in emergency situations.

Starting from the common framework of education and training projects designed for the European Union for the 21.century, which contains basically: education for life, education for learning in a democratic society, education for developing creativity, critical thinking, and discovering talents, education for independence and freedom in their work, as well as for self-education, and training for civil society and broad general education, to the successful design of technological information and education through teaching character Polytechnic (technical, technological and computer education in primary, secondary and higher education, free technical activities of students, selection programs, and extracurricular activities through amateur radio clubs, volunteer fire companies, diving clubs and other organisations involved in education, protecting and rescuing people and property) and to create continuity in the monitoring, training and training of future personnel ,necessary reformed Civil Defence and Civil Protection within the Department for Emergency Situations, as part of Defence of the Republic of Serbia, trained in civil society institutions in line with new trends in Europe (education for democratic civilian control over the military, as well as training of personnel of the existing system and future system 112 that needs to integrate the system of civil defence of local to national level with the system 112 EU), we approached this study which was just on that line.

This approach provides a new quality and continuity in monitoring, training and education of future employees necessary to reform Civil Defence, as well as to prepare them for further education in specialised military institutions if they wish.

In a world that is rapidly changing and where the knowledge is been more complicated and enlarged everyday, and unsuspected sources of information proliferate, data, information and facts can become irrelevant and outdated even before they are used. Heuristic approach to the design of future system problems in operation of emergency, seeks to overcome these problems.

The personnel of the future system 112 is collecting information in accordance with the rules on the exchange of information through the list of questions. On the territory of local governments (regions, municipalities) may appear all kinds of risks (war, threat of natural disasters such as floods, large-scale fires, earthquakes, landslides, epidemics, pandemics, etc..) And technical accident, ie. Emergency situations that need to be detected in order to take timely measures of protection and shelter for people and property.

Timely, accurate and precise information in these situations means life. Therefore, to the staff working on these jobs, it has been paid special attention ,when it comes to their training, skill in handling the most modern and versatile equipment, resourcefulness in emergencies and timely transfer of information to the entities responsible for rapid intervention in the aforementioned situations.

II. THE TERM HEURISTICS

"Eureka" is defined as "I found, I found". While the term "heuristic" means "the science of finding new ways of scientific knowledge." Heuristic approach to the problem of the empirical search or optimisation method that usually solves the problem, but there is no evidence that mathematicians and physicists accept. No one knows whether they will always give the best answer (solution). While metaheuristics, a schematic method for finding good heuristics for particular problems, is a term that often appears in evolution (development) algorithms and logic applications:

"What kind of setup parameters to use in order to get good results when applying heuristic method X to problem Y?".

"How do I adjust the parameters of heuristic X to get a better problem Y?".

"Which is better, heuristic X or heuristic Y?".

The heuristic modeling involves the creation of such a heuristic model that has meaning and represents more originals in one and the same model, ie. This model allows the identification of new knowledge and develop the creativity of students requiring a level of autonomy with respect of prior knowledge of each student individually (example: Mobile phones in the function of emergency). The heuristic model is determined by very few actions during problem solving so that leaves the team members (staff for emergencies) the possibility of finding one or all possible solutions depending on prior knowledge, degree of autonomy and his creative abilities. This approach to the problem solving, allows each team member (personnel for emergency situations) to achieve their best, as weak, average, and above-average, ie. talented team members. Installation problems with heuristic strategy means that a member of the team is put into a position to identify, using old experiences in new situations, knowledge is known to lead to a new situation (function), discovering new ways of creative problem solving.

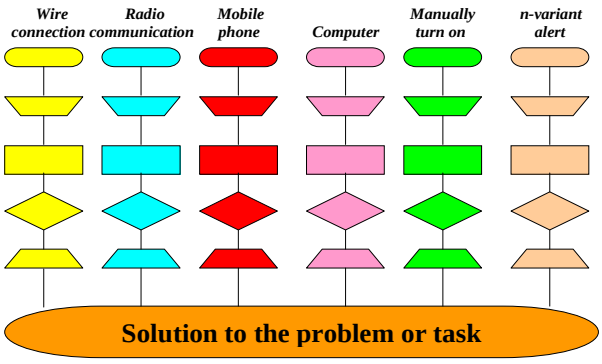

Image 1

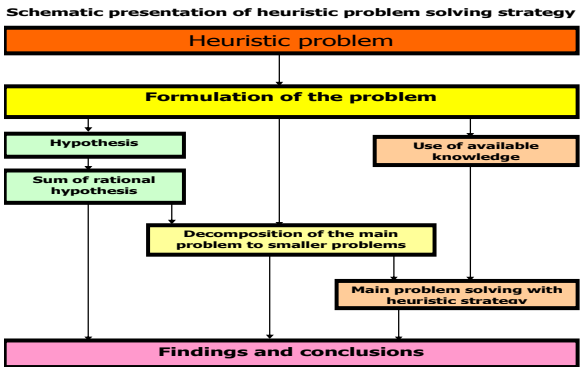

Image 2

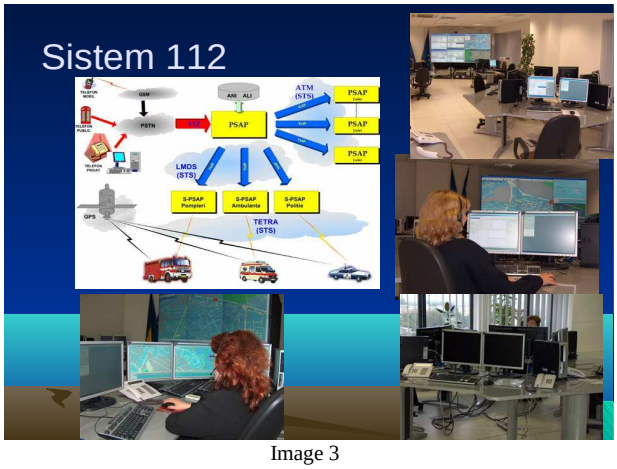

Image 3

Remote start the siren is done by computer or by mobile phone using the pre-created text message, that message contains:

- The place of inclusion (eg DVD Nova Crnja),
- Type of hazard (eg fire risk),
- The protective code of an operative,
- SMS messages sent via mobile GSM system reaches the receiver proper siren, this message is decoded in the modem and then the device starts PLC Energy Management asynchronous motor siren.
- The operative who sent an SMS message will get feedback that the siren is set off.
- The aforementioned information is received via mobile phones and people who have authorised such personnel on duty outside the fire station, fire tank drivers or other operatives.
- If the system is controlled via a computer, then all events are recorded and stored ,
- The run of sirens (eg siren test first Wednesday of each month) can be pre-programmed 10 years.

This system can be applied for:

- Sirens with pneumatic control devices
- Sirens with asynchronous motors
- Each system is constructed independently, and can also be linked together into one integrated system.

The principle of operation of the system:

Location siren 1 Central system - Computer

Operations officer

Location siren 2 Location siren 3

Image 4

Third Example: IMPLEMENTED MODEL UNIT - teaching topics we chose to implement a number of units within the chosen curricular theme, contributing to the development of logical-dialectical thinking of respondents, while the teaching of technical and IT education provides scientific and dialectical character and orientation of the Polytechnic as pedagogical-didactic categories derived from the goal of teaching the above subjects.

Teaching theme: "Electronics and radio engineering".

Unit: "Digital Communications" class.

Type: Laboratory exercise.

Educational level: application of knowledge.

Teaching methods: experimental and laboratory work.

Form: group, working in pairs and individually.

Type of course: a heuristic approach to laboratory exercises.

Teaching aids: PC, Bim-projector, mobile phone.

Educational objectives: a clear idea about the possibilities of mobile phones and their operating range of software functions (phone book-"Phone book" message - "Messages", lists the call - "Call Register" Phone setup - "Setting", call forwarding - "Call divert "games -" Games ", the tools - the" Office Tools ", profiles - "profiles", the Internet -" Internet ", meeting -" Appointments ", etc.).. introduction of operational functions that have practical application in everyday life and work of citizens with emphasis on the possibility of using emergency sirens for the remote control.

Educational objectives: encouraging students working mood, opposing opinions and acquiring new knowledge, fostering independence, systematic, logical reasoning and finding new solutions applicable in practice.

Creating a heuristic problem

Teacher reminds the students about basics of binary numbers, analog and digital, A/D and D/A converters, modulation and demodulation of digital messages, and the teaching of the "Mobile phones" and "Basic functions of mobile phone" as the users had to repeat as homework in order to successfully monitor the exercise. The teacher sets the questions in the form of a heuristic algorithm to projector, ie. instructional sheet number 2. with the following content:

LIST OF COURSE No. 2

Today you will learn by going alone ,to try to solve a given problem situation shown at the heuristic algorithm. based on facts and data you have collected , and thinking towards solutions to problems you try to start a hypothesis (of a solution to the problem). Today's problem has a variety of heuristic solutions, which can be observed at a given heuristic algorithm. Your task is to aim your hypothesis in the direction of finding as many solutions there are ,thus confirmed the main hypothesis "previously acquired knowledge and their proper use in practice to expertly practical use of basic mobile phone functions ie. Its use in everyday life and work."

The heuristic algorithm of operational functions of mobile phones

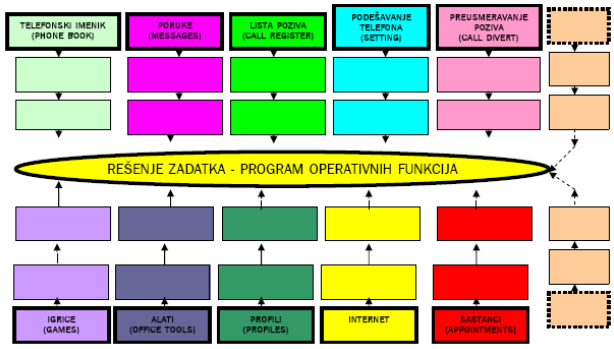

Image 5:

- Experiments performed by the users of sirens.
- The activity is aimed at teachers incitement of the siren users on finding new original solutions and their practical test on a mobile phone (any user has your cell phone).

Motivation: thinking in the right direction, to continue with new solutions - try to start a hypothesis.

Students set the hypothesis: Based on the main hypothesis "previously acquired knowledge and their proper use in practice to expertly practical use of all basic functions of mobile phones, ie. Its use in everyday life and work" subhypothesis placed in accordance with the prior knowledge and motivation of each horn user, to explore new solutions previously unknown to him, as well as the capabilities of mobile phones that they own. "If the entrance-(functional soft keyboard mobile phone) sets the signal in the form of a driver, the output-display comes to activating and registering your choices, and its practical implementation. Users horn teacher says to check the hypothesis: Users sirens individually checked their driver, confirm its validity, and therefore the hypothesis. On the slide are written all the mobile numbers of the siren users, to be able to communicate with each other. The teacher monitors the work of each user and leads him to come to one of the least of all possible solutions to the heuristically conceived problem.

After checking the hypothesis the siren users make a general conclusion: Proper preparation of the driver who leads at the entrance - functional soft-keyboard mobile phones causes the safe operation of output and its registration in the display, as well as the practical in effects of education through the problem solving of heuristic problems in terms of increasing educational outcomes of implementation of selected options. Therefore, cell phones have a whole array of options and they are widely used in everyday life and work, especially in emergency situations.

III. CONCLUSION - EFFECTS OF EDUCATION THROUGH THE PROBLEM SOLVING OF HEURISTIC PROBLEMS IN TERMS OF INCREASING EDUCATIONAL OUTCOMES

Experimental problem was realised in a selected syllabus in the field of emergency situations, suitable for processing heuristic approach ,that is conditioned adequate teaching methods, forms and means of work to constantly learning. Realisation of work in the experimental group E1 was carried out through the intense work of the soldiers at the civil service, compliance with certain stages of work and increased cognitive effects.

The survey was conducted in the Department of Emergency Management,in the District of Central Banat, Zrenjanin. The experiment included one group of siren users and that makes the experimental group, "Experiment with one experimental group," where we want to determine how much progress siren users have, in education, in the handling and use of IT in emergency situations, using heuristic models of these themes. In the experimental group, the selected program contents were carried out using a heuristic model as a guide (manual) in that implementation.

As the Dependent variable, experimental studies have been defined as "teaching the effects of increased education of siren users for alerting the population in emergency situations, by using a heuristic model." The impact of using a heuristic model of the effects of instruction in emergency

areas reflected in the results of knowledge tests of the siren users. Studying the heuristics in teaching, analysis and selection, the choice for the most propriate content was made , which ensures optimal use of the effects of teaching in the field of emergency situations, in terms of combining frontal and individual work.

Results of experimental factors were made by an action on the basis of the test horn users, at the end of each lesson or a specific topic. To determine the effect of experimental factors clear from the results of the final state, ie. quantity of acquired knowledge, we took the initial state (what they already knew users Mermaid) ie. results of initial conditions that we set at the beginning of these program areas of the testing sirens. The experiment included 20 horn users, the arithmetic mean of the final state Xf = 4.19, the arithmetic mean of the initial condition Xi = 2.05, therefore, the average efficiency factors of the experimental XF = Xf - Xi = 4.19 to 2.05 = 2, 14% or the percentage of CF = 51%. Of course, we did not manipulate the results of individual siren users but we considered the mean. Based on this we can conclude that the clear effect of the heuristic model about 51%, which means that the level of each student - siren user ,increased realization at the end of that lesson. block hours by 51% compared to the knowledge they had at the beginning.

These results may serve as suggestions for designing the curriculum for training of personnel of Civil Defence and Emergency Management Division (Civil Defence), local governments, companies, public companies, associations, media, NGOs and other entities in the Republic of Serbia) in order to create continuity in the monitoring and training of future personnel necessary reformed Civil Defence and Emergency State of Emergency, and education of youth in the spirit of rational use of existing resources, through team work on a joined project that brings together different ideas of team members - Involvement of all stakeholders from the local level of operational disaster management (floods, storm winds, droughts, fires, technical and technological disasters, etc..), and placing these models in the function of emergency situations through a demonstration application, to concrete examples of rational and timely decision-making in the prevention and elimination activities consequence of eventual disasters that can befall us.

Target groups of the Public Service to intervene in case of flooding, the level of districts and counties, the population living in flood risk zones in the Central Banat District - Serbian, as well as neighborhood counties Timis, Caras - Severin-Romania.

GOAL: Create a legal framework in Serbia in order to achieve superior results: Joined intervention procedures and cooperation in case of flooding, based on agreements between public services in the border zone; A number of possibilities for protection against flooding due to cross-border cooperation;

Better protection of life and property of the population and businesses in the zone; Increased security quality of life of residents in the region of CBC (Central Banat District and parterskim counties) Increase the speed of the flow of information between authorities and institutions involved in the fight against floods; Promotion Offers for Cooperation the level of districts and counties / regions / border zone, and competitive value of common shares, in case of inability of local emergency forces at the district or county / regional / border zone, on a case by case basis; A number of volunteers-volunteers who are trained appropriately,by the heuristic model of teaching and can be educators of the population.

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CURRICULUM OF MODERN EDUCATION

N. Komerdelj, M. Mićić, S. Jokić, S. Babić-Kekez
Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
komerdelj@hotmail.com

Abstract - The elementary parts of the curriculum and their importance for modern teaching are presented here in this work. A curriculum's circle of one school and its most important parts that affect directly modern teaching process are presented.

I. INTRODUCTION

The concept "curriculum" appeared in Europe at the end of the 16 century and in the beginning of the 17th century and it meant the order of the education (the order of studying according to the age). In a modern sense, the concept of curriculum implies the educational plan and program, and especially, the aims and the results of educating, the contents of teaching and educating, the educating methods, the standards of the knowledge and the educational style. The curriculum includes the description of the tasks and organized activities that are directed to produce an appropriate behavior. Many people who occupy with didactics have written about this concept. One of them considers that curriculum includes all educational questions, the others affirm that curriculum occupies with an education and study planning. Some teachers that are considered as the defenders of the curriculum movement think that curriculum occupies with planning problems. This curriculum movement has three main elements:

- studying aims
- hierarchy of educational aims
- the control of the realization of studying aims.

The defenders of this movement consider that didactic practice can be made more effective by the aim as a central category. The education that is directed to the aim has next characteristics: the aims are a constituent part of the curriculum, the instruments for the aims` setting must be practically used, and the aims must be clearly described. The precise aims are not the sufficient base for the choice of the effective methods. The success of the studying and educating according to the set aim can be effectively checked (Miler). The defenders of the curriculum movement ask the aims to be classified according to the complexity, and for the base they took the taxonomies of the behaviorists. The studying purpose is to change students` behavior in the cognitive, psychomotor and affective field. The teaching and studying process in the curriculum movement has three phases:

- The teaching and studying planning,
- The teaching and studying realization,
- The teaching and studying control,

The teacher's aim is to make some "fine" aims from the rough ones that could be realized during the teaching process. In sum, the curriculum movement asks that the whole planning is subordinate to the studying aims, to establish the hierarchy of the whole studying aims and to control and value teaching and educating effectively.

The educational system in our country is based on the national or frame curriculum. It is a national document that defines the educational system from nursery schools to the universities. This document is based on defining the educational achievements, which means the studying results in accepted knowledge standards that a student will have at the end of his education.

II. THE CURRICULUM'S SPECIES

The curriculum can be closed and then we talk about a stable system that gives no possibilities to deviations from the set contents, aims and tasks. It is not flexible at all and it can be changed only according to a certain law procedure.

The open curriculum is a very elastic and flexible system. It respects the demands defined by the national curriculum, but it also respects the whole creative and functional demands of the user of the educational services: the students, parents, social environment, and modern scientific views regularly are involved into the contents that are obligated –for example in computer science, science and social science.

The creative curriculum is mostly related to a nursery school and the program`s contents in the

first grades in elementary schools. His main characteristics are some specific demands and strategies about how the children should be introduced into the studying world and how cognate knowledge correlate to cognate situations in a functional and interesting way.

The mixed curriculum is planned to have some special, pretty free defined training course unities that are only connected by an educational program as a directing document.

The hidden curriculum (this term has been introduced by Phillip Jacobs) presents the contents that are naturally implied, so there is no need to define them, or, on the other side, it is an expression of the silent resistance to any kind of changes.

III. THE SCHOLASTIC CURRICULUM IN SERBIA

In our educational system all educational institutions have the curriculum that must be based on the law of the national curriculum. This kind of curriculum is defined by the educational institutions (schools) whose aim is to satisfy both common and specific needs of the users of educational services. The schools define their own curriculum and they decide by themselves which contents (besides the mandatory ones) they would specially develop and in that way be different from other schools. The process's organization, the different kinds of work, studying, educating, estimating, self-estimating and development of the educational values are planned by the school's curriculum. That unity of the process and contents in the modern school's curriculum can be graphically presented as a curriculum's circle.

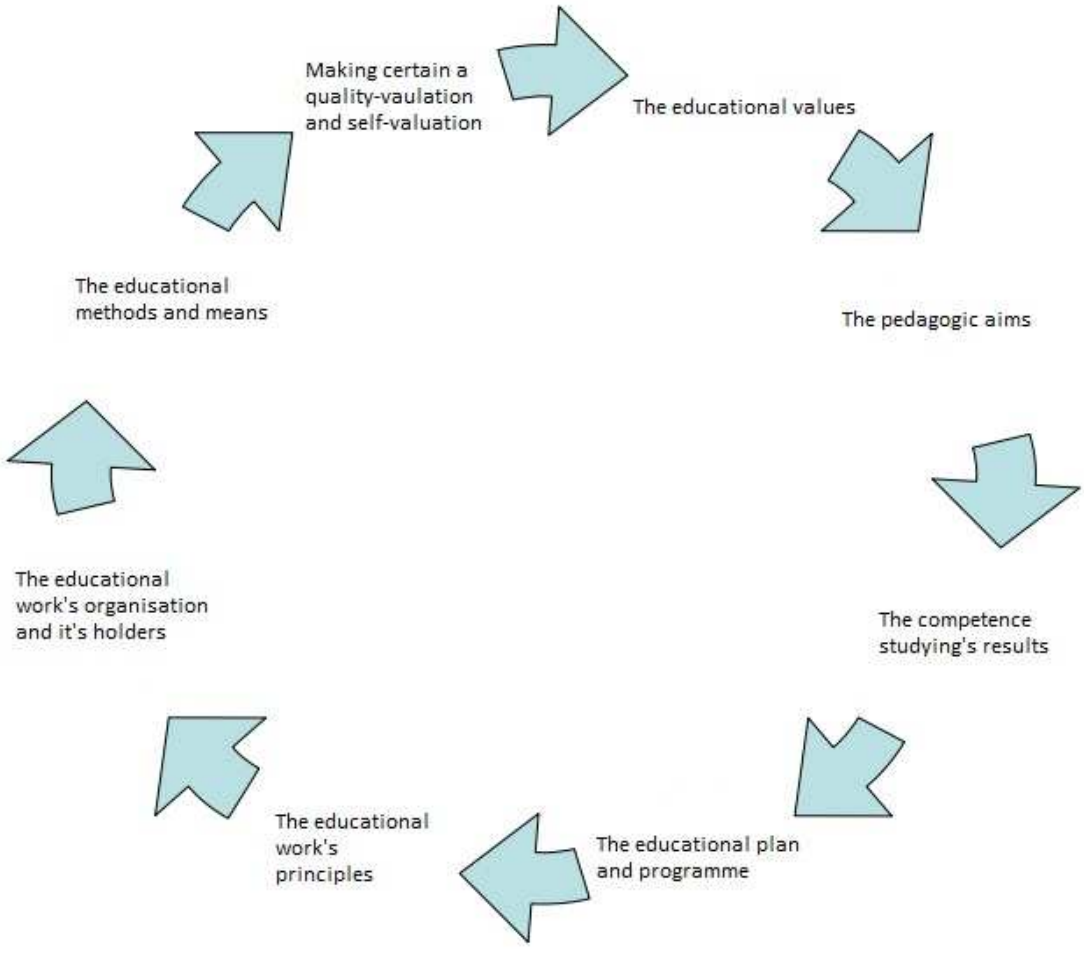

Figure 1. One model of the curriculum's circle

IV. THE AIMS OF THE MODERN EDUCATION

The education is a unique process, whose task is to give a possibility to a student to get knowledge, to develop his abilities and to educate. In the curriculum of the modern education a special emphasis is given to the aims of the education. The modern education's organization develops from the educational aims, so therefore in the educational technology a big attention is given to the aims` setting and realization.

A defect of the traditional education is generality of the aims. Therefore there are two key categories in a technological approach to the education:

- Clearly and precisely the aims` setting up
- Educational process's correction according to previous results

There are some taxonomies of the educational aims and tasks in a cognitive, affective and psychomotor field to realize that. A new technological approach to the education demands for the defining of the aims, which means that it must be completely clear what results the students must achieve during the education and how the teachers could estimate are they achieved or not. Although, besides everything, neither a complete standardization in the describing of the educational aims and tasks can be achieved neither the education can be reduced on the reproduction's frames.

Here is one example of the aims` taxonomy in the cognitive field:

TABLE I.

The elementary categories of the educational aims	The examples of the generalized educational aims` types
1. Knowledge It's a memory and reproduction of the educational contents of different characters. The characteristic of the category "knowledge" is recalling during the reproduction.	A student - knows the terms that are used in educational contents - knows the concrete facts, methods, procedures - knows the elementary concepts, rules and principles
2. Understanding The understanding of the worked up content can be seen in a possibility to transform the subject matter from one form of the expression to the other, the translation from one language to the other, from linguistic form to mathematical one. The interpretation of the subject matter or the assumption of the further course of the events can be accepted as an indication of the understanding. Those educational results overcome the simple memory of the subject matter.	A student - understands the facts, rules and principles - interprets the material using the language -interprets schemes, graphs and diagrams -transforms linguistic materials into mathematical expressions -supposes the further course of the events, describes the consequences of that development according to existing tasks.
3. Application It is necessary to have an ability to use the learned material in concrete circumstances and new situations. The application of the rules, methods, concepts, laws, principles, theories belongs here.	A student -uses the concepts and principles in new situations -applies the laws, theories in concrete practical conditions -demonstrate the right application of the methods and procedures
4. Analysis This category implies the ability to distribute the subject matter into constituent parts to clearly see its structure. To calculate the parts of the totality, the connections among them, the understanding of the concept of the organization's principles of the totality is necessary. The educational results are on a higher intellectual level than in categories-"understanding" and "application".	A student -emphasizes the hidden assumption -notices the mistakes and failures in the logic of reasoning -notices the differences between the facts and the consequences -estimates the importance of the data
5. Synthesis The ability of combining the elements to get a new totality is implied. A new product can be a report, an activity plan or the totality of generalized connections. A creative ability is necessary for the expected results, especially for the making the new schemes and structures.	A student -writes a shorter creative essay -suggests the plan of the doing the experiments -uses the knowledge from different fields to make a plan of solving the different problems.
6. Evaluation An ability to estimate the knowledge of different contents (an artwork, research data) is necessary. The students` reasoning should be based on clear criteria which could be defined by themselves or by someone else, for example by a teacher. The estimating reasoning, which is based on clear defined criteria, is necessary for the educational results` realizing with all the demands of the previous categories.	A student -estimates the logic of the subject matter's structure in written form -estimates the compliance of the conclusions with existing data -estimates the importance of different activity's products starting at the external quality criteria.

Bloom's taxonomy was used as a base of a better planning, organization and educational process's estimating, and it also helped to make the educational process more rational and more effective.

V. THE TEACHER'S ROLE AND THE EDUCATIONAL CONTENTS

The educational program is only in rough indicators in decentralized educational systems, and everything else about the choice of the contents is completely in the school and teachers` power. The didactic modeling of the educational structure is also a very important and responsible teacher's task. That indicates that teacher's possibilities are remarkable to influence on the educational contents.

In a modern school, a teacher is expected to be a person that not only lectures, but also to be a person that organizes, encourages, estimates, uses different processes and styles of studying and a person who knows to apply certain strategies. A good teacher does not oppose to some students` influence, because he will realize his role even better if he cooperates with his pupils. The educational practice and many researchers have shown that a teacher who has a good cooperation with his students is very successful in his educational work.

The educational content – educational structure – has a great influence on a style and approach of the teacher and the student and mediates between them. The content defines in a great deal the essence of the education and the teacher's style. A teacher chooses the aims, tasks and methods of his work depending on the content.

VI. ESTIMATING AND SELF-ESTIMATING

Self-estimating/estimating means own practice and own work, analyzing what and how has been made. The aim of the estimating/self-estimating is the advancement of the work quality of one educational institution – school. Our educational system is open for the experiences of those systems which have longer tradition and positive results in quality providing. The self-estimating makes the base of the politics of quality providing in EU. In those educational systems the procedure of self-estimating, with eternal estimating, is accepted as the most effective mechanism to provide a work quality at school.

Self-estimating/estimating includes:

- the whole educational system
- some parts (for example –all elementary schools)
- individual schools
- individual classes or units

On every mentioned level, key areas or their parts, individual operating parts or individual indicators can be estimated. According to the volume, self-estimating/estimating can be partial or global. Self-estimating/estimating is put into practice to provide work and it is one of the mechanisms of providing a good work quality.

VII. CONCLUSION

The curriculum includes all the activities and experiences which are planned for students` work at school and also other activities that are realized under the school's patronage and that achieve the wanted development of the students. It is different from the educational program and plan by its volume. The curriculum includes the tasks` description and organized sequences directed to produce a certain behavior. It is aim directly to the aims of the studying.

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INFLUENCE OF INFORMATION SYSTEMS ON QUALITY OF TEACHING PROCESS IN HIGH SCHOOL EDUCATION AT THE REPUBLIC OF SRPSKA TERITORY

N. Đalić
Faculty for traffic engineering, Doboj, Republic of Srpska
djalic8@yahoo.com

Abstract - Using information systems in high school institutions increases significantly efficiency of the work, decreases usage of paper documents and also decreases numbers and risks of errors. On the other side, it increases the control over entire system by providing accurate and relevant informations which contributes to making quality leadership decisions. Observed from the information point of view, information systems cosist of set of methods, activities and resources harmonized to make realization of certain goals possible. EDIUS informational system, which is in use in high schools at the Republic of Srpska teritory, proved to be very efficient and provides improvement of quality of both teaching process and educational institutions.

I. INTRODUCTION

In current educational system from our surrounding, information science and infromation systems have large significance. Information systems spread through all areas of school work, from administrative work, communication, archiving data in electronic form, to use of information systems in educational process.

International Federation for Information Processing – IFIP defines information system in the following way: „ Information system is a system which collects, stores, processes and delivers informations important for organization and society, so that they are available and usable for anyone who wants to use them, including management, clients, empolyees and everybody else. Information system is an active social system which can but don't have to use information technology.“[2]

Information system of high schools presents total information system of high school educational institution and it is mainly based on usage of information technology.

Information system of high school education enables consolidation and grouping of all informations about important activities in connection with students' educational process, with which informational system is included in small number of educational institutions which own that kind of system.

Based on the fact how it is projected and realized, system enables accurate and relevant informations which provide following of realization of educational process, and making significant decisions, and also provides high standard to teachers and students during education in the area of making, storing and exchanging informations and knowledge.

Using information system in high school education increases efficiency of the work and decreases usage of paper documents, number of errors and also increases the control over entire system. This informational system provides accurate and relevant informations for observing teching process in high schools and making decisions about it.

II. CONCEPT AND USAGE OF INFORMATION SYSTEMS

Information system is compact set of elements for collecting, storing, processing and distribution of informations. Business subjects, different types of organizations and individuals in contemporary society depend on information systems in leading their operations and activities, maintaining competitiveness on the market, offering different services and advancing personal abilities and capacities, and also by availability to new information technology. Providing different human activities information systems influenced society changes, made everyday actions faster and influenced structure of system and subsystem, changed methods of offers and demands of

products at the market too, and even understanding and approach to work. [3]

Information systems, from information point of view, present set of methods, procedures and resources coordinated in such manner to help reaching certain goal. Activity of every information system can be divided on the following main parts:

- Data collection
- Data processing,
- Storing of data and informations
- Distributing data and informations to users.

Information system consits of two functions: informing function and documenting function.

Observing from system approach point of view "Information system presents organized set of methods, processes, and operations for collecting, storing, processing, transfering and distributing data inside one organization, including equipment used for those purposes and people who do those activities." [1]

Working within certain organization information system provides to it relevant communication as within itself and with its surroundings. Because of that, condition and assumption of existence and development of any organization is to have at its disposal custom-made and adequate information system in which all procedures and methods of information activities are analysed and elaborated. Depending who does the activities, information system can be manual or computerized, that is supported by information technology. If people do those activities then that organization has manual information system, and if those activities are done by modern informational technologies, then those organizations own computerized information system.

"Information system supported by information technology is information system which includes usage of computer technology." [3]

III. INFORMATION SYSTEMS' DEVELOPING CONCEPT

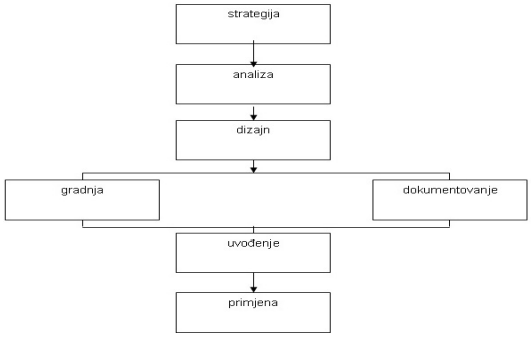
Activities of planning, projecting and realization of new or modification of existing information system includes development of information systems.

Methodology of projecting information systems includes modeling of process, data and resources, and also applying to system of any kind.

Developing usage of information systems in education it is achieved:

- Establishing modern educational system which is adapted to needs of information society,
- Development of digital educational resources,
- Teachers' knowledge for usage of information technology,
- Increasing the level of knowledge and skills for usage of information systems with wide population,
- Knowledge for usage of information system at work place in a manner which will increase level of efficiency, improve work quality and provide better jobs,
- Intorducing modern concept of e-studying and open distance studying,
- To make information system integral part of educational programmes, educational programmes and teaching processes adapted to needs of information society, and teachers trained for modern features of education,
- Developing concept of education and studying during entire life,
- Including society groups with special educational needs, which includes acquiring knowledges and skills form the information technology field.

Developing of information system according to principles of life span includes such process which goes through sequence of successive processing phases, where ending one phase starts the next one and where in-between phases there is strong connection. [5]



Picture 1. Development of the life span of information system

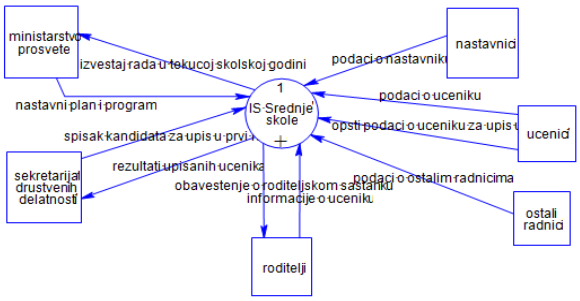
With this process system analysts, software engineers and programmers create and build information system for business subjects.[1]

IV. USAGE OF INFORMATION SYSTEMS IN HIGH SCHOOLS ON THE REBUBLIC OF SRPSKA TERITORY

Foundation or the base for efficient leadership in education presents educational information system. Information system is the most important part of the organizational-pedagogical system of the school. By realization of educational information system information presumptions for leading and developing information system are improved. Like any other information system, high school information system should provide collecting, transfering, processing and storing data, the same as distributing informations to users. In that way, improvement, development and modernization of educational process is ensured, and it is also possible to lead educational system with more quality.

With development of modern technologies comes to development of new communicational and presentational tools. When specialized software packages appeared they made organizing both, management and deucational process easier to the great extent.

In high scools on the wide area of Republic of Srpska (30 schools at the moment) EDUIS information system, which includes wide range of activities of high schools' institutions, is in use.

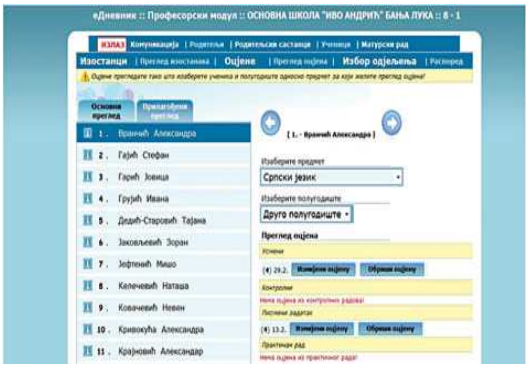


Picture 2. Data streaming diagram of high school information system

Faster and more efficient communication with parents is achieved by using electronic class journals, as unique practical solution for parents to have direct insight to students' achievements, grades, behaviour and absence from classes. Using electronic class journals also has major influence on students' opinion about education and presents to them additional motivation for better grades and fewer number of classes they didn't attend, because of parents' every day insight on their education.

Picture 3. Web site of electornic journal

As a part of this system there is a module for Ministry, based on which, responsible persons and institutions have accurate information about management of certain school institution at any time. Based on that module ministry can control teachers' work and collect different statistic reports about achievements of the classes sorted by various criterias and to follow activities of the teachers.



Picture 4. Preview on teachers module

By using information system in high school education teachers have great advantage comparing to teachers who haven't yet switched on this manner of organization in education. Module for teachers in educational information system makes logging grades in class journal and following students' absence from the classes easier to the great extent. Teachers also write subject's content in electronic class journal and required books, and based on that students are allowed to see electronic form of certain subject's annual plan. [4]

Based on the experience of the teachers who use information systems for all sorts of records, it is proved that saving time, human and other resources is the main advantage of introduction of information systems.

Preparing statistic reports for teachers' councils is made easier for teachers, and there is also possibility to get already written diplomas at the end of the school year, which means they don't have to write them manualy.

Usage of information systems in education itself is seen through increase of quantity and quality of levels of knowledge and skills of teachers who use information system in their work, and also through higher level of individuality of studying, or that is in students independece when working. Accuracy in making tests, giving possible answers, simpler and more accurate correcting errors is increased and it is given higher and easier possibility of following students' results and progress during high school education. [4]

It's noticeable that among high school youth this type of education motivates students, makes subjects' content more interesting, creates faster and longterm memory and developes students' self-initiative when working.

Parents module can include informations about parents meetings, and what is very important all existing problems can be found out through this module. Based on that, parents, at any time, have insight on all informations about their child's education, with easy and visual interface for usage.

At the municipality Doboj teritory there is no usage of information systems at the moment, but it is expected in the near future. High school teachers are interested in this way of organizing teaching process for that would make administration and organizing educational process easier to the great extent.

Education of Doboj's high school teachers, who were not educated enough for usage of educational information systems, is previously done. Education was organized on initiative from schools and Republic of Srpska Ministry for education and culture.

V. CONCLUSION

Need for introducing information system is seen through possibility of covering all information streams in managing educational system, in accordance with tasks which are done in that system.

Form information systems is expected to provide base for executing different assigments and demands which users put on the system. That arises need for complex and efficient information technologies needed for creating, building and functioning of information system.

In the nearest future, high school education should be adapted to changes in education, which were made by the influence of information technologies. Equipping schools presents the first condition for usage of information systems for advancing teaching process, which should be one of the main goals and assigments of every school's management.

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LIFELONG IT TEACHER EDUCATION AS AN OPEN AND DYNAMIC PROCESS

D. Dević, B. Nikolić, T. Šašić, S. Jokić, E. Tobolka
Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
dijanadevic89@gmail.com, nbudimir87@gmail.com, sasicka@hotmail.com, smaletin@tfzr.uns.ac.rs

Abstract - New challenges imposed on education drive the need for training and professional development of its employees. The modern conception of education requires continuous training of teachers to solve everyday problems and adapting to change. Teacher training involves changes in specific knowledge, abilities, skills, attitudes or behavior in order to prepare for better performance of the present work. The new generation accustomed to the use of modern ICT (information and communication technologies) to accept the information in new ways. Teachers need to enable these students to present information in an appropriate manner. This is possible if teachers are trained and qualified to use ICTs and open to lifelong learning.

I. INTRODUCTION

The continuous development of science, technology and society in general, requires a steady lifelong development and education professors. Although modern technologies enable the acquisition of knowledge, skills and abilities outside of teaching, contemporary analysis of education point out that the teacher is very epicenter of the formal education of students. However, the role of teachers today, and his 60-position of the last century has dramatically changed.

Each new generation is increasingly reliant on modern technology, and is their way of viewing the world has become different. Modern generations are accustomed to a different lifestyle, the way we receive new information, the way they master the material and so on.

From this angle frontal form of teaching, the modern generation can'not represent knowledge that dates back to the example. Plato and Aristotle, as it once was. The fact is that this knowledge is valid and incontestable, but the frontal method of teaching does not help in acquiring, understanding and ultimately use them.

Since our time is characterized by numerous, varied and often radical changes in all spheres of human life it is necessary to make changes in the field of education. For coping with these changes, the mere possession of ready knowledge may not be enough for the education of youth. Modern generations are accustomed to multimedia information display, and if they are they do not appear in such a way, probably will not be overcome, and the teacher's role today is more difficult than it was in earlier decades.

At the present time, the teacher has the task to "create" young people who will be trained to recognize and solve problems, to come up with new solutions and new discoveries, people can easily adapt to new technological and other changes that will be empowered to choose and the decisions that will be able to communicate with others, be collegial, aware of yourself and your abilities.

To create such a person, the education is necessary to introduce major changes. Consider the fact that only 80% of primary current to do jobs that now may not exist, and will use technology that we are yet to come. Therefore, we must turn to reforms in education. What reforms should be made in education, are best able to assess the teachers themselves, because, as noted above, teachers are the epicenter of formal education. Only motivated teachers can establish a quality education system, a result of such a system is invaluable, because it "create" high quality, flexible and confident young people.

To understand the present status of education and teachers must be taken into account that in the previous period, the percentage of spending on education in GDP was in decline. Today's average teacher salary is the best illustration of the social status and reputation of the teacher. Many years of low wages and poor working conditions have resulted not only in loss of motivation, but also corruption. Moreover, the number of teachers who work extra jobs, they engage in other activities that have nothing to do with teaching, and feel no need or desire to use at least part of their free time for training [7].

This work will be exempt issues that are being told in the work of Prof. Dr. Ružice Rosandić and her colleagues, because the situation in the

country, where education has not changed much, but the emphasis placed on information and communications training for teachers.

II. EDUCATION TEACHER

In recent discussions on the role and status of the teaching profession is more and more about the professional development of teachers, not about education or training teachers. Maybe someone will think it is a game of words, however, this view is fundamentally changing the concept of view of the teaching profession, to his further education and training.

The most powerful driver of the company's education and requires the application of innovation in order to quality work. In recent years in Europe and the Republic of Serbia there was promote lifelong learning and lifelong learning. One of the strategic goals was promoted in Lisbon in 2000. year, to Europe until 2010. in this area, becoming "the most competent and dynamic knowledge-based economy" [5].

A society that teacher's a set of social and human capital, leading to economic prosperity of the country [10]. The indisputable fact that "knowledge is power" (Bacon) is connected with the fact that science and technology continually going forward, and imply that one should constantly be formed and has a stake in society.

Formal education is limited, regular, hierarchically structured learning, which leads to the acquisition of certificates and diplomas in primary, secondary schools and colleges.

Informal education is unplanned, individually, personally initiated the most education. Acquired pursuant to the everyday experiences, socialization, reading books and literature, communication with other people, monitoring educational programs. Sometimes referred to as accidental learning or learning by doing.

Non-formal education is organized and planned facilities that take place outside the formal system of education (seminars, training courses ...). These are activities that encourage individual learning, the acquisition of different knowledge, skills, attitudes and values development, activities that are complementary to formal education.

In general terms lifelong learning and professional development is the development of people within both her professional role and in the framework of formal and informal education. Professional development is a broader concept of teacher training and upgrading, career, it is a long process that involves itself in a variety of planned system capabilities that enhance the professional growth and development of teachers.

Professional growth and development of teachers, increasing teachers' implies awareness of what, how and in what way can improve the educational learning process. Professional development has been defined and consists of four components [12]:

- The first phase begins with the compulsory period of education and internships, and this phase is completed by passing the exam for the license. In this way, officially confirmed the ability of teachers to be able to do the job alone.
- The next phase of the training, conducted in accordance with the Rules of continuous professional development and acquisition of teachers, tutors and associates [11], which states that a teacher, counselor and an associate has a right and duty to pursue advanced training, and facilities obligation to ensure the realization of those rights.
- The third stage is the monitoring and evaluation system. The goal of monitoring is a modification, improvement, improvement of practice. It is therefore necessary to evaluate not only the results but also the process that led up to them. Evaluation is the basis of intervention actions. The results that come after the evaluation we used as a concealer for further work.
- The last stage makes progress through the acquisition of title, which aims to provide personal support and professional development of teachers, active participation in planning and implementing education, development of professional autonomy and developing and improving the quality of the educational system. Obtaining the title of the institution is possible only through professional development and application of knowledge in practice. The law prescribes four titles, which teachers may or may not need to acquire: pedagogical advisor, mentor, instructor and senior adviser to pedagogical.

Key determinants of professional development that is a continuous process, systematically planned, lifelong, complex dynamic model of cooperation between a number of different

institutions (schools, colleges, professional associations, etc..), That takes place in schools and the students and in collaboration with colleagues, because teachers are key players of quality education. M. Vilotijević stated that the school as a peaceful and relatively closed oasis of knowledge must grow into an open research station in which the young acquire and continually update the knowledge [8].

The teacher is the one who directs the activities of students, in other words, learning is managed. Despite the fact that the individual learning activities, teacher's role is to motivate students, help them build their own learning style, each of them is progressing at a pace that suits him and themselves come up with new knowledge. In this context the use of modern technology offers great opportunities, both in terms of rationality and efficiency of the educational process and the self in terms of both teachers and students.

III. ICT TEACHER EDUCATION

Most teachers in the Republic of Serbia had a moderate attitude towards the use of modern information technologies in educational process. This problem is deeply rooted in the social system of the Republic of Serbia, because most of the faculty's mission to "create" educators in their educational curricula, IT is only the first year of study. Lack of computer literacy is not only represented among future teachers, but it occurs at the primary level, which does not represent the true path to further education and upbringing of future generations. Well-known statistics that are performed in the Republic of Serbia, and the results of the computer literacy of students are devastating.

Technology is, as noted above, progress and become an integral part of everyday life. Created a computer on which the last century could not even dream of, and the Internet has become the world's largest library of human knowledge, and some teachers still refuse him, holding fast to the old beliefs and traditional forms of teaching.

Most teachers spend many hours trying to teaching fact that it is best to learn, not to surrender, because certain subjects are best taught using computers and different programs.

However, it should be noted that the teacher does not expect the modern tendency to be imperative to continue. Just the right choice of teaching methods can provide mastering, which does not mean that the teacher must always apply a computer or any other technological invention. In contrast, the teacher must critically examine all aspects and select those teaching methods that could best be used to direct students toward independent thinking and reasoning, they included themselves in the application of modern technology or not.

A teacher in his work must achieve a balance between tradition and modern trends, between what is in teaching already proved successful and what was imperatively required. What the teacher is more relevant and pedagogically qualified, to him will be easier to determine what it is that needs to be changed, and what to preserve in his previous work, because the only objective and critically evaluate their own work, teachers can move forward.

Improvements to the teacher in his work to establish, should not only assess the pedagogical aspect but also in terms of improving the spiritual process that occurs as a result of communication and interaction between teachers and students and between students themselves.

From the standpoint of sociology, a man is defined as a social being, and is one of the most important task of every teacher to teach students basic social and moral norms, and to teach them to respect and accept their peers as equals, and prevent any form of discrimination. Which implies that student’s must continually develop tolerance, and teach them the culture of discussion.

This task can be contradictory application of technology in teaching, because the question is: How much growth can lead to technical improvement of the quality of life and the socialization of children, when Serbia was the biggest trend in the use of social networks? This question in turn and many others, such as: Do you mean the technical progress and moral progress; As technical progress reflects the value system in a given society? etc..

The key issue for teachers is: How their knowledge to make stimulatory for the development of thinking in students, to connect theoretical knowledge with practice, and that is the best way for students to get interested in the material?

Although the answer to this question is not unique, the solution can be found every teacher. If the teacher is familiar enough with the abilities and interests of students, the only thing he needed for the realization of the goals is motivation and a

good knowledge of teaching methods to turn your ideas into action. Thus, for example. blackboard full of formulas in chemistry or physics simulations can replace or videos on your computer, and these same examples will be much clearer and more comprehensible.

The fact is that teachers can't ever resist modern technologies, and new generations who are accustomed to the standards of modern technology, but they should join. This statement does not mean that the teacher should change the entire organizational and methodical way of working, but only to the continuous professional development, trying out new teaching methods, objective self analysis and finally draws conclusions that the new teaching methods give better results or not. Training of teachers should not only informal but also formal and created a system of professional training for work, education system INSET (In-Service Education for Teachers), designed as an upgrade of formal education, innovation knowledge acquired during training for the job of teachers, and improvement of skills and abilities, the application of knowledge and practice. Šefika Alibabić emphasis on skills and experience exchange in the process of professional development. In the INSET-a is achieved continuous professional development of teachers [1].

Professional development of teachers in the implementation of IT can be reduced to a certain organizational forms within the INSET-a (training, courses, seminars, training, counseling, experimental classes, distance education - E - learning, professional references and informal forms of education), it is necessary to enable the teacher and the use of computers in teaching, to discover all the advantages that technology offers, and to use them in the best possible way.

IV. CONCLUSION

A teacher must never forget that the process of teaching primarily interpersonal relationship that is learning through dialogue and understanding, for teaching and learning process are the unique design of the spirit, growth and development and those who teach and those who teach. New technologies should encourage teachers to apply modern methods that will enable them to rebuild the relationship between teachers and students, which may seem a motivation for both sides.

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INFORMATION LITERACY AND INFORMAL CONTEXT LEARNING

D. Grahovac, D. Karuović, B. Egić
Technical faculty "Mihajlo Pupin", Zrenjanin
aruena@tfzr.uns.ac.rs

Abstract - Informal learning does not have the appropriate status of the generally accepted measures referring to education. The informal learning values and methods are less present than the principles values and methods presented by schools, faculties and universities. The expansion of the information technologies development and application in all spheres of society demands a new, wide and versatile knowledge, which is to say that the formal learning can hardly satisfy all individual and social needs. On the other hand, informal learning has not been exploited enough.

Due to everything that has been stated, it is necessary to explore in detail the degree of students' information literacy and the factors that affect the level of students' information literacy. Are these factors educational institutions, family, peers, the Internet, mass-media,...? Do the informal learning and particular educational activities that help you 'learn without noticing you are learning' have an impact on students' level of information literacy and to what extent?

I. INTRODUCTION

Contemporary revolutions in science and technology have given rise to outstanding changes in all spheres of society. As a civilizing process, informatization has an impact on all segments of life and work, including the systems of education. Many scientists believe that the contemporary education is not sufficiently oriented towards the achievements and attainments of the information and communication technologies (ICT). Therefore, numerous political and pedagogical strategies have been implemented in order to acknowledge and validate informal education and learning, in within the European Union and European Council, as well as within the cooperation of these two European institutions.

Commerce development tendencies have shown that education and creation of human resources are among top priorities of national strategies and policies of social, economic and technological advancement. Constant changes in society and economics, a rapid development in science and technology and especially the expansion of modern and postmodern technology forms represent a highly educated population that is capable of successfully participating in social processes and using the available technology. In this way, developed societies necessarily become learning societies.

Education is obliged to follow the most innovative information technology achievements and to use new technologies. The basic task of educational systems is to ensure that every individual develops his potential, becomes capable of using his knowledge and of improving it, selects what is important within a certain context and understands what he has learned. Solving this task is not simple but one thing is certain-changing and adjusting educational contents, approaches, structures and strategies, including the inclusive approach to students are starting points which lead towards solving the task.

The basic objective of introducing the contemporary technology into an educational environment is to facilitate obtaining knowledge and to make that knowledge lasting as much as possible. It depends both on financial opportunities and subjective factors – lecturers and students, on his volition and capability of dealing with the contemporary technology.

It is in human nature to be intimidated by introducing innovations and to resist them. It is a natural fear of changes, convictions referring to a negative effect of those innovations and to overcoming the 'obstacles' which go along with innovations. This is exactly when it is necessary to enrich learning by applying contemporary technologies but also to open the door of informal learning, so that the gaps in the area of possessing skills are fulfilled, which makes knowledge and skills visible. This is how the students' motivation is affected in a positive manner because by explicitly recognizing what people can do, one can experience his own values. To a great extent ICT will contribute towards making the obtained knowledge up-to-date, developing, exploratory and technological. Simply, today both students and lecturers have to know how to use contemporary methods and technologies in the sphere of education.

Within an information-oriented society teaching methods have to improve the teacher's and student's ability to use the power of information. Teachers should always point out the importance of a high quality of information. Students should be taught to make a distinction between a fact and an opinion. The key lies in the ability of evaluating information, establishing its value in comparison to other information and in establishing authenticity and modernity. Is there any space for informal education and informal learning for teachers and students? Currently, the informal learning does not have the status of generally accepted measures referring to education. The informal learning principles, values and methods are less present than the principles, values and methods presented by schools, faculties and universities. The expansion of the information technologies development and application in all spheres of society demands a new, wide and versatile knowledge, which is to say that the formal learning can hardly satisfy all individual and social needs. On the other hand, informal learning has not been exploited enough in our country.

It is equally important that students possess both information and informational literacy, the knowledge about these sorts of literacy and how important they are for education today.

II. LEARNING IN DIFFERENT LIFE CONTEXTS – LIFE-WIDE LEARNING

In Europe contemporary flows in the sphere of education strongly promote 'learning during whole life' – lifelong learning but also learning in 'different life contexts' – life-wide learning. The ambitious strategic aim of the European Union, proposed in Lisbon in 2000, suggests that Europe should become 'the most dynamic and competitive economics based on knowledge' until 2010. To put it more simply, it should get closer to the ideal 'Europe of knowledge'. Both younger and elder people should be encouraged to use opportunities for their own improvement in and out of a school context.

Every kind of learning which leads towards a higher rate of employment, personal development, more active attitude in society and understanding contemporary European values should be valued and acknowledged. In this context, thanks to its flexibility and ability to respond to rapid and intensive changes of 'Growing Europe', informal learning has a significant role. In recent years, numerous political and pedagogical strategies have been implemented in order to acknowledge and validate informal education and learning, in within the European Union and European Council, as well as within the cooperation of these two European institutions. The fact that using Tablet PCs in the world (the USA, Japan, China, India, South Korea) has become a reality the best testifies how much attention in the world is paid to new educational technologies, i.e. their application in teaching. For instance, the Ministry of Education of South Korea has published a plan to digitalize all school books until 2015. The Ministry will provide free Tablets for children coming from poor families.

The term 'learning in different life contexts', which appears in various documents of the European Union, points to three basic forms of education in the contemporary society – formal education, informal education and informal learning.

A. Formal education

Formal education is conducted in specialized school institutions and after this process an individual obtains a certificate about the qualifications gained. Formal education is regulated by particular legal acts and knowledge and skills are obtained according to a plan and program that has been determined in advance in accordance to established education standards. Knowledge is gained gradually, depending on the age and this is why it is divided into grades and degrees (primary school, secondary school, higher school and faculty). Prime characteristics of formal education are: high level of institutionalization, equality on the level of primary education, varied secondary and tertiary education which enables specialization in various kinds and levels of qualification. The basic disadvantage of formal education is its inertia because it adapts more slowly to society changes, i.e. it does not follow rapidly all the changes in society and development of new educational technologies.

B. Informal education

The Europe's new educational area represents an affirmation of lifelong learning and linking formal and informal forms of education via developing programs of good quality.

A consequence of the formal education inertia or its own nature results in its not being able to keep track of the development of new discoveries. Therefore, informal education's purpose is to

make formal education complete and to give us the opportunity to access all those contents which are inaccessible through formal education or which are completely intact; such as various courses in specific skills and practical business skills, self-improvement etc. However, there are numerous similarities between formal and informal education – both are based on a bipolar process of teaching and learning with lecturers or teachers, and on teaching contents. Due to the lack of a sufficiently effective model of flexible formal education, in some cases, informal education is the one that narrows the gap between the existing and necessary education, scientific disciplines and wishes of young people. Informal education is conducted through activities such as courses, seminars, lectures, conferences, workshops, different types of training and volunteering. Even though informal education is not legally regulated and there are not any particular rules about what it should be like, there has to be a frame within which it can be conducted, as well as the aims and tasks which have been prepared in advance and which are to be followed and adapted to a target group. Exactly due to the differentiation of education contents, it has to be flexible in order to suit all students. What is typical of informal education is that students have to take part in those courses, seminars etc. voluntarily, and usually it does not depend on the age, experience or previous education. A lecturer has to be a trained and competent person and his/her role is not just teaching but also there has to be an exchange of experience and skills between them, and students have to learn through practical work, so that those who are learning become active factors of the learning process.

C. Informal learning

According the EU Commission (2000):

"Informal learning is a natural part of everyday life. As opposed to formal and informal education, informal learning is not necessarily intentional, and therefore it can be recognized by individuals themselves as a contribution to their knowledge and skills."[5]

"Informal learning is a lifelong process through which every individual gains attitudes, values, skills and knowledge from everyday experience and educational influences coming from the environment." [6]

Informal learning, also known as 'life school' is the oldest way of acquiring knowledge and skills; it is something natural in everyday life. It is lifelong, voluntary, unplanned and spontaneous; it appears through interaction with friends, parents and media, without any special plan or structure. Informal learning represents a combination of life and learning and it relies on systemic and cumulative aspects of everyday experiential learning.

As opposed to formal and informal education, informal learning does not have to be conducted consciously, and it often comprises educational activities that help you 'learn without noticing you are learning'. The substantial difference between formal education and informal learning is that formal education invariably implies teaching, whereas this is not the case with informal learning. In contemporary high-tech societies informal learning can take place in various environments such as libraries, museums, scientific centres, botanical gardens and mass-media, and one of the most exploited resources of informal learning is the Internet.

The strategy and concept of learning has become a major baseline for social, state and educational policies in the world. Its realization depends on individuals' qualifications for operating in an informatics environment, possessing skills of finding, selecting, evaluating and using information timely; in other words, it depends on information literacy.

III. INFORMATION LITERACY

The fact that the International Alliance for Information Literacy (IAIL) was formed in 2003 at the suggestion of the Prague Conference of Experts on Information Literacy the best shows how much attention is paid to information literacy in the world.

One of its objectives is to allow the exchange of research work and knowledge about information literacy between nations. The International Alliance also believes that *lifelong learning* is a basic human right and that her final goal is the usage of information literacy in order to offer the opportunity to take part in the *information society* to all people, so that they can exercise their right. Founders of the International Alliance are the Institute for Information Literacy of Australia and New Zealand (ANZIL), with its bases in Australia and New Zealand (http://www.anziil.org/), European Network for Information Literacy (EnIL), with its base in the European Union (http://www.ceris.cnr.it/Basili/EnIL/index.html),

National Forum for Information Literacy (NFIL), with its base in the USA (http://www.infolit.org), NORDINFOlit with its base in Scandinavia, SCONUL (Society of College, National and University Libraries) and Advisory Board on Information Literacy with its base in the United Kingdom (http://www.sconul.ac.uk/groups/information_literacy).

The concept of information literacy developed along with the advancement in information and communication technology in the early 1970s, and the term was first used in 1974 by Paul Zurowski, who was the first man of the information industry at the time. On behalf of the National Commission on Libraries and Information Sciences in his report he defined information literacy as 'an efficient exploitation of information in a problem solving context'. [1]

The American Library Association (ALA) says: "In order to possess information literacy, a person has to be capable of recognizing which particular information is needed and afterwards, that person has to be capable of finding, evaluating and using the information efficiently."

Finally, in 1989 the U.S. Presidential Committee on Information Literacy published a report which even more pointed out the significance of information literacy by defining it as 'the ability to recognize important information, and also to find, evaluate and use it efficiently'; once again pointing out that information literacy is 'a skill necessary for lifelong learning and for creating an informed and prosperous citizenry'. [2]

In 1998 the American Association of School Librarians (ASSL) and the Association for Educational Communication and Technology published *Standards of Information Literacy for Students*, which presented nine indicators which can be used by secondary school librarians and teachers when defining an informationally literate student and determining the influence of information literacy on independent learning and social responsibility:

1. An informationally literate student approaches information efficiently and effectively.
2. An informationally literate student assesses information critically and competently.
3. An informationally literate student uses information precisely and creatively.
4. A student learning independently is informationally literate and seeks information in accordance with his own interests.
5. A student learning independently is informationally literate and understands the importance of literature and other creative forms of information.
6. A student learning independently is informationally literate and strives to being successful when seeking information and obtaining knowledge.
7. A student contributing positively to the intellectual development of a community and society is informationally literate and understands the importance of information within a democratic society.
8. A student contributing positively to the intellectual development of a community and society is informationally literate and behaves ethically towards information and information technology.
9. A student contributing positively to the intellectual development of a community and society is informationally literate and participates effectively in seeking and creating information. [3]

In 2000 the Association of College and Research Librarians (ACRL), a branch of the American Librarian Association, published *Information Literacy Competency Standards for Higher Education*; thereby providing five standards and a significant number of indicators regarded as best way for the implementation and evaluation of information literacy programs after finishing secondary school. The five standards are:

- An informationally literate student determines the type and scope of information on his/her own
- An informationally literate student approaches the information needed effectively and efficiently
- An informationally literate student critically assesses information and its sources and incorporates the chosen information as a part of his/her own knowledge base and system of values
- An informationally literate student, either as an individual or as a part of group,

effectively uses information in order to reach a particular goal

- An informationally literate student understands numerous economic, legal and social problems which surrounds the information, thereby approaching them and using them in an ethical and legal manner.

In 2007 the American Librarian Association broadened and altered the standards that should be followed by librarians. The addition published is *Standards for the 21st Century Learner* and it tackles several types of literacy: information, technological, visual, textual and digital literacy. These literacy aspects are organized within four principal objectives which would enable students to "use skills, resources and means", to "explore, think in a critical way and obtain knowledge", to "make conclusions, reach decisions based on facts, apply their knowledge in new situations and create a new knowledge base", to "exchange knowledge and to contribute to the development of a democratic society in an ethical and productive manner" and to "strive to personal and aesthetic development". [4]

IV. CONCLUSION

"During their lives all people learn consciously and subconsciously and they have a legitimate necessity to have their learning acknowledged and supported everywhere and in every form." [7]

A constant and accelerated development in science and technology, especially the expansion of modern and postmodern forms of technologies, represents a highly educated population who is capable of participating in social processes efficiently and of using the ICT available, i.e. a population which is informationally literate. The educational trend of today is characterized by striving for flexibility, individualization; it creates a necessity to learn anywhere and at any time through formal and informal education and informal learning.

Educational institutions have to focus on information literacy on all levels. This demands commitment to learning during whole life and the ability to discover and identify innovations necessary for keeping up with changes.

Informal learning is a very important educational process and we are witnesses that a great number of learners are learning in informal contexts. Furthermore, one of the most exploited resources of informal learning is the Internet and it is assumed that a great number of learners have gained knowledge about ICT outside of formal education. Particularly, it should be highlighted that, due to the inertia of formal education, there is an enormous necessity to get information and knowledge about ICT in other ways, because school contents do not completely follow innovations in the sphere of ICT.

The problem of information illiteracy, as a global political and educational unit, has caught many educational systems unprepared by posing the question:"Now what?" How can an enviable level of information literacy be reached? One thing is certain, informal sources and informal learning are unavoidable because it has become evident that formal education is no more capable of keeping up with the development of ICT and fulfill demands for quantity and quality permanent education.

As soon as possible it is essential to provide the answer to the question:"Can the incorporation of informal learning elements into formal education or the implementation of particular educational activities which make you 'learn without noticing that you are learning' into school contents result in reaching an enviable level of students' information literacy?"

Moreover, it is also necessary to determine whether and to which extent *informal learning affects the level of students' information literacy, i.e. to determine whether using informal sources of knowledge contributes to increasing the level of students' information literacy.*

Hence, we have to continue tackling informal learning, we have to continue exploring it and it is serious scientific work that can explore the possibilities of realizing the aforementioned educational units and that can provide the answer to the question:"Now what?"

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PERSONALISING THE WORLD EDUCATIONRABINDRANATH TAGORE AND VISWA-BHARATI

D. Datta
Independent Scholar, Department of English Calcutta University,India
dipannitadatta@gmail.com

Abstract – Rabindranath Tagore (1861-1941) is globally recognised as a poet. His poetic endeavour however personal did not miss concerns for education development for all, the intricacies involving his contribution to world education and uneven reputation notwithstanding... A holistic mode of understanding the civilian space that would relate to questions of identity, relationship and the possibilities of human survival itself was crucial for him. Viswa-Bharati University, his brainchild, was conceived with such a conscious mission to personalise education in an atmosphere where the world would make a home in a single nest. The 'open education' it offered was an alternative to the crisis the system of education was facing during the heydays of colonialism. Today, under the forces of globalism we are having similar uncertainties, ruled by conflicts of race, class, nation and gender. In what follows, the essay while interrogating the need to engage our understanding with Tagore's legacy into the global arena in the context of today's world, will show that personalising education and open education did not oppose the thoughts of East and the West regarding science and humanities. The conclusion will show that maintaining allegiance to human ties influence the boundary of education and vice versa providing conditions for world citizenship.

I. INTRODUCTION

"He alone sees, who sees all beings as himself".

This link from the *Isha Upanishad*, forms the central line of the essay "The Centre of Indian Culture"— a prepared speech of Rabindranath Tagore (He was the first Asian to win the Nobel Prize for literature in 1913) and his first major effort to define Viswa-Bharati University to India and to the world in 1919 (This lecture was delivered by Rabindranath Tagore in 9 February 1919 in Madras, India. It was the first major lecture of Tagore in English on what should be the ideal of education in India. The lecture was first published by the Society for Promotion of National Education, Adyar, Madras (1919)...

To read Tagore just as a poet, thus, is to suppress an early voice contributing towards global consciousness through which I call 'open education'. This is not to discount his achievements as a poet or his poetic imagination. It is to stress the fact of the dehumanising effects of modernisation on educational system, which served as an inexhaustible source of incessant profit during the colonial times; and the opportunities and responsibilities he had accepted from the hands of the modern time. In a letter to William Rhothenstein (who introduced Rabindranath to W B Yeats, Ezra Pound, Brtrand Russel, H G Wells, George Bernard Shaw and many other scholars and intellectual of the time) who obviously urged the poet to stay away from politics Tagore wrote on 6th October 1920:

I have nothing to do directly with politics; ... But politics is not a mere abstraction, it has its personality and it does intrude into my life where I am human. It kills and maims individuals, it tells lies, it uses its sacred sword of *justice* for the purpose of massacre, it spreads misery broadcast over centuries of exploitation and I cannot say to myself, 'Poet you have nothing to do with these facts, for they belong to politics'. This politics assumes its fullest diabolic aspect when I find all its hideous acts of injustice find moral support from a whole nation only because it wants to enjoy in comfort and safety the golden fruits reaped from abject degradation of human race. [1]

The obvious gap between human civilisations that was created through colonialism and its binary nationalism and on the other hand an opinionated brahmanic education style which also indulged in casteism could only be filled up by what I have called as the 'open education' system. In this respect education of the mind was essential. That cannot be achieved through any cut and dried method, not by rote learning, but by widening the relationship— to see all human beings as his own 'self' and not as some 'other' language community. In an extended motto for the university Tagore wrote:

Viswabharati represents India where she has her wealth of mind which is for all. Viswabharati acknowledges India's obligation to offer to others the hospitality of her best culture and India's right to accept from others their best. [2]

II. TAGORE'S IDEAL OF EDUCATION

The differences between the East and the West during the time Tagore inhabited were on the rise, yet he was optimistic that human society has not reached its limit of moral possibility. It is with this conviction he declared that "we must create opportunities for revealing the different peoples to one another". Viswa-Bharati becomes an experiment in which an aggregate of individuals of different civilisations and traditions "learned to live together through a wider relationship of humanity"[3] as Katheleen M O' Connell puts it. Connell has elaborately studied the evolution of the Tagore's thoughts and ideas on education. The epistemological significance and complexities of the scientific inquiry that Tagore's ideal of education development project suggests will be the present focus. Viswa-Bharati embodied what it is called *living beyond the boundary*. The Viswa-Bharati experiment was done on a "world-wide basis", and not on the basis of loving one's own country that nationalism/colonialism/imperialism promoted. It was not done, like, in the closed "Laboratory School, the school where John Dewey [the American Educator] conducted his path-breaking experiments in democratic education reform" [4]. Tagore's university experiments were inspired initially by the *ashramic* tradition of ancient India. But he soon realised that that would limit its geographical boundary and that the idea and practice of students learning and assimilating their learning in joy would become static. The growth of the school-university was his constant engagement. It offered the common meeting ground where the home and the world converged, and where there were no questions of conflicting interests. *Visva*, the world started residing in *Bharat*, India and vice versa. That is precisely what Visva-Bharati's motto is: *Yatra visvam bhavatyekanidam*. This is translated as: "Where the world makes a home in a single nest". In his words it offered the place, "where we can work together in a common pursuit of truth, share together our common heritage, and realise that artists in all parts of the world have created forms of beauty, scientists discovered secrets of the universe, philosophers solved the problem of existence, saints made the truth of the spiritual world organic in their own lives, *not merely for some particular race to which they belonged but for all mankind*. When the science of meteorology knows the earth's atmosphere as continuously one, affecting the different parts of the world differently, but in a harmony of adjustments, it knows and attains truth. And so, too, we must know that the great mind of man is one, working through many differences which are needed to ensure the full result of its fundamental unity".

It is this scientific bent of mind and the philosophy of "truth", which according to Tagore is realised through man, that Albert Einstein paid tribute to. As the above passage reveal Tagore was a defender of human bonds and thus "the state of realising our relationship with all" [3], was important for him. The *Upanishadic* principal to work together in a common pursuit of truth — to realise the 'relationship of the individual to the universe'—became the basis of his educational commitments. Although, his pursuit were steeped with inspirations which were primarily internal (hence personal), and the philosophy was imbibed from the ancient *Upanishad*, he was never opposed to the creative aspects of modern science and remained open to external influences. Science did not simply signify a mechanistic analysis of facts to Tagore. Rather, science was a broader interpretation of facts from which he devised his pedagogy in both conceptual and practical terms. Education of the mind, primarily (not exclusively), in this respect was important for him. Although he did not follow any specific formula to elicit the complexities of the inner-outer dichotomy, science for him rendered a wider perception of the universe. This new philosophical discourse of science, which formed the basis of Tagore's experiments with Viswa-Bharati, finds articulation in his book *Sadhana* (1913)

"In India men are enjoyed to be fully awake to the fact that they are in the closest relation to things around them, body and soul, and that they are to hail the morning sun, the flowering water, the fruitful earth, as the manifestation of the same living truth which holds them in its embrace. Thus the text of our everyday meditation is the Gayatri, a verse which is considered to be the epitome of all the Vedas. By its help we try to realize the essential unity of the world with the conscious soul of man; we learn to perceive the unity held together by the one Eternal Spirit, whose power creates the earth, the sky, and the stars, and at the same time irradiates our mind with the light of a consciousness that moves and exists in unbroken continuity with the outer world".

This open and the inclusive approach that his pedagogy reflects suggest a possibility of the process of survival in difficult political times when the shadows of the present tend to blacken the light of a possibility of its fundamental unity. We must remember that Tagore's life was roughly coterminous with the historical fact of colonial rule and more precisely with the rise and fall of the British Raj. Thus the approach which is essentially holistic also suggests the complex ways of analysing the profundity that underlies the philosophy of maintaining human bond across cultures as briefly suggested above (which is also found in almost all of Tagore's writings) and the often contradictory aspects of narrow necessities that confine a man in 'a prison house'. They emphasise on the need to relate the everyday with the eternal unknown for when a man does not realise his kinship with the world, he lives in a prison house whose walls are alien to him. Amartya Sen's influential observation on what he calls "interpretational epistemology" is useful here. He writes, "While Tagore was totally opposed not only to ignoring modern science in trying to understand physical phenomenon, and particularly critical of giving ethical failures a role in explaining natural catastrophes, his views on epistemology were interestingly heterodox... This is, alas, not the occasion to discuss this engaging issue further. We could ask for clarification as to the sense in which "realisation" is being used. Some would compare Tagore's position with certain recent philosophical works on the nature of reality, particularly Hillary Putnam's argument that 'truth depends on conceptual schemes and it is nonetheless "real truth".

III. CONCLUSION

Although Tagore was deeply immersed with the "truth of the spiritual organic", his ideals were often of a wide range that transcended the limits of a concretely personal. He was aware of the conflicts of the time and by applying the basic insights into science to bridge the gap between the East and the West through education he dedicated his pursuit of truth to the cause of common good. A conflict raged in his mind as to how far he was to devote himself to his work. It caused a deep anxiety for Rabindranath Tagore. The struggle between the inner and the outer has manifested life in its various forms and Viswa-Bharati University by transcending a narrow course of Nationalism, 'the territorial demon', laid the foundation of world citizenship in the divided world in the early twentieth century with an objective of enriching human civilisation and realising the self simultaneously. Rabindranath Tagore did not submit to the violent rule of the machine (which was of benefit of the few), and thereby he laid the basis of liberal education as well. His poetic endeavour in this regard was personal, but that did not miss concerns for education development for all in an era of colonial repression. In brief, by maintaining allegiance to human ties Viswa-Bharati University influenced the boundary of education providing conditions for world citizenship. It is important to engage our understanding with Tagore's legacy into the global arena in the context of today's world especially because the security of basic human rights is still in jeopardy.

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INFORMATION TECHNOLOGY IN EDUCATION

I. Tatomirov, B. Žigić, I. Leontić, J. Stojanov, B. Egić
Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
ivan.tatomirov@live.com, boris.zigic@hotmail.com, ivica.leontic@tfzr.rs, stojanov.jelena@gmail.com, begic@tfzr.uns.ac.rs

Abstract - Knowledge and use of information technology is considered one of the main forms of literacy. For these reasons it is necessary to apply information technology in the teaching process in elementary and high schools. This way it will enable all students to acquire IT literacy. In addition, information technology can be used in the implementation of research activities carried out by students, to present and publish results of their work, preparing presentations, creating databases, using spreadsheets, e-mails and other communication services. In addition to basic concepts of IT in education, this composition presents the pedagogical aspects of proper teaching. We also compare the traditional and modern model of education system. As an example of use of information technology, we will specify e-learning that is appointed into the site of the Technical Faculty "Mihajlo Pupin" in order to provide preparation for the entrance examination in mathematics for high school students.

I. INTRODUCTION

For many years, often talks about the application of information technology in teaching information technology as a good basis for the creative use of knowledge. Computers, the Internet and multimedia are an integral part of the educational process for students to be active users of information technologies, which have become an indispensable element in the development of society, in order to be prepared for their daily use.

Knowledge and use of information technology in the modern world presents itself as elementary form of literacy and culture, equally with the knowledge of reading, writing and calculation. There is no doubt that the use of information technology significantly facilitates learning and work for which the entries and significant changes in education.

Equipping schools with modern equipment and information literacy is one of the priorities of educational reform. The organization and methodology of teaching also need to make radical changes in the way that will be in defining the educational objectives and to take into account the new opportunities provided by technology, internet and multimedia. It is not only improving the environment in which it is used but it's also changing it from the basis.

Every student should leave the school as a computer literate person, which means that the student know how to learn, because they know how knowledge is organized, how and where to find the necessary information and how to edit them and use the information found in such a way that others can learn from them. Then we can say that the student is prepared for a whole lifetime learning because it can always find the information for any task or decision with which to meet, and it is well known that a man learns while he was alive.

In the educational process it is important to establish a system of primary education, which refers to the knowledge and skills of computer literacy, as well as the application of information technology in teaching and learning. Teachers should be trained for carrying out educational projects in the field of IT in learning and to monitor trends of frequent changes in information technology, which is an essential process that cannot be ignored. Also teachers must be trained in the recognition of knowledge using information technology to promote independent learning and to continue self-improvement.

Recent research has shown that computers are effective teaching tools that facilitate the control, regulation and management of teaching and learning through constant feedback. Computers provide faster and more efficient emission, transmission and absorption of knowledge, which allows a new organization of teaching that is closer to the individual interests of students. Teaching and learning with computers are more effective than traditional learning because students are progressing quickly and the knowledge they are more durable. Application of information technology in teaching encourages the development of traits such as imagination, memory, independent learning and builds

sensitivity to problems, openness, flexibility, independence in work and tolerance.

Computers can be used in almost all subjects, and most schools have already formed specialized classrooms for performing multimedia teaching. It is necessary that teachers through professional development programs acquire or improve their knowledge, skills and abilities to apply information technology. Today, the success of IT in education depends largely on the knowledge, skills and abilities of teachers, which includes the use of computers in data handling, communication and problem solving.

The introduction of IT in education brings many benefits some of which are quality educational program, increasing the speed of Studying and information about important concepts. The teacher should be visited equally to all students, helping them to progress at the pace that suits their abilities, to thereby develop abstract thinking and individual progress in acquiring and expanding knowledge.

II. TEACHING AND LEARNING

From the pedagogical point of view student is in the center of learning and teaching. In the figure 1 [1, 12] is shown on the didactic triangle clarifies relationships of students, teachers and teaching content.

If given access to observe the special point where technology occupies a means of learning, we get supplemented by didactic triangle as in Figure 2 [1, 13].

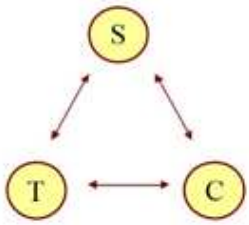

Figure 1: The didactic triangle: students, teachers, curriculum content

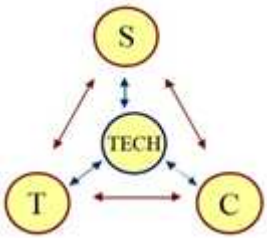

Figure 2: Additional didactic triangle: students, teachers, curriculum content and technology

Information technologies are not limited to use in just one generation, but are fully available to all people of different age groups.

When the work of preparation for teaching, in which modern technologies have an important and active role, it is often forgotten or poorly meet the educational and methodical. People who are planning these facilities are often put into the background students where these facilities are intended.

Information technology has become an integral part of any education system to support teachers in the performance of traditional teaching or as a new method of teaching.

III. TRADITIONAL AND MODERN MODELS OF EDUCATION SYSTEM

Traditional education is based on a model reproduction of knowledge, which is the basic idea of static transfer knowledge from teacher to student. Here the student is a passive recipient of knowledge.

On figure 3 [1, 14] we can see the transition between traditional teaching paradigm and modern.

Internet service WWW (World Wide Web) has allowed the establishment of thousands of systems that apply advanced information technology. Much of these systems had limited the learning opportunities for their work based on a static view of teaching content.

By introducing information technology into the teaching process was changed to current methods of learning and education, and required new methods. There are different types of learning depending on what is taught, the characteristics of the person who teaches, but also the person who teaches. Knowledge is the value that an individual acquires learning and what is different from person to person. Everyone thinks differently and adopt different data in certain situations and depending on achieving personal growth.

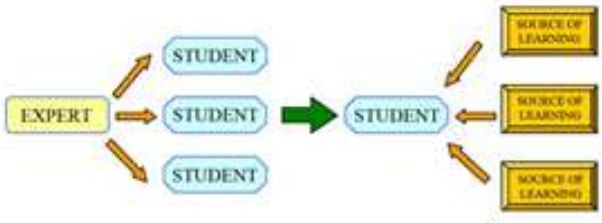

Figure 3: Crossing the traditional teaching paradigm to a modern

Learning is an activity which the individual reaches a relatively permanent change in his

behavior. The changes depending on the information received and processed. It is important to general understanding and ready to bring the level of personal experience.

The term "learning" is much broader than the term "education". The term "education" can be defined as deliberate, pedagogically designed and organized learning experience or an individual that is reflected in increasing knowledge and skills.

In today's development there is still a system in which the material is divided into tightly defined sections where teacher teaches and the student listens. This is not a good way of functioning, especially now that we live in times where we are information technology at your fingertips. The education system should aim at the center instead of being a student teacher. On figure 4 [1, 16] is shown a graphical comparison of two models of the educational system.

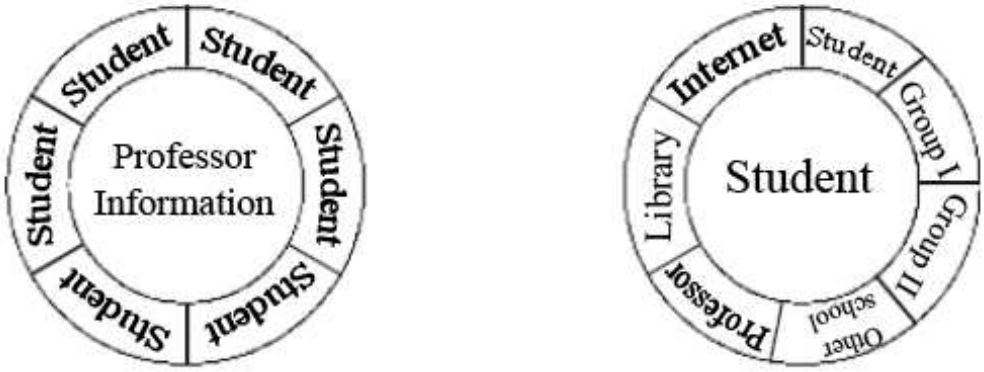

Figure 4: Comparison of two models of education system

Teachers today have to master modern methods and technologies in education and to complement and improve on a daily basis because we have witnessed a rapid development of information technology.

Today's education should be placed in the new framework in line with the needs and abilities of the individual and the circumstances in which the learner. If programmed properly, computers have the ability to make individualized orders.

Teaching and learning are very complex undertaking. A teacher has to balance and optimally deploy all the elements that are essential for the task of learning. In addition to making teachers are important factors for successful teaching and the students' experience with the topic being studied, his general knowledge, the student response to technology, his emotional state, sex, his willingness or unwillingness to cooperate with other students and more.

IV. APPLICATION OF INFORMATION TECHNOLOGY IN TEACHING AIMED AT STUDENTS

A new teaching paradigm is focused on the student. The student is placed in the center, while in the environment are resources for learning. According to all the student-oriented and included the phrase - resources for learning.

As one of the basic functions of teaching aimed at students that are learning shapes to suit the individual needs of students, it is easily noticeable that the most effective and most economical way to achieve this use of information technology.

Information technologies play an important role in all stages of learning for both students and teachers with a new role to support them.

Resources that provide information technology can be used in the implementation of research activities performed by students. However, it is essential that students have clear goals and outcomes so that all their efforts concentrated on the analysis and use of information collected and to solve problems, to avoid unnecessary waste of time.

Also, IT can be a useful tool to help students to be able to present and publicize their work in an interesting and attractive way, with indirect development and elements of competencies that will be very useful in the future. In this case in particular comes to the fore the advancement of knowledge and skills to use business application packages, such as Microsoft Office. The use of programs that are an integral part of business applications increases the relevance of learning and makes it possible to put it into context.

Specific examples of active use of information technology by students are:

- prepare a presentation in support of presenting the results of student,

- creating a database to collect, sort and use the data collected,
- using a spreadsheet as a tool for efficient operation,
- use of the Internet as a resource for finding needed information,
- use of E-Mail and other services for communication within the student teams.

In the near future, its place in schools will take the software to track student progress that could significantly affect the motivation and direction of interest of students. Various questionnaires, quizzes and self-checking applications allow students to receive feedback on their progress, but also to improve until we achieve satisfactory results.

V. ELECTRONIC TEACHING AS AN EXAMPLE OF USING IT IN TEACHING

At the Technical Faculty "Mihajlo Pupin" developed a project called "E-preparatory courses in mathematics for the entrance examination" and placed on the site of the Faculty. It is intended that all current high school students, prospective students and to all those who wish, to master a specific mathematics lecture, which occurs at the entrance exam. Teaching content is led by Professor Momcilo Bjelica and assistants Stojanov Jelena, Danikov Jelena, and Gosevski Biljana.

For now, there are lessons from 9 subject areas, and faculty is intending to add content for other subjects, which are included in the entrance exam.

In this way, every user is able to comply with their knowledge, skills and time to prepare for entrance exams.

When E-learning is started, a choice of lessons is presented, as in Figure 5.

Problem solution can be seen in Figure 7.

Figure 5: The initial appearance of e-learning

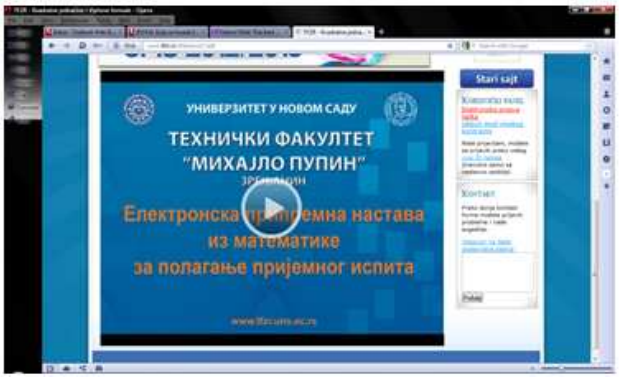

Figure 6: Start e-learning video

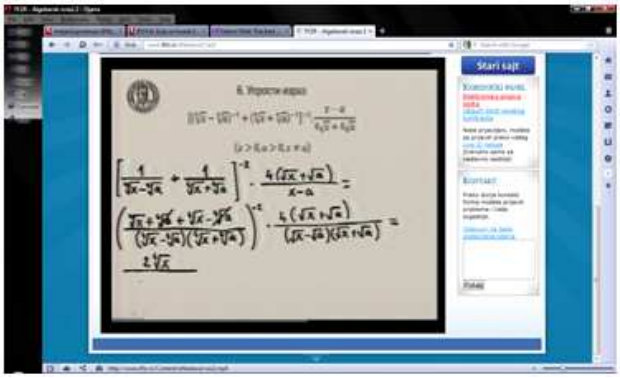

Figure 7: Video recording of the problem

Results on the advantages and disadvantages and possible directions of improvement of this method of teaching will be known after the entrance exam in June this year.

This is one of the most important examples of application of information technology in teaching and educational process in general.

VI CONCLUSION

As information technology became an integral part of life, they have found their place in education. The requirement for quality education is to be associated with quality teaching staff, and therefore the school and should be capable of changing on a daily basis and adjusting to changes in technology and in society and culture. Worldwide information technology is now used to allow each student the appropriate way of learning.

The introduction of IT in schools and teaching I have gained all the prerequisites to change the position of teacher and student, I.e. that teaching is more oriented towards the student to be able to collect information from multiple sources and to advance knowledge and adopt the pace that suits him. Teachers are better prepared for professional development and professional advancement and use of information technology in the teaching process.

The introduction of information technologies in educational process has resulted in increasing the quality, because it required some changes in work organization, teaching methods and forms.

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REPRESENTATION OF INFORMATICS-COMPUTER CONTENTS IN TECHNICAL EDUCATION PRIMARY SCHOOL TEACHING FROM THE 1985/1986 SCHOOL YEAR TO THE 2011/2012 SCHOOL YEAR

M. S. Šiljak *, I.R. Tasić* & S. M. Šiljak**
* Technical Faculty „Mihajlo Pupin“, Zrenjanin, Serbia
** High technical school for professional studies, Požarevac, Serbia
marasiljak@yahoo.com

Abstract- In the Republic of Serbia, since the 1985/1986 school year the 8 class primary school pupils have been studying informatics-computer contents as per appropriate teaching program and within the teaching theme “Electronics and informatics” of the regular school subject Technical education. In previous period primary school education has been included into reform thus teaching programs and plans have been changed in primary schools and these changes occurred in the Technical education school subject. The mentioned school subject had the same name up to the 2007/2008 school year when changed into the school subject Technical and Informatics education and that name exists nowadays. Changes of the primary school teaching plans and programs, where the mentioned school subject was also included, initiated the subject research to set quantitative participation of informatics-computer contents, namely Technical and informatics education in primary schools for the period from the 1985/1986 school year up to the 2011/2012 school year. The reached results confirmed the basic hypothesis that in primary schools, in the observed period and in the mentioned school subject teaching the representation of informatics-computer contents was constantly increased as per number of classes as per school grades.

I. INTRODUCTION

Unique eight years elementary school as compulsory for all seven to fifteen years old children was based and introduced at the Republic of Serbia on September 1st 1959. According to that period plan and program the school subject under the name Basis of general technical education was represented and compulsory from the fourth to the eight school class.

Since the introduction of the unique and compulsory eight years elementary schools the teaching plans and programs have been often changed and supplemented by many reform operations in the previous period for harmonization with politics, social and economy flows of the social community and also for increase of educational achievement of school pupils. Such changes and supplements have been also happened to the plan and program of the school subject Basis of general technical education that parallel the name was changed and finally in the school year 1985/1986 it became Technical education. That name was kept up to the school year 2007/2008 when changed into Technical and informatics education and it is as nowadays.

In the Republic of Serbia, from the school year 1985/1986, the eight class school pupils, started studying the “informatics-computer” contents for the first time, under the teaching school subject Technical education according to the teaching program and within the teaching topic “Electronics and informatics.

The elementary school teaching plan and program changes that happened also in the mentioned school subject initiated subject research to set quantitative participation of the “informatics-computer” contents at the school subject Technical education (TE) namely the Technical and informatics education at elementary schools from the school year 1985/1986 up to the school year 2011/2012.

II. RESEARCH GOAL AND TASKS

By the subject research it wanted to recognize if there were any important quantitative changes in the “informatics-computer” contents in elementary schools, in the teaching plan and program, from 1985/1986 to 2010/2011 school years, in the compulsory school subject Technical education i.e.

Technical and informatics education.

The research goal is: to set quantitative representation changes in the "informatics-computer" contents at the technical education teaching starting from the school year 1985/1986 when mentioned contents were introduced for the first time up to the 2010/2011 school year when was the last change at the eight class teaching plan and program.

Basic hypothesis: during the period from the 1985/1986 school year up to the 2010/2011 school year the quantitative representation increased in the "informatics-computer" contents that was studied at elementary schools according to the school subject Technical education i.e. Technical and informatics education teaching plan and program.

III. RESEARCH FINDINGS

A. Basic teaching plan and program

From the 1985/1986 school year, *by Common plan and program of educational work in elementary schools* [2], the teaching plan and program, valid in that period, had been radically changed and parallel the compulsory school subject Technical education in the eight class had been changed in a way that the "informatics-computer" contents had been for the first time introduced in the "Electronics and informatics teaching topic having 3 classes, that resulted in 2,10 % of a mentioned school subject year fund classes (graphic 1). It is noticed that the first eight class year generation graduated in Serbia in the school 1985/1986 year and had opportunity to study the "informatics-computer" contents of the mentioned school subject. Further, from the school 1985/1986 year, changes and supplements have need made periodically in the teaching plan and program for the first to the eight class school pupils.

B. First change of the basic teaching plan and program

By Rule book on changes and supplements of the Rule book on elementary schools teaching plan and program [3], being applied from the 1995/1996 school year, among others, some changes and supplements had been made in the Technical education teaching program as follows:

- For the seventh class, when the seventh school pupils for the first time studied the "informatics-computer" contents at the teaching "Informatics technology" topic with a fund of 14 classes, that resulted in 19,44% of the mentioned teaching subject year class fund (graphic 1);
- For the eight class, when school pupils had not more studied the "informatics-computer" contents within the teaching "Informatics technology" topic but those contents had been studied through a new teaching "Informatics technology" topic with a fund of 10 classes at the teaching topic "Modules" with a fund of 6 classes resulting in 16 classes, namely 22,85% of the mentioned teaching subject year class fund (graphic 1).

C. Second change of the teaching plan and program

By a new *Rule book on changes and supplements of the Rule book on elementary schools teaching plan and program* [4], being applied from the next 1996/1997 school year, among others, some changes and supplements had been made in the Technical education teaching program as follows:

- For the seventh class there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" and no changes applied in the class fund (14 classes) in the mentioned teaching topic (graphic 1);
- For the eight class there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" and "Modules" and no changes applied in the class fund (16 classes), but there had been some changes in the year class fund that resulted relatively in the increase of class fund of the "informatics-computer" contents by 0,67% with relation to the school 1995/1996 year and it was 23,52% of the year class fund in the mentioned teaching subject (graphic 1).

D. Third change of the teaching plan and program

By a new *Rule book on changes and supplements of the Rule book on elementary schools teaching plan and program* [5], being applied from the school 2000/2001 year, among others, some changes and supplements had been made in the Technical education teaching program as follows:

- For the seventh class there had not been any changes in the teaching "informatics-computer"

contents topic under the name of "Informatics technology" but the number of class fund had been changed: 14 class fund had been increased to 24 classes that resulted in 33,33% of the year class fund at the mentioned teaching program, namely it was by 13,89 % higher with relation to the school 1996/1997 year (graphic 1);

- For the eight class there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" and "Modules" and no changes applied in the class fund (16 classes) in the mentioned teaching topic (graphic 1).

E. Fourth change of the teaching plan and program

By a new *Rule book on changes and supplements of elementary schools for the fifth and sixth school class* [6], being applied in the fifth school class from the school 2006/2007 year and for the sixth class from the school 2006/2007 and 2007/2008 years among others, some changes and supplements had been made in the Technical education teaching program as follows:

- For the fifth class, when the fifth class pupils studied for the first time the "informatics-computer" contents at the teaching "Informatics technology" topic with a fund of 10 classes and in the teaching topic "Modules and constructor modeling - computer exercises with standard applications" with a fund of 4 classes which was 14 classes in total, namely it was 19,44 % of the year teaching fund in the mentioned teaching program (graphic 1);

- For the sixth class when the sixth class pupils studied for the first time the "informatics-computer" contents at the teaching "Informatics technology" topic with a fund of 14 classes which was 19,44 % of the year teaching fund in the mentioned teaching program (graphic 1);

By a new *Rule book on changes and supplements of the Rule book on elementary schools teaching plan and program* [7], being applied from the school 2006/2007 year, among others, some changes and supplements had been made in the Technical education teaching program as follows:

- For the seventh class there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" but the number of class fund had been changed: from 24 classes it was decreased to 14 classes and a new teaching topic had been introduced "Modules-robot constructions of construction sets, work with interfaces, computer use" with a fund of 4 classes that was 18 classes in total, namely it was by 25,0% of year teaching fund classes of the mentioned school subject, namely by 8,33 % less with relation to the school 2000/2001 year (graphic 1);

- For the eight class there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" but the number of class fund had been changed in the teaching topic and it was 14 classes and by mentioned change a new teaching topic "Modules-computer use (internet, e-mail) and work on the base of interface technology" with a fund of 6 classes which was 20 classes, namely, 29,41% of the teaching fund in the teaching subject, namely by 5,89 % higher with relation to the school 2000/2001 year (graphic 1).

F. Fifth change of the teaching plan and program

By a new Rule book on teaching plan for the elementary school second cycle and the teaching program for the elementary school fifth class [8], being applied for the fifth class from the school 2007/2008 year there had been some changes in the Technical education teaching program in a way that it was named as Technical and informatics education and parallel the teaching program for the fifth class had been changed. There had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" but the number of class fund had been changed: from 10 classes it had been increased to 16 classes and by mentioned supplement a new teaching topic "Constructor modeling-modules-pupils with special computer interest could use software on spatial modeling and construction" with a fund of 6 classes which was 22 classes in total, namely, it is 30,55% of the year teaching fund classes in the mentioned school subject, i.e. by 11,11 % higher with relation to the school 2006/2007 year (graphic 1).

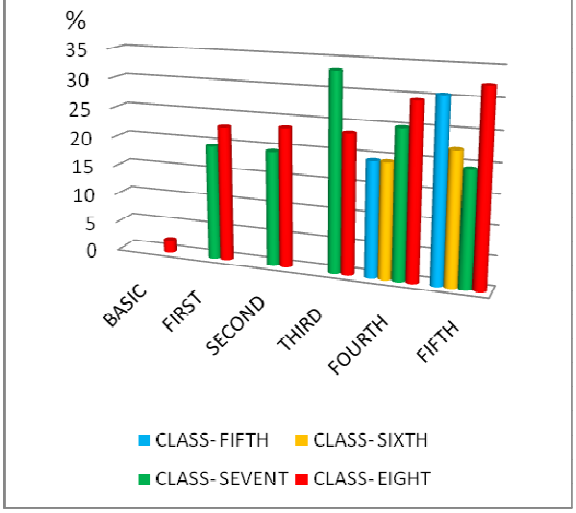
By a new Rule book on elementary school teaching program for the sixth school class [9], being applied for the sixth class from the school 2008/2009 year there had been some changes in the Technical education teaching program in a way that it was named as Technical and informatics education and parallel the teaching program for the sixth class had been changed. There had not been

any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" but the number of class fund had been changed: from 14 classes it had been increase to 16 classes, namely it is 22,22% of the year teaching fund classes in the mentioned school subject, i.e. by 2,82 % higher with relation to the school 2006/2007 year (graphic 1).

By a new Rule book on elementary school teaching program for the seventh school class [10], being applied for the seventh class from the school 2009/2010 year there had been some changes in the Technical education teaching program in a way that it was named as Technical and informatics education and parallel the teaching program for the seventh class had been changed but there had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" and no changes in the teaching topic fund classes (14 classes), namely, it is 19,44% of the year teaching fund classes in the mentioned school subject (graphic 1).

By a new Rule book on elementary school teaching program for the eight school class [11], being applied for the eight class starting from the school 2010/2011 year there had been some changes in the Technical education teaching program in a way that it was named as Technical and informatics education and parallel the teaching program for the eight class had been changed. There had not been any changes in the teaching "informatics-computer" contents topic under the name of "Informatics technology" but the number of class fund had been changed: from 14 classes it had been increase to 16 classes, the teaching topic "Modules-computer use (internet, e-mail) and work on the base of interface technology" had been cut and introduced a new teaching topic "From idea to realization-modules" where two teaching units with "informatics-computer" contents under the name "Simulation of software use as per pupils' tendency" had been introduced with a fund of 2 classes and "Practical examples of management by use of computer" with a fund of 4 classes which was 22 classes i.e. 32,35% of year teaching fund classes in the mentioned school subject, namely it is by 2,94 % higher with relation to the school 2006/2007 year (graphic 1).

It is noted that school pupils who will finish elementary school in the school 2011/2012 year, with relation to the school pupils who finished their elementary school in the school 2010/2011 year, have not had any recorded changes in elementary school teaching plan and program, they have not had any recorded changes in the teaching plan and program at the Technical and informatics education school subject and there are no differences in the teaching fund classes number of the "informatics-computer" contents, in the Technical and informatics education school subject from the fifth to the eight class.



Graphic 1. Changes on elementary school teaching fund classes with "informatics-computer" contents in teaching of TE i.e.TIE according to the teaching plan and program changes

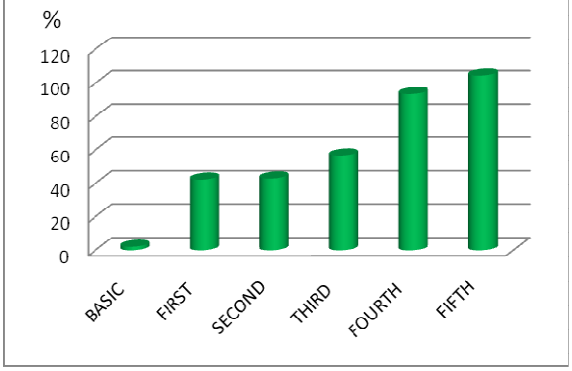
IV. CONCLUSION

The subject research results show that the basic hypothesis is confirmed as a whole i.e. in the period starting from the school 1985/1986 year up to the school 2010/2011 year the quantitative representation of the "informatics-computer" contents being studied at elementary schools according to the teaching plan and program for the school subject Technical education namely Technical and informatics education was increased.

The research confirmed that in the observed period, by the elementary school teaching plan and program, from the fifth to the eight classes and specially in the part referring to teaching of the school subject Technical education namely Technical and informatics education, an intensive and cumulative increase of fund classes is clearly expressed for studying of "informatics-computer" contents and there was no increase of teaching year fund classes from the mentioned school subject.

Practically and virtually, school pupils who finished elementary school in the school

2009/2010 year (the fourth change of teaching plan and program) and on the school 2010/2011 year (the fifth change of the teaching plan and program), from the fifth to the eight class, had only one whole school year with "informatics-computer" contents in the school subject Technical education namely Technical and informatics education (graphic 2).



Graphic 2. Cumulative representation of informatics-computer" contents in the school subject TE namely TIE in elementary school according to the teaching plan and program changes

The research results may contribute in general development of pedagogy theory and practice in the field of elementary school teaching and/or may specially contribute in improvement of Technical and informatics school subject teaching and/or may be a support as a reliable base for any future elementary school reforms to increase pupils' educational achievements proving validity and the merits of the subject research in space and time.

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THE IMPORTANCE AND ROLE OF EDUCATION IN SOCIETY

I. Tasic*, J. Tasić**, T. Mitić**, D. Tubić***
*Technical Faculty "Mihajlo Pupin", Zrenjanin
**Informatics teacher, Primary School "Mihajlo Pupin" ,Veternik
***Economic – Businees School, Odžaci
tasici@tfzr.uns.ac.rs, jeca25000@gmail.com, epsodzaci@gmail.com

Abstract - Education is one of the important, special and complex segments. A number of concepts, approaches and definitions of education still can be divided into two groups. For ones, modern education contributes to the achievement of social life, it is a basic social process of maintenance man and the progress of mankind, and the continuity of culture. For others, modern education is the key factor of economic development and the knowledge of which depend on all other social processes.
Key words: education, school, student, society

I. INTRODUCTION

Education is a continuous process which aims to transfer knowledge and skills, and develop skills necessary for participation in social processes, and functioning within the human community. At different stages of development of human society, different types of skills and knowledge are favored. However, it is certain that individuals and groups, who have favored disposal of knowledge and skills, held an important, privileged position within the narrower and wider communities. The traditional definition of education based upon the belief of education as the systematic acquisition of scientific knowledge about nature, society and human thinking and mastery of skills and work habits by which the specific personality traits and adopt view of the world are developed and shaped. More modern understanding of education assumes that the institutional education system of acquiring knowledge and train people to acquire knowledge, skills and habits they need. Education as a development resource should provide, the educational system and educational content that is in it to realize, realize the main objectives related to personality development, the preservation of man's natural environment and create awareness about the global problems of the contemporary modern world, education of humanity. In the modern world, education monitors changes caused by their developments. Thus, education in the 21st century will be directed towards the acquisition of knowledge that becomes an important factor of social development and will have a decisive value for the individual and for civilization.

II. THE HISTORY OF EDUCATION AND SCHOOLING

Knowledge and skills are always passed on from generation to generation, and it is important to note the tendency of preservation and promotion of a knowledge management as well as challenging them and creating new, and that it always has been a part of the educational process. Knowledge and skills acquired initially were based solely on experience, and were passed orally, so the process of education was of informal character.

In the distant past, people's knowledge was passed from generation to generation and jealously guarded. The first forms of schools and education have appeared in ancient Greece, in Sparta and Athens. The Spartans were tightly organized and in constant war of preparedness and the Spartan training aimed at preparing troops always ready to fight the enemy.

Unlike Sparta, Athens recognized the need of nurturing the soul and body in general and also in setting ethical rules for coping with life. They actually crystallize the spirit of the time that has emerged through natural development of human society. Through all the activities of the ancient society, a strong need to collect acquired but also scattering of knowledge into a common framework can be seen. It should be based on traditional education, not just the European system of values, but values around the world known at that time. This would be both systematically passed, which would contribute to faster and better development of knowledge themselves and society as a whole. Numerous schools of before Socrates period discussed the physiological phenomena through the dialog method combined with art and physical culture, or through an ascetic monastic character of the school organization.

Education in the Middle Ages is primarily oriented to the practical needs. Although there were people who loved knowledge for its own sake, they were rare and often felt the need to seek excuses for their intellectual curiosity. The main goal was that every person has the knowledge necessary to perform his job. Other skills are worthless, and they could be dangerous. Medieval education can be described only in academic institutions such as schools and universities, as represented by the nobles and the homes where the young nobles acquired knightly education. Producing young knight in the formal education and marked the end of the proof that it can take its place in society. Throughout the Middle Ages book knowledge in Western Europe, with the exception of Italy, was mainly restricted to those who belonged to the priestly ranks. To 12 century literate laity was extremely small. After the 1100th year, their number is constantly increasing. Many rulers and nobles know how to read, while with the merchants reading and writing must have been widespread. However, one should not exaggerate the extent of literacy. All the nobles and most retailers have catered to the officials who led their conversation and reading their letters that they received. There was hardly any a truly educated laity. [1]

The creators of Slavic books were two educated Greeks from Salonika, Constantine (in monasticism Cyril) and Methodius. The activity of Cyril and Methodius and their students, regardless of the place and country where it developed, had a general Slavic character. The general Slavic and most important achievements of their work: Slavic alphabet, Glagolitic, and somewhat later, Cyrillic, the first literary Slavic language, called Old Church Slavonic in science, and literature created on it. [2]

III. EDUCATION AS AN ENGINE OF SOCIETY

Each national economy and its long-term growth depend almost entirely on the quality of its human resources. In this case, the use of these resources and invest in their quality is the primary factor in development. Modern national education policy in developed countries are based on a concept developed in recent decades in international organizations dealing with educational policy (UNESCO, OECD, ILO, Council of Europe, European Commission) and that they recommend to their members in implementing the national education reform. These are the concepts of lifelong learning and the concept of a learning society.

The concept of lifelong learning and human resource development of a harmonized system includes various forms of learning at all stages of life. These are: organized learning (education and training) that can be formal (school) and informal and unorganized or informal learning. One can learn for a lifetime, but you cannot go to school for whole life, so this learning in adulthood, is primarily organized in noschool organizations, or where an adult works and lives.

So the company, more developed especially, becomes a learning society. The modern education system consists of a network of school-related and non-school organizations and their partnership. The school is no longer the only educational institution and the development of human resources of a country can not reduce to reform of a school system. In developed countries, the system of human resource development include education of youth and adults and non-formal adult education, and more and more consideration is given to the Information and self learning. Education is now considered a condition of survival and development of modern societies. Those who survive are the first and easiest to adapt and to adopt the innovations.

IV. KNOWLEDGE AND EDUCATION

Knowledge is the most important human resource and capital, and there is the necessity of holding the information (knowledge) in order to survive in a constantly changing environment of today's society called knowledge society. An educated man is in the spotlight of that society. It is necessary to define some terms that are used as synonyms for knowledge:

- Learning is the process of acquiring skills and knowledge, resulting in a relatively permanent change in behavior.
- Training-means acquiring new knowledge and practical skills necessary for the operation, management, and management of the organization, according to adopted rules, regulations and standards. Training leads to changes in skills.
- Training-an exercise in acquired practical knowledge and skills.
- Developing knowledge-is related to the acquisition of new knowledge, skills and abilities that enable an individual to undertake complex tasks, preparing it for the future and the demands to come. The development leads to changes in attitudes and values.

- Education-acquisition means constant innovation and broader knowledge in the applied scientific disciplines and business practices. [3]

V. KNOWLEDGE AS INTELLECTUAL CAPITAL OF 21ST CENTURY

According to research by Stanford University (USA), total human knowledge was created up to 1900. It was doubled up to 1950. Since then, the whole of human knowledge doubles every 5-8 years. This fascinating information is interesting by itself, but there are unforeseen implications on our daily lives, -personal and business. At the private plan's "explosion" of knowledge with the result that countries and individuals who are newly-acquired knowledge at their disposal have great potential for continuing strong growth in living standards, quality of life and wealth in general. In business life of individuals, organizations, states and the observed world as a whole, this vast, rapid, and daily changes affect the way that in every respect, and significantly alter the previous way of life. At the beginning of the 21st century, we are faced with the enormous changes:

- Life, society and economy become more complex,
- time-we live in is unpredictable,
- nature of jobs is radically changing,
- more business-disappearing due to technological change,
- the past-may be less support and guidance for the future.

It is already difficult to predict what knowledge and skills will be needed and requested for the next 10 years. In most professions knowledge is doubling every few years, which means that knowledge of each one of us needs to be doubled every 2 -3 years just to "keep up" with the changes, and those who did not will inevitably fall behind! Society in which knowledge is valued as a resource, investing in education and science, which was developed information infrastructure in which highly values individuality, creativity and ability of individuals and organizations is named in an innovative society. [4]

VI. EDUCATION FOR ECONOMIC DEVELOPMENT

In developed countries the main development resource is human capital, and its quality is important to determine the education and training. Education and training should contribute to sustainable national development and the continuous development of individuals. Therefore, all developed countries hold education and human resource development as national priority and implement those strategies of development of education and training that contribute most to the economic, social and cultural development of society and the personal development of its stated members. .Because of these reasons modern strategy of education and human resources they caught not only education of children and young people but also formal and informal education. It is estimated that those countries whose development policy is not based on the concept of lifelong learning are doomed to economic and political marginalization.

The contribution of education and training development is widely acknowledged fact. It is estimated that investment in education and training of individuals make a profit that is comparable to investments in physical capital. An increasing share of services in the economy, the speed at which technology changes, the growing share of knowledge and information in relation to the value of production and the level of economic are restructuring in favor of this type of investment. It is estimated that an additional year of average schooling in the developed countries of Europe immediately led to increased economic growth by about 5% and to increase long-term growth by 2.5%. During the nineties, greater investment in human capital brought annual growth to 0.5% or more in several EU member states compared to the previous decade.

The main objectives of the future education are relating to:

- to prepare young people in their personal life to gain a realistic picture of themselves, which will be implemented in personal, social and common conditions,
- preparing young people for life in a democratic society, which includes information on rights, fundamental freedoms, duties and responsibilities of citizens,
- prepare young people for work, which should provide a broad view of work and theoretical insight into the nature and forms of work
- preparing young people for cultural life, to find resources for personal enrichment and involved in the spiritual, cultural and historical heritage and so are prepared for life in a multicultural world.

Accordingly, it is necessary to change the strategic direction of development of the education system in terms of exercising the right to quality education, to achieve the development of personal skills of every citizen. All this should allow the possession of certain skills and traits: a complete knowledge of the native language with basic knowledge of grammar, sentence structure, understanding the basis of mathematics and natural sciences, which must be coupled with new technologies, the ability to think the solution to the problem or knowledge to make the difference between facts and prejudices, mastery learning techniques to acquire new skills and adapt to new situations, and mastery of communication skills, including proficiency in one foreign language. Diploma is not a guarantee of a job, if you do not have the appropriate personal qualities, such as the ability for teamwork, a sense of responsibility and personal discipline, decision making ability, sense of cooperation and willingness to take risks, initiative, curiosity and creativity, professionalism, striving for perfection and achieving a sense of the possibilities and limits of civil liability.

Based on these attitudes, life-long learning and the need to realize the essence of learning involves teaching people to think, not only to accumulate facts. Some countries reform their educational systems to use the experiences of those countries that have already implemented such a reform, of course, leading account their specific features and characteristics. In this way they give the corresponding contribution to the education reform of world system. Education is undoubtedly of great importance for the development of society in all ages of its existence. In the modern world, education follows the changes caused by their development.

Thus, education in the 21st century will be directed towards the acquisition of knowledge and will become an important factor of social development and will have a decisive value for the individual and for civilization. Education will be important for perception and understanding of global changes in modern society, particularly regarding the problems associated with harmonizing economic development with environmental laws in terms of science and technology, in terms of preserving cultural identity and sovereignty of their nation states in terms of globalization of economic life economic and political domination of most developed countries, as well as in terms of democratization of social relations.

VII. THE PROJECTED FUTURE OF EDUCATION

The process of knowledge acquisition and transfer of knowledge is inevitably accompanied by the development of society. Specifically, the pre-industrial period of development of society, traditional values, knowledge and practical skills were passed down from generation to generation. During the period of industrial development, and all of the knowledge could not be more learned in the family. Because of that, the process of transferring knowledge turned into mass education. Automation machines more and more, and man better and better successfully solve many routine tasks at the intellectual and creative activities. In addition, the machines perform physical flow of materials and people dealing with the flow of information and knowledge. However, in automated manufacturing systems of tomorrow, no machines or people will no longer be tied to the factory or office, or people will live in big industrial cities of today. In fact, it will be deployed around the world, close to one another to be linked very sensitive communications, and your job will be done in the immediate social groups in their homes.

Technology of tomorrow do not need semi-skilled labor force that performed monotonous tasks on the current line, it needs people critical spirit, which can seamlessly manage the new circumstances, people who are willing to work during the coming new knowledge .To new time , called the digital era, risk society and civilization, knowledge, and certainly requires a new form of education. In such and such, new circumstances, education is a fundamental task and should improve the adaptability of man in time that comes and play a significant role to increase those skills that are needed. However, in order to set the future of education that could be achieved, it is necessary to predict who will perform the tasks that will be of interest.

We also need to know and what would the title be needed, what will dominate family relationships, such relationships will prevail. There is a need to look and what would be a moral or ethical problems that could arise and what technology will be developed and what will be the organizational structure to fit. All this, as well as determine other intellectual and psychological skills and knowledge to the people of tomorrow will be needed to successfully track the rapid social development. Thus, man's future depend on its education. Consideration of possible projection

of the development, changes in education in the future will refer to the change of organizational structure of the education system, the improvement of curriculum and the promotion of orientation directed towards the future. The current classical teaching will not be able to meet the needs that anticipate changes in the future. This lecture will disappear and they will replace many of the other newer methods of education based on experience, for recreation, for fun and work.

As a new approach to education inevitably follows the changes in the society of tomorrow are expected, futurists legitimately raise the question of whether the educational process will be held in appropriate institutions. This is because, a much higher intellectual level of the world population and a much higher level of general education and culture is provided. Thus, in these circumstances, the parents assume the role of teachers, which are otherwise in many developed countries already thought. Also, it talks about education opportunities through observation and participation in many important social events, and talk about life-long education and distance learning, but it is slowly becoming a reality. In accordance with such visions, as possible new forms of education in the future are mentioned: home education, mobile education, lifelong learning and virtual education and distance education.

The changes brought by the new time changes that are associated with transience, diversity and newspapers certainly suggest the need for new knowledge. Knowledge in the future I going to get older faster, so it will be necessary to take into account the efficiency of learning. In this regard, it will be very important to learn how to learn, how to forget and learned how to learn again. This education will receive a new dimension.

VIII. THE PROMOTION OF EDUCATION IN SERBIA

Serbia needs the education system that is compact, and flexible. Compact means that it is fully in line with the development strategy, a flexible, easily adaptable to the market. The reform process must be continuous, consistent, clear, precise and oriented towards the needs and interests of citizens of Serbia. In understanding this concept of education, as part of the development of human resources of a country is an individual, his future, employment, personal and professional life. If one would be a good educational system it must be compatible with the selected development strategy that is able to quickly respond to labor market trends.

This means that when a development strategy is chosen incorrectly or if the labor market permanently emits false signals, the system of education can be effective. To avoid this conceptual error it is necessary to harmonize the development of education strategy with the planned general social and economic trends and developments. Restructuring the economy towards the service industry and the development of other segments of industry and agriculture in particular has to respect policy and education and to build in that direction further development of the education system. In the education sector in Serbia, which includes preschool, elementary, middle and high education is just over 1.3 million students and about 110,000 employees. This means that the field of education covers almost a third of the active population in the Republic, or just over 20% of the total population.

This means that nearly 3 million people aged over 15 has a minimum life and job skills. One of the big problems with education that will meet in the coming years is demographic decline and reduction of number of children, which means fewer students in schools. Last years, decreasing the number of students enrolled in first grade of elementary schools and much middle is already facing the problem of fewer students. In the context of technological development of society and the changed relationship and structure of the economy and especially in the context of the different roles of the citizen as an individual, the role of education must become significantly different. Since teachers have much more autonomy to be innovative and creative, they have a range of abilities to transfer knowledge and skills of students in coping with new or unforeseen circumstances. Therefore, education and training of teachers and educators are becoming a key requirement of the overall development and education.

Another major area of priority is education reform education in order to meet the needs of the labor market. In understanding the concept of education as a source of human resource there is a need for qualified and skilled labor that are becoming very important factors .One of the biggest challenges of the Serbian economy and society is to reduce the total number of unemployed. Be sure that the education system can not resolve this issue, but it certainly can and must be directly related to employment policy in

Serbia. Modernization of the State and its orientation towards modernism technologies must influence the innovation goals of education and the convergence of the developed countries. Therefore, the aims of modern vocational education in our country have to be oriented towards the strengthening of expertise and greater flexibility in overcoming the changing demands in the world of work and in society as well as the acquisition of key skills so that young people were ready for new professional challenges and can be included in the overall modernization of society. Realizing that our society is moving towards the learning society, it is necessary to develop it in young and make them ready for training and further education.

In order to achieve the necessary social and economic change, Serbia has to restructure its human capital, supply it with new knowledge, skills and values, attitudes and behavior. This means that education is the basis of socio-economic transformation of Serbia. All the more, to the question of further development of the education system and its strategic basis is in relation to the development of society and economy.

IX. CONCLUSION

Man finds, creates, enlarges, improves, apply and transfer knowledge to others. Therefore, knowledge is the mediator between the individual and society. Educated man is a part of society and should be the center of successful development of a knowledge society. It is very important to enable the individual to control personal development. Taking responsibility for our own development, he is responsible for the development of society. Understanding and respecting the individual characteristics of man plays an important role in the learning process, but the learning opportunities offered in the community should have the benefit of the whole community. Starting from all previous determinations, and taking into account all previous approaches to education, modern education is, from a sociological point of view, defined as a social process in which knowledge is acquired, from the standpoint of its importance to civilization and global changes is viewed as the need for a developed personality, which is the main determinant of knowledge as a development resource. In this context, education will be important for perception and understanding of global changes in modern society, particularly regarding the problems associated with harmonizing economic development with environmental laws in terms of science and technology, in terms of preserving cultural identity and sovereignty of nation states in their globalization of economic life, economic and political domination of most developed countries, as well as in terms of democratization of social relations.

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IMPACT ON THE ENVIRONMENT CHOICE OF HIGHER EDUCATION INSTITUTIONS AND THE IMPORTANCE OF STUDENTS AS A CUSTOMER

N. Aleksić
TECHNICAL COLLEGE OF PROFESSIONAL STUDIES
aleksicnatasa0@gmail.com

Abstract - It is generally known that in previous work, higher education institutions in this region has received little attention to its services. The paper reviews the main elements and aspects of students' satisfaction as a service offered by higher education systems. Such an ignorant attitude and disregard for the actual user requirements is an unfavorable environment for the improvement of higher education services. The aim is to point out: the importance of students as consumers and the environment influence the choice of higher education institutions.

I. INTRODUCTION

Population education is a key factor of economic development of a country, a human resources are the most important resources of a society. Ways of creating, placing and promoting education services is a subtle and complex as that education is a key instrument in addressing economic and social problems in Serbia.

Studies of students attitudes regarding the education service is committed to the achievement of complex tasks, bearing in mind what has been established either as a statement or proposition.

The subject of this research is to extract the views and opinions of students about the impact if various internal and external factors. Research with users of services is a starting point, in order to more accurately define the needs, motives, students, and those factors that influence the decision making process, making a determination, users of services is a starting point, in order to more accurately define the needs, motives, students, and those factors that influence the decision making process, making a determination, the current sources of information, needs and desires for further education, etc.

The main task of this research is to determine the indicators on the impact of the decision making process and attitudes of students in relation to the higher education institution.

The task was to:

- Examine the decision – making processes of learning (decision time);
- Identify sources of information;
- Identify how family, friends, the media contribute to the choice of the faculty;
- To determine the quality of knowledge acquired in high school;
- Identify the level of satisfaction with the organization of classes and lectures;
- To explore students expectations of the study program;

Investigate interest in the continuation study. To collect data on attitudes and opinions of students, selected survey research process, namely a questionnaire for students.

- ***Statistics collection*** (population) – included the first student year;
- ***Physical*** – Research was carried out High Technical School of Professional Studies in Kragujevac.

II. MAKING DECISIONS ON THE SELECTION OF STUDIES

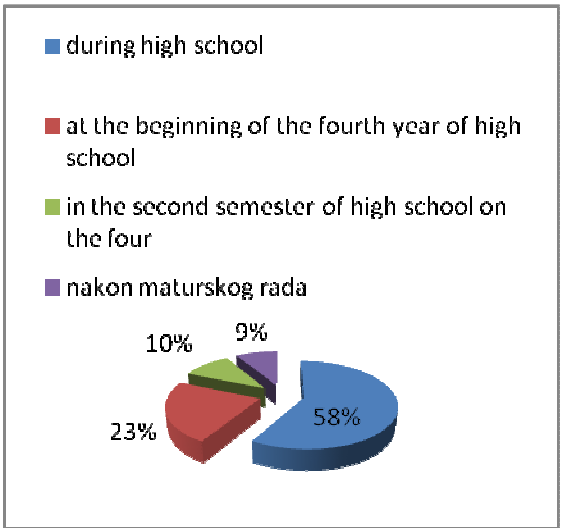
A. The thinking process (decision making)

Grooming and primary processing of statistical data, collected by statistical survey was conducted centrally, for more efficient use of data processing techniques.

Empirical research, as a case study in terms of organizational structure, application of marketing concepts and High Technical School of Professional Studies, presents the results of research on the target group of students who provided information on the decision – making

process and factors that influence the process in selecting faculty.

Chart No.1



The process of making a decision on the selection of studies

With the aim to determine the statistical term for the beginning of the questionnaire, respondents were asked:

What is the period when it begins the process of thinking and making decisions about college?"

The decision process begins when a person becomes aware of the need.

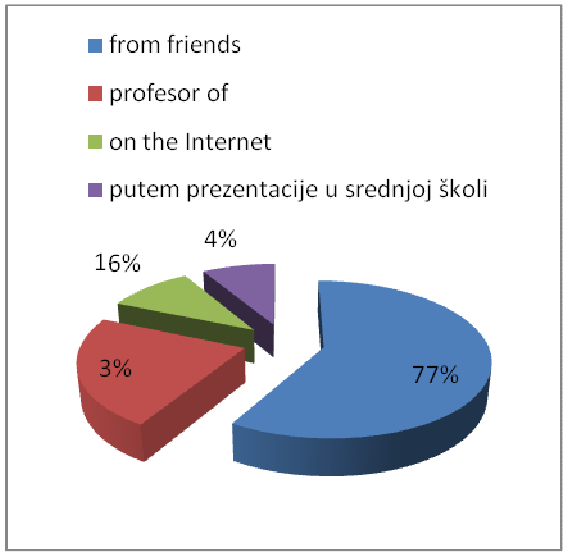
The marketing of this phase is called the recognition of a need or problem. However, this does not mean you automatically need awareness and action conditions. Since selecting the study fell into important issues, most are entering a phase reference.

B. The process of informing

Finding information is subject to the dominant process information. High school students on the basis of available information, identify alternatives and criteria for selecting the best alternative.

The aim of obtaining information is to create awareness among students that there are educational products and services that can meet the need or desire.

Chart No.2



Process information

The marketing is different:

- internal and
- external information search.

Since the choice of college does not exist as prior experience (Except for students who want to change the faculty), it is an internal method is insufficient and recourse to external information. Externally, involves collecting information from various external channels (friends, propaganda, informatory,…) And according to our statistical surveys, the majority of subjects reached its decision based on recommendations from friends.

The media, as sources of information are the least influence on the formation of attitudes. Thus, personal resources are in this situation proved to be dominant.

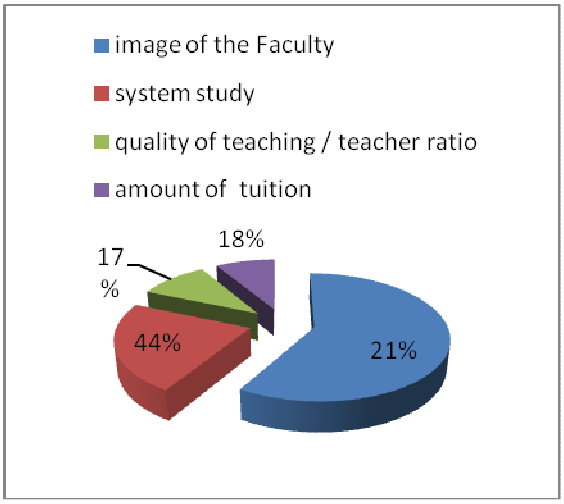
The results show that personal contact has the greatest impact on future users of educational services.

C. Estimates of the attributes of students in decision – making process

In the alternative assessment procedure, which college to choose, students can opt for one of two possible approaches:

- Assess the brand or
- Assess the attributes of the faculty.

Chart No.3

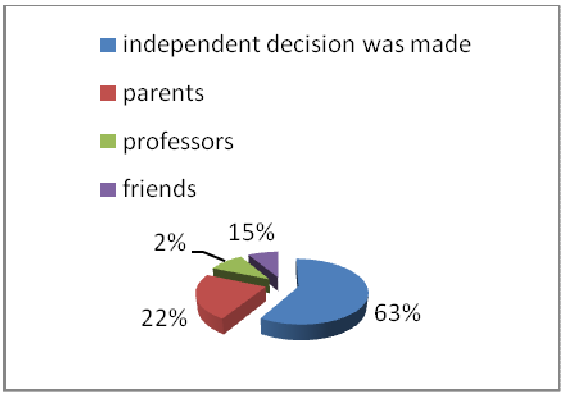


Assessment of student attributes in the decision

Based on statistical research, in can be concluded that the system of studying Higher Technical School of Professional Studies was crucial in deciding the choice of faculty.

The next question was about the influence of reference groups in the decision making process, bearing in mind that people as consumers take on certain standards of behavior under the influence of the group.

Chart No.4



Influence of reference groups

With the aim to establish a reference group of key impact on the students in making such important decisions, the results confirm that the family as the primary reference group, influenced the decision making process, but not as much as the decision was made independent students.

Hypothetically speaking, say that their profile can be classified as routine users, who know what they want and have no need for additional information.

3. THE DETERMINATION ON THE MOTIVE IN THE DECISION PROCESS OF FACULTY SELECTION

The behavior of students, as future students in the process of deciding on the choice of faculty is a part of their overall behavior, which are the subject of marketing research and testing, and without knowing the motives and motivational processes and behavior (actions), it is almost impossible concept appropriate marketing strategies and appropriate marketing – plans, programs and marketing activities.

To this could be accomplished marketers need to know the process of student motivation, that is, needs, desires, requests, problems, the motives of conduct, etc.

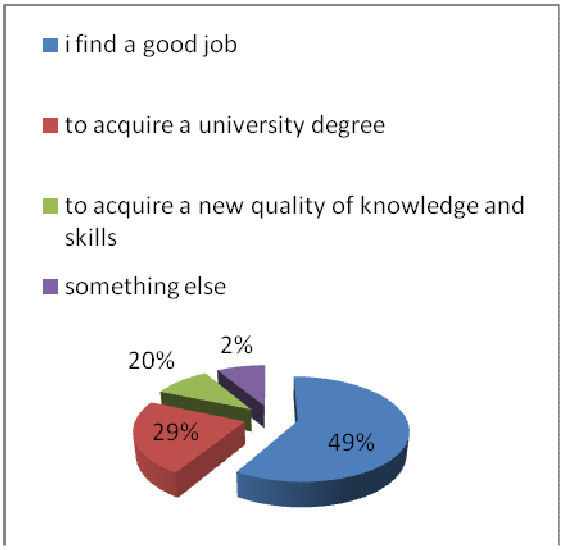
Given the fact that they are invisible motives of human behavior interpersonal reasons, respodents were asked:

"Provide basic motivational factors and their expectations about the choice of faculty?"

The list of human motives are often too long to be of practical use in marketing. On motive might have resulted in several effects may result for multiple motives. Motives act as an immediate stimulus, initiator of the action and the motivation of the students are essentially always finds a need.

During the last few decades, recorded the fastest growth in demand for intellectual services, particularly in the field of information and communication technologies.The need for increasing knowledge and modern business activities require knowledge of modern technology.

Chart No.5



Motives and expectations of students

The new structure is based occupations need for training with an emphasis on language and communication skills, computer literacy and communication, foreign languages, developing social responsibility, etc.

Students apparently have the attitude that your chosen college programs to suit all these needs of the labor market. To achieve a better relationship with the demands of the labor market and achieve those principles underlying modern economic processes, especially in the sphere of global changes, the High Technical School of Professional Studies is particularly focused on strengthening informal, training through the development of cooperation with employers in all sectors (practice), but also by introducing new systems of training, such as carrier development, creative workshops, tribune, etc.

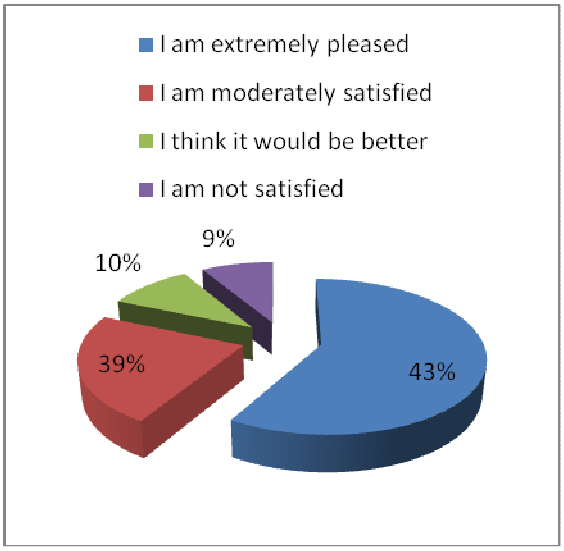
It is precisely in response to changes in the labor market, which require different trained and prepared individuals who have professional mobility and are ready to learn lifelong.

A. Satisfaction of students

In order to determine the satisfaction of students at the beginning of the school year, the results are shown graph.

By processing the results of how students are satisfied first lectures confirms the statistical evidence presented in Figure 6.

Chart No.6



Students' satisfaction of quality first teaching

The results just confirm that marketing activities can not be effectively implemented without the cooperation of employees. Employees are an essential element in increasing productivity, providing quality customer service and gaining competitive advantage. The quality is the perceived level of service performances by the students. Service quality is particularly important and can be quite variable depending on the skills, motivation and mood supplier services (teachers and staff in the students service).

IV. BOLOGNA DECLARATION

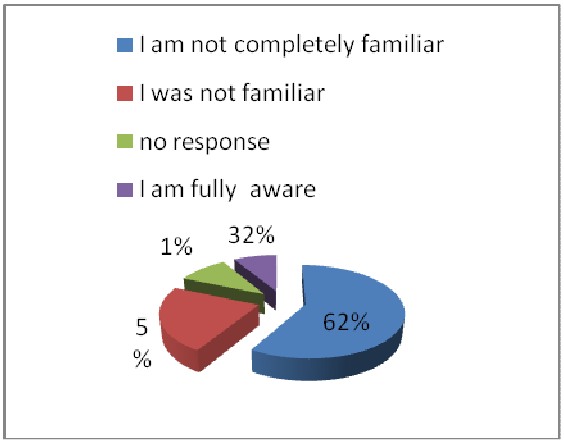
The Bologna declaration is a key document which marks a milestone in the development of European higher education is free and commitment of each signatory country to reform its own higher education system to create a general convergence at European level. [1]

This declaration was agreed to achieve its higher education policies of the signatories of the *Declaration* in order to satisfy the six basic principles during the first ten years as contained in the following [2]:

- Education system of easily readable and comparable degrees of final issuance of the *Diploma Supplement,* in order to encourage employment of citizens and the competitiveness of European higher education;
- introduction of the basic system of study based on two cycles:
  - graduate and
  - post-graduate studies.
- establishment of the so – called *actual points or credit system* (ECTS) as a means of encouraging student mobility;
- encourage *mobility* – obstacles to the mobility of students and teaching staff need to be overcome in terms of improving education and study opportunities and appropriate support for teaching staff, researchers and administration through the recognition of their activities in Europe, without damaging their actual status and rights.
- *promoting European cooperation in quality assurance in developing comparable criteria and methods;*
- promoting the European dimension of higher education; European facilities should be represented in particular in the development of curricula in higher education cooperation and mobility program in integrated educational and research programs.

According to defined purpose of the research we wanted to determine the extent to which students know the principles of the Bologna reforms in the education system. It is easy to argue that the reforms implemented technically, but only by supporting the process and "listening " students can get real results on the satisfactory implementation of the Bologna process, as well as other positions.

Chart No.7



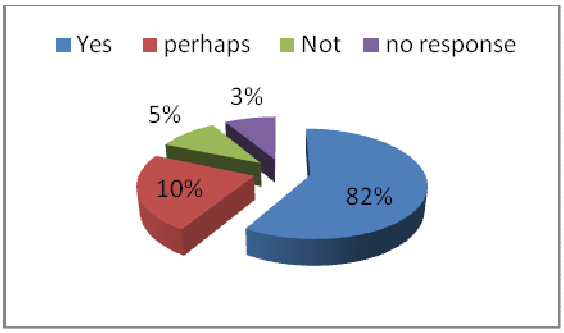
Knowledge of the principles of the Bologna Declaration

In accordance with the results of the European *students union [3]* (which also included students from Serbia) research on the High Technical School of Professional Studies show that most students did not fully familiar with the Bologna Declaration.

Realizing that our society is moving towards a learning society, it is necessary to develop in young and ready for training and further education.

To the question: *"Would you continue education at higher levels of study?"*

Chart No.8



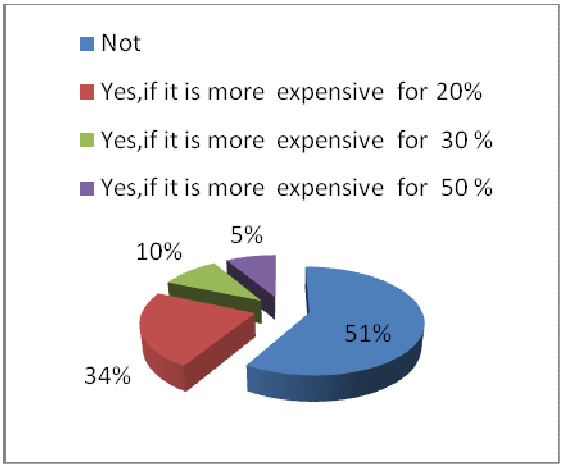
Further studies

The results indicate the desire of students to pursue master studies after graduation.

A combination of economic and psychological components of the price is a strategic element to inform the target group about the quality and cost. [4]

Numerous studies show that student use price as an indicator of quality.

Chart No.9



Impact of prices on the decision to study

To the question: *"Would you give up student enrollment if tuition increased?"*

The results indicate that most students would be dropped from enrollment to tuition is higher.

V. CONCLUSION

Education should provide the opportunity for each individual creations of social participation, improve the quality of life, personal choice, employment opportunity of continuing professional development.

The goal is to develop a standard system that ensures the achievement of quality, efficiency and effectiveness of education at all levels and in all segments.

Strengthen and develop vocational education and training as part of overall social and economic development of Serbia with the direct recognition of market needs and the needs and desires of individuals.

Research shows that students respond differently to educational institutions and their image, and it was determined that higher education institutions can be differentiated by location, quality, nature study programs, quality characteristics, achievements of graduates, technologies used, program requirements, tuition changes, behavioral staff (teaching and non-teaching staff).

The results of experimental studies indicate that the Technical High School of Professional Studies has a defined strategy that enables differentiated advantages in the market of education. An attractive program of study, a renowned teaching staff and rapid adaptation response to changes or new needs of the environment indicates that the vocational high schools trained to educate emprower and prepare individuals for the needs of modern society.

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EDUCATION AS RESOURS OF 21ST CENTURY

M.Siljanovski, D Glušac
*Technical faculty „Mihajlo Pupin“, Zrenjanin, Serbia
majasiljanovski@gmail.com

Abstract - The concept of lifelong learning and human resource development of a harmonized system includes various forms of learning at all stages of life. These are organized learning (education and training) that can be formal (school) and informal and unorganized or informal learning. Because it has to learn, a lifetime, but a life cannot go to school, learning in adulthood, or even what an organized, generally does not take place at school than in no school organizations, or where an adult and working lives. So the company, and the more it is developed, it becomes a learning society.

I. INTRODUCTION

Each national economy and its long-term growth depend almost entirely on the quality of its human resources. In this case, the use of these resources and invest in their quality is the primary factor in development. The education system is fundamental precondition for growth and infrastructure development as well as to the transportation system, energy system, a network of institutions and legislation.[1]

The environment in which economic development is taking place today provides certain advantages and limitations. Advantages but also the challenges of globalization appear, open competition and information technologies and to allow all. Limitations are in the demographic structure of population as well as the legacy of negative selection of personnel, the rigidity of institutions and legislation that still hinders the progress and positive change in society.

Modern is the national education policy in developed countries are based on the concept that in recent decades developed into international organizations dealing with educational policy (UNESCO, OECD, ILO, Council of Europe, European Commission) and that they recommend to their members in implementing the national education reform [9]. These are the concepts of lifelong learning and the concept of a learning society. Education is now considered a condition of survival and development of modern societies.

II. KNOWLEDGE AND EDUCATION

A. Terms and definitions

Knowledge is the most important human resource and capital, and given the necessity of holding the information (knowledge) in order to survive in a constantly changing environment of today's society called knowledge society. It was an educated man in the spotlight.

It is necessary to define some terms that are used as synonyms for knowledge:

• Learning is the process of acquiring skills and knowledge, resulting in a relatively permanent change in behavior.

• Training means acquiring new knowledge and practical skills necessary for the operation, management, management of the organization, according to adopted rules, regulations and standards. Training leads to changes in skills.

• Training is a practical exercise in the acquired knowledge and skills.

• Develop skills related to acquiring new knowledge, skills and abilities that enable an individual to undertake complex tasks, preparing it for the future and the demands to come. The development leads to changes in attitudes and values.

• Education means acquiring and continuously updating knowledge in the broader discipline of applied science and business practices relevant to business and corporate objectives.

• Converting knowledge into core asset - human resource management is faced with new demands, new challenges and new responsibilities.

Knowledge is the current definition is characterized as an individual, silent phenomenon, focused on action, based on the rules and constantly changing. Given the complexity of the term, the knowledge is expressed as competence.

III. SIGNIFICANCE EDUCATION

Knowledge and education as a process, significantly affecting raising the quality of life, to

improve living standards, and today it has at every turn. Knowledge can be acquired through many media, independently and in groups, without limit.

The importance of education and nurturing intellectual capital of a community, we can see the list of Cross-nine of the richest, most prosperous countries, and lists the nine poorest countries in the world, which were established based on the observation of two components: life expectancy and the percentage of literacy in these countries.

Table 1: Comparison of differences in developed and poor countries[5]

BENIN	37,5%	50,4 years
BURKINA FASO	23,0%	43,0 years
BURUNDI	48,1%	42,5 years
CHAD	53,6%	47,0 years
KONGO	80,7%	49,0 years
ETHIOPIA	38,9%	47,3 years
GUINEA-BISSAU	36,8%	45,1 years
MADAGASCAR	80,2%	53,8 years
MALAWI	60,3%	37,6 years

NAME OF THE STATE	RATE OF LITERACY	AVERAGE LIFE EXPECTA-NCY
BELGIUM	100%	75,1 years
CANADA	96,6%	75,4 years
DENMARK	100%	74,9 years
INSLAND	100%	78,4 years
JAPAN	100%	78,4 years
LUXEMBOURG	100%	74,9 years
NORWAY	100%	76,5 years
SWITZERLAND	100%	77,7 years
U.S.	95,5%	74,4 years

The data clearly indicate that this is all about "two different worlds." While the nine richest countries, one doctor comes to 242-534 people in the nine poorest countries is one doctor comes in 3707-49118 people. The link between education and quality of life is even more apparent when attention to life expectancy.

What significant enters the width crisis in these countries is that countries with low literacy, and also countries with high debt - this makes them the much needed money instead on education, spending on debt refunding - which is a vicious cycle of illiteracy continues, leading the country to even greater poverty.

IV. KNOWLEDGE AS INTELLECTUAL CAPITAL 21ST CENTURY

According to research by Stanford University (USA): A total of human knowledge is created to 1900th was doubled to 1950. year. Since then, the whole of human knowledge doubles every 5 - 8 years.

This fascinating than the fact that in itself is interesting, there are unforeseen implications on our daily lives - personal and business. At the private plan's "explosion" of knowledge with the result that countries and individuals who are newly-acquired knowledge at their disposal a great potential for continued strong growth in living standards, quality of life and wealth in general. In business life of individuals, organizations, states and the observed world as a whole, this vast, rapid, and daily changes affect the way that in every respect, and significantly alter the previous way of life.

At the beginning of the 21st century faced with the enormous changes:[6]

- life, society and economy become more complex,
- the time in which we live is unpredictable,
- the nature of work is changing radically,
- more jobs disappearing due to technological change,
- the past may be less support and guidance for the future.

It is already difficult to predict what knowledge and skills will be needed and requested for the next 10 years. In most professions, knowledge is doubling every few years, which mean that knowledge of each one of us needs to be doubled every 2 - 3 years just to "keep up" with the changes, and those who did not will inevitably fall behind!

Society in which knowledge is valued as a resource, investing in education and science, which was developed information infrastructure in which highly values individuality, creativity and ability of individuals and organizations named in an innovative society.

Japan was in 1980. , made a strategic decision to change the Japanese economy development strategy. Instead of investing in heavy industry and petrochemical industry, the focus of investment has shifted to activities that are based on the human mind and knowledge and to consume little energy and raw materials. Results and visionary decision, we can see today.

In the U.S. the number of employees in high-knowledge industries, such as professional and business services is equal to the number of employees in the industry.[4]

The UK government's main priority is to educate its citizens. This commitment was confirmed by their appointment, "the first Undersecretary of State for Lifelong Learning" (first Under-secretary of State for Lifelong Learning).Today, many organizations are aware that the only way to win and retain competitive advantage - learn faster than the competition. That is why more and more companies trying to adopt and implement the concept of "knowledge organization" and thus achieve market advantage. The best example of a "knowledge organization" is certainly a company "Microsoft" Bill Gates's.

Swedish company Scandia, which deals with financial services, is the first company in the world in 1995. In its annual financial report in a special section, express the value of their intellectual capital. Thanks to his visionary work, a Swede Leif Edvinsson has become known as the first director of intellectual capital in history.

V. EDUCATION RESOURCES IN 21ST CENTURY

Following significant changes in the environment resulting from the development of science and technology, education, and the overall educational system, succumbed to the reforms. In this way the social changes affected the education reform, which included changes in the structure of education, the functioning and efficiency of education, a network of educational institutions, educational programs, forms and contents of education, as well as the goals and methods of education. Traditional schools and education systems in general quite inefficient and inflexible, school education systems mean individuals, and so do not let them get ahead in accordance with their capabilities.

• The report UNESCO is particularly drawn to the role and importance that education plays in the process of overcoming the opposition in the 21 century[7].

Man's need for continuous learning is expressed as:

- Learning to know - means mastering the scientific information and knowledge to master the means and refers to the realization of the essence of a meaningful life, developing skills of learning, understanding and discovery, education of attention, memory and thinking;
- Learning to work - involves acquiring new knowledge that can be practically applied;
- Learning to live together - involves acquiring knowledge about others, understanding their needs and respects their diversity;
- Learning for existence - means the preparation for independent and critical thinking about all the phenomena and processes in the environment.

The main objectives of the future of education relating to:

- preparing young people in their personal life gain a realistic picture of themselves, which will be implemented in personal, social and common conditions,
- preparing young people for life in a democratic society, which includes knowledge of law, fundamental freedoms, duties and responsibilities,
- preparing young people for work, which should provide a broad view of work and theoretical insight into the nature and forms of work,
- preparing young people for cultural life, to find resources for personal enrichment and into the spiritual, cultural and historical heritage and so were prepared for life in a multicultural world.

It is necessary to change the strategic direction of development of the education system in terms of exercising the right to quality education, to

achieve the development of personal skills of every citizen. All this should allow the possession of certain skills and traits: a complete knowledge of the native language with basic knowledge of grammar, sentence structure, understanding the basis of mathematics and natural sciences, which must be coupled with new technologies, the ability to think the solution to the problem or knowledge to make the difference between facts and prejudices, mastery learning techniques to acquire new skills and adapt to new situations, and mastery of communication skills, including proficiency in one foreign language.Diploma is not a guarantee of a job, if you do not have the appropriate personal qualities, such as the ability for teamwork, a sense of responsibility and personal discipline, decision making ability, sense of cooperation and willingness to take risks, initiative, curiosity and creativity, professionalism, striving for perfection and achieving a sense of the possibilities and limits of civil liability.Based on these attitudes, life-long learning and the need to understand essence of learning involves teaching people to think, not only to accumulate facts.Education reform is based on its essentially socio-economic conditions in individual countries, based on the categorical system of values that exist in them, is in the specifics of that nation, as depends on the achievement of the objectives of which are expected to reform education.

In terms of global unification of humanity and interdependence of states and nations in various fields of social life, and education, as well as in terms of universality of science and education, inevitably leads to cooperation in this field and a new model of education reform [8]. Thus, each country's reform their education systems using the experiences of those countries that have already implemented such a reform, of course taking into account their specific features and characteristics. In this way gives the corresponding contribution to the global process of educational reform.

Education is undoubtedly of great importance for the development of society in all ages of its existence. In the modern world of education follows the changes caused by their development. Thus, education in the 21st century will be directed towards the acquisition of knowledge becomes an important factor of social development and will have a decisive value for the individual and for civilization. Education will be important for perception and understanding of global changes in modern society, particularly regarding the problems associated with harmonizing economic development with environmental laws in terms of science and technology, in terms of preserving cultural identity and sovereignty of their nation states in terms of globalization of economic life economic and political domination of most developed countries, as well as in terms of democratization of social relations.

VI. IMPROVING EDUCATION IN SERBIA

Serbia shall have education system that is compact and flexible.Compact means that it is fully in line with the development strategy, and flexible, easily adaptable to the market.

The reform process must be continuous, consistent, clear, precise and oriented towards the needs and interests of citizens of Serbia. In understanding this concept of education, as part of the development of human resources of a country is an individual - and to his future employment, personal and professional life.

To be a good educational system must be compatible with the selected development strategy that is able to quickly respond to labor market trends. This means that when a development strategy is chosen incorrectly or if the labor market permanently emits false signals, the system of education can be effective. To avoid this conceptual error is necessary to harmonize the development of education strategy with the planned general social and economic trends and developments. Restructuring the economy towards the service industry and the development of other segments of industry and agriculture in particular has to respect policy and education and to build in that direction further development of the education system.In the education sector in Serbia, which includes preschool, primary, secondary and higher education is just over 1.3 million students and about 110,000 employees. This means that the field of education covers almost a third of the active population in the Republic, or just over 20% of the total population. Although it has developed a network of primary schools and the law free and compulsory primary education, and although the number of illiterates in the constant decline in Serbia still has about 200 thousand full of illiterate people over 10 years. The total educational structure of population in Serbia, despite some improvements in relation to the balance of 1991. was still unfavorable. According to data from 2002. The near 22% of the population older than 15 years has not completed primary education.

Almost 24% of the population has a primary school education as their maximum, which means that almost 46% of the population is the basic minimum education or less [3]. This means that almost 3 million people aged over 15 has a minimum life and job skills.One of the big problems with education that will meet in the coming years is demographic decline and reduces the number of children, which means fewer students in schools. Last years, decreasing the number of students enrolled in first grade of elementary schools and much middle is already facing the problem of fewer students.

In the context of technological development of society and the changed relationship and structure of the economy and especially in the context of the different roles of the citizen as an individual, the role of education must become significantly different. Since teachers have much more autonomy to be innovative and creative, to have a range of abilities to transfer knowledge and skills of students in coping with new or unforeseen circumstances. Therefore, education and training of teachers and educators are becoming a key requirement of the overall development and education.Another major area of priority is education reform education in order to meet the needs of the labor market. In understanding the concept of education as a source of human resource needs for qualified and skilled labor are becoming very important factor.One of the biggest challenges of the Serbian economy and society is to reduce the total number of unemployed. Be sure that the education system cannot resolve this issue, but it certainly can and must be directly related to employment policy in Serbia. According to data from the Statistical Office in late October 2005. in Serbia there were 990 011 unemployed persons. In this issue over 36% are younger than 19 to 30 years. In addition, in relation to the acquired education in that number more than 54% are those with three or four year vocational education. This structure of the unemployed and the employed labor force requires changes and modernization of education, especially vocational education and lifelong learning of the entire complex in Serbia.

Realizing that our society is moving towards the learning society, it is necessary to develop in young and ready for training and further education. That is, the professional education should provide opportunities for every individual to achieve social participation, improve the quality of life, personal choice, employment opportunity of continuing professional development.The third major priority for the development of education as an essential prerequisite to establishing a system of human resource development is the harmonization process with priorities development of education in Europe in 2010. year.[2]

In order to achieve the necessary social and economic change in Serbia has to restructure its human capital, supply it with new knowledge, skills and values, attitudes and behavior. This means that education is the basis of socio-economic transformation of Serbia. All the more, to the question of further development of the education system and its strategic basis in relation to the development of society and economy.

VII. CONCLUSION

Education is one of the important, special and complex segments, on which is based among other things, and human resource management. It is known that employees are the most important resource to the disposal of an undertaking. This assertion is based on the relationship of employees with all the variables involved in their operations.

Education, as a major challenge contemporary civilization, as the bearer and agent of social change, as a way of informing about the change and acceptance of new attitudes and values as a way to acquire new knowledge - variously in the literature and determined differently in practice, define its goals.A number of concepts, approaches and definitions of education but can be divided into two groups. For a modern education contributes to the achievement of social life, it is a basic social process of maintenance man and the progress of humanity, and the continuity of culture. For others, modern education is the key factor of economic development and the knowledge of which depend on all other social processes.

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CURRICULUM OF CONTEMPORARY TEACHING

J. Starc
School of Business and Management, Novo mesto, Slovenia
jasmina.starc@guest.arnes.si

Abstract - The author of this article presents a modern curriculum for management education and training. This model is based on the findings and analyses of existing models of education and training of employees as well as on a large-scale survey carried out among 365 middle and senior managers working in the economic sector. On the bases of analyses, we developed a framework determining the most suitable and most recommended curricular elements (learning goals, learning contents, teaching methods and forms, learning materials, evaluation). These elements were then used as the foundation for developing a new model of curriculum for middle and senior managers.

I. INTRODUCTION

Today's organizations consider education and training as urgent, wherein organizations of the future consider it as a value and part of its culture. Education and training are processes that organizations utilize to understand and adapt to the process and state of the environment. Organizations have to adapt very quickly based on the turbulences of the environment. Those organizations that have a better rate of learning are more successful. The essence of such an organization is to establish a connection between the individual and organization and between the individual's learning and the learning knowledge of the organization.

We know that today's system of adult learning encompasses a vast area considering the educational needs and activities of each individual, who is influenced by historical and other cultural factors as well as environmental influences. This is the reason why there are differences in the theory, content, and methods of education in comparison with other countries. We have to be aware that the global social goals of adult education in contemporary developing ocieties have to include the fundamentals of lifelong learning.

Lifelong learning is becoming a way and part of everyday occurrences. Learning goals and objectives are changing because the education of adults is transferring from formal educational institutions to one's more intimate sphere. These goals are being "daily" re-defined as becoming broader, more complex, and specifically oriented towards training for every life occurrence. In addition, lifelong learning is becoming more informal due to technology and global computer networks providing the opportunities to ready access knowledge.

Managers of the future will be responsible for their own knowledge. Managers will have to decide on the resources, create their own representation of effects, time used for their own experiences, connect data with new circumstances, and so forth. Forthcoming are interdisciplinary areas of education that require from the manager flexible knowledge, skills, new habits and combination of information from various disciplines.

From the onset of the 21st century, the new profile of a manager should be convincing, especially being able to motivate co-workers and to attract them by being a role-model. One of the major challenges for managers of the future will be to coalesce the objectives of the company with the personal goals of employees (as well as management).

II. CURRICULUM

There are many definitions for the term curriculum; however they all apply to a system of education (Kelly, 2004, p.148) and frequently are related to the processes of long-term planning in education (Florjančič, Ferjan, 2000, p.313). The term curriculum includes the complete concept of an institution's educational program or of a teacher, as well as, including any changes and curricular developments (Posner, 2004, p.5). Individuals tend to regard that the curriculum includes educational goals, learning content, standards, and/or strategies of education.

Knowledge of curricular theory can be quite convenient for organizations and for implementing job training and education of employees. Analyzing the curriculum from the viewpoint of management process functions we can determine that within a curriculum all processes of

management function are included, which are planning, organizing, management, and quality control (Ferjan, 2005, p.350):

- a curriculum in-and-of itself is a plan that defines how and with which resources the process of education will be implemented;
- within the curricular process, we choose organizational forms of education including the function of organization;
- in the implementation phase we circumvent from the design, planning and organizational level upwards toward the management and implementation level by transferring concrete work tasks to employees;
- evaluation is one of the methods of quality control.

More specifically, Ferjan (2005, pp.351-354) points out that when (a) *defining educational goals* in the curricular process that this should include the observations of happenings in the social, scientific, and technological environment, identification of current educational goals and goals that have already expired, identification of participant needs and finalizing the structural goals of education; (b) *defining learning content* we have to consider information of key facts and legality, methodological knowledge of the expert area, viewpoints of specific values within the expert area, communicating and acquiring skills, ensuring abilities of using obtained knowledge in practice and opportunities of building knowledge; (c) *choosing methods and organizational forms of education* we can choose between many alternatives where we have to consider which forms and methods educational goals will be obtained; (d) *preparing materials* we have to consider that the content should be oriented towards achieving goals defined in advance, adapted towards background knowledge, interests and needs of users, where there are no unnecessary elements so it does not lead to communicative overloads (e.g., unnecessary descriptions, pictures, schemes, and so forth), and for the user they should be appealing (contract, colour scheme, and so forth) and other factors.

When choosing teachers for implementing the educational process we have to take into account: their personal characteristics as well as their professional references, those that are absolutely necessary and those that are not, those that we are ready or able to pay, determine where we will obtain them (inside or outside the organization) and to mutually come to an agreement with regard to implementation (Ferjan, 2005, pp.203-204).

The *implementation* phase also considers the adequate implementation of the educational process (Flojančič, Ferjan, 2000, p.316). In this phase, we implement the educational plan, where we have to consider the administrative-technical tasks (logistics, contacting the teachers and students) and for the correct flow of pedagogical and/or andgragogical processes (Ferjan, 2005).

The *evaluation* phase, which has to be an element in every curriculum, assesses the quality of the educational process. Assessment is chosen among numerous models and methods of evaluation.

Ideally, the curriculum would include six types of information (Posner, 2004, p.31):

- information regarding the *problem* for which the curriculum was created and the types of *professionals* that cooperated in the development of the curriculum;
- a clear purpose, *what* the learners should learn- known as learning goals; what the teachers should be teaching- this is the content; which *order* they should be taught- this is *consecutiveness*;
- a clear purpose of *why* these learning goals and contents are important: this is the *principle* or sometimes referred to as *philosophy*;
- guidelines in the form of suggestions or instructions, *how* to teach to the goals and content- these are *strategies of teaching*;
- instructions, *how* the curriculum and students are *assessed* and the results;
- information whether the curriculum was *implemented* and if it has not been implemented, for *which situations* it is suitable. When it has been implemented than noting *what happened*.

It is clear that most curricula do not include all these different types of information, but it does represent a sample of an ideal curriculum. Frequently, a curriculum only lists information with regard to goals, content, and consecutiveness.

III. METHODS

With the research conducted among middle-level and senior managers in Slovenian companies, employed within the economic sector, we wanted to determine which methods of the curricular elements of education and training are most sought after and represent an important part of a manager's professional development.

To implement the model of a curriculum for managers of Slovenian companies we had to:

- research their needs and opinions regarding the most suitable learning content areas, methods and forms that would attract them towards training and education;
- define teaching methods and teaching forms that are directed towards practice and represent an alternative to the currently existing forms;
- research various forms and opportunities for managerial education and training;
- define the educational institutions where managers would like to be educated and trained;
- research the profile of instructors that would, through their expert knowledge and practical experiences gained through experiences where they are currently primarily employed, offer managers a great deal of information as well as qualitative and valuable experiences;
- define a timeframe of education and training that is acceptable for most manager participants in education and training.

The sample represents top and middle-level managers employed within the economic sector of Slovenian companies. Out of the 500 distributed-questionnaires 365 (75%) were returned. After examination we eliminated 12 (2.4%) of the questionnaires. The sample of surveyed managers employed within the economic sector, represents 353 units of which 155 were female and 196 were-male (43.9% and 55.5%, respectively). Most of the participants were older than 46 years of age (38.5%), which indicates that managers were in their mature years with a great deal of working-experience. We could assume that top and middle-level managers have rich experiences that were obtained through work experience.

The analysis has shown that most participants (45.3%) were employed in large-sized companies, 30.9% in small-sized companies and 23.2% in middle-sized companies. 59.8% were employed as top-level managers and 39.4% of the respondents were employed as middle-level managers. It is encouraging that 90.1% of the participants had an adequate or a higher level of education, one that is formally required of them.

Data that were needed for the purpose of the research were collected with *a questionnaire*. Data were analysed using SPSS 15.0.

IV. RESULTS AND DISCUSSION

From the analysis and interpretation of results we can summarize the concepts of the study that were obtained on a sample of 365 surveyed managers employed in the economic sector. The purpose of the study was to create a modern curriculum for management education and training.

With the design of educational and training programs, the aim is to continuously satisfy the global and differential educational requirements and needs towards training. We have to consider the cognitive, affective, and motor goals that were depicted by managers. Only in such a manner we will be able to ensure their complete development that in addition to their professional development to also include their personal development. Planning is connected with the implementation and the financial and programmatic components serving as the basis for later implementation of training and education.

More precisely, the results have shown that we have to consider the implementation, programmatic and financial components, which include:

- the programmatic content of the curriculum:
  - *general learning content:* financial management (average score of 4.36), production/operation management (average score of 4.06), innovative management (average score of 4.0), computer science (average score of 4.29);
  - *specific learning content:* knowledge of a foreign language (average score of 4.26), emotional intelligence (average score of 4.01), ecology (average score of 4.01);
  - *offer more from the areas of:* strategic management of an organization (average score of 3.28), global law and policy (average score of 3.15), European law and policy (average score of 3.09), national law and policy (average score of 2.98), communicative skills (average score of 2.90);
  - *method:* internal, external, part-time studies;
  - *timeframe for implementation:* formal education up to two years; informal training: 6-10 days a year;
  - *location of implementation:* university (average score of 3.94), MBA (average score of 3.55), graduate programs - Master's study (average score of 3.94), Chamber of Commerce (average score of 3.72), commercial offerings (average score of 3.30).
- implementation component of the curriculum:
  - *teaching forms:* group work;
  - *teaching methods:* role-play (average score of 4.12), case study (average score of 3.94),

discussions (average score of 3.75), lectures (average score of 3.72);

- *organizational forms:* workshops (average score of 4.14), seminars (average score of 4.02), emotional/interactional training (average score of 3.72), classes (average score of 3.67), professional excursions (average score of 3.60);
- *teaching aids:* CD and DVD (average score of 4.19), electronic media (average score of 4.08), professional publications (average score of 3.69);
- *educational providers:* lecturers/instructors from global companies (average score of 3.87), practitioners from universities (average score of 3.86), experts from organizations (average score of 3.79), important and valued professional (scientific) references (70.5 %).

- financial component of the curriculum:
- *organizational means:* education and training of middle management that would not cost more than 1,600€ per year; education and training for senior management that would not cost more than 2,500€ per year;
- *personal means:* education and training programs for middle and top management that would not cost more than 420€ per year;

- curriculum evaluation:
- *measuring efficacy:* recommended;
- *method of assessment:* questionnaire;
- *elements to assess:* all elements in the curriculum.

It would be ideal if a model of a curriculum in training and educating managers would include all the elements suggested by the managers as this type of model would ensure participation in education and training, provide for self-initiated admissions, a sense of satisfaction with the quality being offered, internal motivation, as well as complimenting lifelong education and training.

V. CONCLUSION

A curriculum represents the whole concept of an educational program or program of training that includes four basic dimensions: learning goals, teaching content, teaching forms and methods, and values that have to be inter-connected. In addition to these fundamental dimensions, it is very important that we add additional ones otherwise we risk the possibility in not being able to successfully implement a curriculum. These additional ones are teaching materials and educational providers of education and training. Experience shows that each of these elements is influenced by other elements and for this reason designing a curriculum is a continual interaction among all dimensions and factors.

The research study was designed based on theoretical examination of the curricular elements in educating and training and based on the empirical results on a sample of 365 surveyed middle and top level managers employed within the economic sector. Managerial decisions in participating in the education and training are influenced by all elements of the curriculum (learning goals, learning content, teaching methods and forms, teaching material, evaluation). Satisfaction with such programs after the educational process has completed is a determinate factor whether one decides to further their education thus, encouraging them towards lifelong education and learning, especially towards self-initiated inclusion in learning because of inner needs and motivation.

The model of a curriculum of education and training of managers represents content directions in the process of lifelong learning of top management in a company. The model defines directions from responses to questions regarding the most effective and most suitable learning content, teaching methods and forms, teaching material and educational providers that provide managers of the future to continuously better the success of their own work, the work of their co-workers and obtain a competitive advantage of their work organizations.

We are aware that the model represents a temporary “solution” – a solution for today and not for tomorrow, as it is a reflection of contemporary organizations interactions with the environment, managers prudent rationalization on the urgency of finding new information through further education and training, availability and needs in including oneself in various forms of additional training and education, current competitive advantages of such companies, and so forth. Finally, we realize that the quick changes in science, technology, and technical areas also influence the changes in the learning content needs, learning goals, teaching forms and methods that are only temporary, but most effective solutions.

A manager that is in command of change is an individual that plays a key role in this quickly developing process of continuous transformations and influences whether he himself, the work organization and/or his co-workers and educationainstitutions with their offerings of managerial training and education, will understand this changing process as an unsolvable problem or

as an opportunity for successful development at a higher level of functioning.

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TEACHING COMMUNICATION TECHNOLOGIES WITH SIMULATION TOOLS

G. Škondrić*, I. Memić*, D. Radosav**, B. Odadžić**
* Faculty of information technologies, Mostar, Bosnia and Herzegovina
** Technical faculty "Mihailo Pupin", Zrenjanin, Srbija
goran@fit.ba, iris@fit.ba, dolores023@open.telekom.rs, borislav.odadzic@gmail.com

Abstract – The main goal of this paper is to present influence of simulation tools on teaching communication technologies. Simulation software is a great tool that can be used by students in order to get practical skills, which normally cannot be gained without the usage of real world equipment. This paper is focused on the usage of simulation tools as something that will help students to visualize important concepts in the field of communication technologies. We present one example based on RIP routing protocol. Our research was focused on two groups of students. One group was thaught with and the other without the use of simulation tool. At the end of this paper we present the results of our research.

I. INTRODUCTION

Communication technologies is a field of information technologies which is developing extremely fast. Teaching concepts of communication technologies is a big challenge for teachers. Classical approach of knowledge transfer is insufficient for complete understanding and acquiring basic concepts of communication technologies. In order to improve quality of teaching many faculties set up laboratories with psychical equipment. By using this equipment students can get practical skills needed in their further work and professional development. This approach is good because it reduces the possible fear that students can have when they are faced with real life situations. Main problems with this kind of laboratories are a number of students that can work concurrently and the fact that this type of equipment is expensive. In order to enable students to acquire necessary skills, many faculties use network and router simulation tools. There are many network and router simulators that allow simulation of LAN, MAN and WAN networks like GNS3, NS – 2, OPNET IT Guru, Cisco Packet Tracer, Boson NetSim etc.

Main goal of simulator usage is not only to provide multidimensional approach in understanding concepts of communication technologies, but also to provide students with additional tool that they can use in future professional work. Student can use simulator to present future network, configure and test performance under different levels of network load and choose the most efficient one to be implemented. Network simulation tools differ in number of supported protocols, technologies, network sizes etc. Simulators use mathematical equation to describe behavior of network nodes. Models can be based on results obtained by measuring real life network traffic, nodes behavior and traffic generated by using certain applications. How precise the results will be depends on model quality and other simulation parameters

Network simulation tools are used by researchers and academic staff for scientific researches. Narul I. Sakar classified existing simulators based on popularity and level of usage in IEEE journals from 2007 – 2009, and the most popular ones were ns-2, MATLAB, OPNET, OMNet++ etc [2].

II. COMBINED APPROACH TO TEACHING

OPNET IT Guru represents academic free of charge version of OPNET simulation tool (Optimized Network Engineering Tool). Opnet is discrete network simulation tool with a development environment that allows modeling and system performance evaluation of computer networks and distributed systems.

This tool is very important for getting important competences within the course of computer networks, e.g. use of network simulation tools for simulating network load and interpreting results of

simulation in order to make a right choice considering the aspect of optimal solutions for network infrastructure development.

The Curriculum of the Faculty of Information Technologies, Mostar includes the course of Communication Technologies. Since 2008 this course has incorporated.

OPNET IT Guru [3] as a simulation tool. Before that, teaching was based on oral lectures and usage of Cisco network equipment (routers and switches). The main question here is how this affects student success in learning and the level of knowledge that students acquire. OPNET IT Guru is a tool that allows a user to use predefined network node models, and to import ACE files based on real traffic captured and monitored in real life networks or "testbed" networks. This tool has predefined standard network applications as HTTP, FTP, MAIL etc. In order to define/set up simulation, it is necessary to follow certain steps like: defining topology, defining applications, defining user profiles and their association with already defined applications, connecting network nodes with predefined user profiles and choosing network statistics to be monitored in the simulation [4].

Commercial version has a much bigger set of predefined models and broader set of features than the free version. Detailed paper on this topic was done by Xinjie [5]. Problems in of communication technologies are related to complexity and students' problem to visualize certain concepts. Besides acquiring concepts, it is equally important for students to develop practical skills such as configuring, planning and designing computer networks. Therefore, our concept of teaching communication technologies relies on tree components:

- First: classical lectures, where professor conducts teaching using frontal approach
- Second: workshops, where a small group of students use psychical equipment such router, switches, cable etc. to develop practical skills.
- Third: labs, where students use OPNET simulation tool in order to fully understand different topics

This blended teaching model was chosen in order to cover specific teaching modules from different aspects. As an example, we will shortly describe teaching unit that covers RIP routing protocol. Using OPNET IT Guru we will create network topology made of one workgroup with 100 users. Users from this workgroup are accessing database server, node_7 on picture. Server is configured as database server that is accessible through network switch (node_8) and gateway router for that network (node_6). Simulation requires defining traffic application that will be used in this network. This is done using application definition (node0). At the end it is necessary to define specific user groups which will generate traffic in this network.

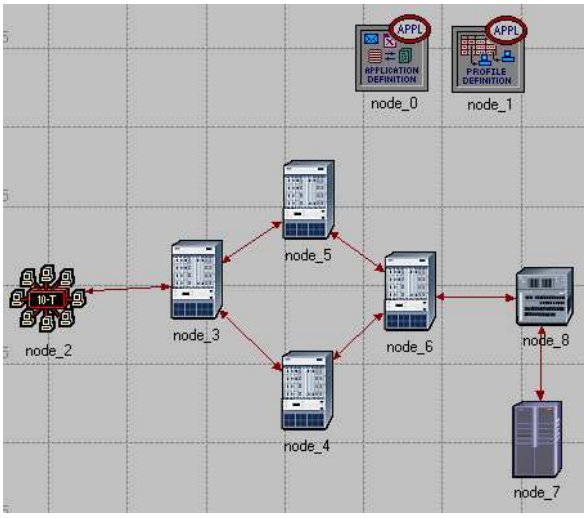

Figure 1. Network topology used for teacing RIP routing protocol.

Those users will be associated with workgroup node that represents subnet of 100 users generating traffic. Network core are four routers that have function to forward traffic from workgroup to database server and backwards. After we define topology we have to choose statistics that will be monitored during simulation. Last step is to start simulation and to analyze results.

Students should first be taught about a concept of distance vector routing protocol, and then about RIP as typical distance vector routing protocol. In order to understand importance of simulation, it is important to say that RIP protocol sends routing updates every 30 seconds. Routing update contains full routing table of specific router [6]. In workshop classes students will learn basic commands they should use in order to configure router to use RIP as distance vector routing protocol and to connect all devices regarding presented topology. Workshop classes will provide students with necessary skills for creating, troubleshooting and maintaining network that uses RIP routing protocols. If there is a lack of equipment there is also a possibility to use certain simulation tools as Cisco Packet Tracer, Bosson NetSim etc.

Basic problem for students is to understand and visualize certain concepts as how this frequent

exchange of routing updates affects performance of computer networks. This can partially be explained using debug ip routing or show ip route command showing students that the router frequently receives and sends update. But this still does not show impact on a computer network.

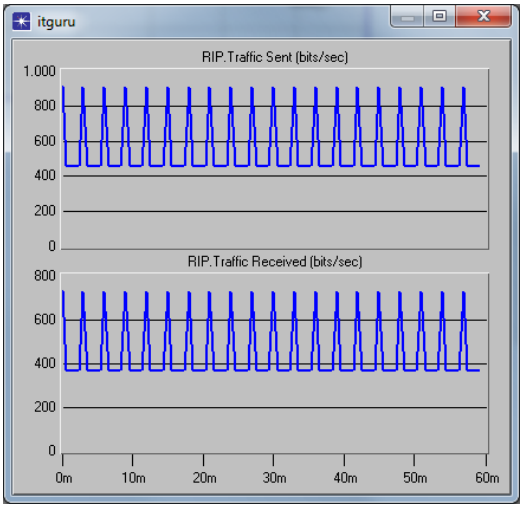

Figure 2. Simulation statistics for traffic generated by RIP routing protocol.

Using OPNET IT Guru simulation tool, students can get a graph where they can see peeks of network load every 30 seconds that proves the fact that this routing updates are an additional load on computer network. Students now can easily visualize this additional load, and see effect of a routing update on the existing network load. This approach should result with complete understanding of a topic in question. Since this tool is widely accepted by many faculties, there is a certain number of predefined labs available on Internet.

III. INFLUENCE OF OPNET

The aim of this research was to determine effect of introducing OPNET IT Guru simulation tool on overall student success. Research was conducted taking into consideration all students of the Faculty of Information Technologies who successfully passed exam of Communication technologies and Computer Networks. We divided students in two test groups. The criterion for splitting them was a year of passing this exam, since OPNET IT Guru has been included in the teaching process as simulation tool since 2008. First group had 333 students and the other one 345.

We wanted to exclude quality of students as a factor that could influence this research. It is well known that certain generations of students have better results than others. We analyzed results of mentioned two groups of students in the course of Computer Network. We chose this course because students have to pass this exam before they can take the course of Communication technologies. Concepts of teaching are the same considering teaching methodology and tools.

Another important fact is that faculty did not increase number of computer network routers and switches, so this can be excluded as a possible reason for differentiation of these two groups, and finally there was no change of the teaching staff. During the research we followed these parameters:

- Number of times of taking an exam before passing
- Student success in courses Computer networks and Communication technologies.

Data that we present here where taken from FIT DLWMS 2 (Distance Learning Management System version2) whereall necessary information about students and their success during studying are stored.

IV. RESEARCH RESULTS

A. *Course: Computer Networks*

We already mentioned that we used results for Computer network course to determine difference between the two groups. This is a reference used to determine trend of progress for the two groups. In table we see classification of student groups based on number of attempts.

TABLE I. COLLECTED DATA FOR COMPUTER NETWORKS

No.of attemtps	I group	II group	I group [%]	II group [%]
1	204	229	61,26	66,38
2	80	75	24,02	21,74
3	29	23	8,71	6,67
4	9	12	2,70	3,48
5	5	6	1,50	1,74
6	4	0	1,20	0,00
7	1	0	0,30	0,00
8	1	0	0,30	0,00
Total:	333	345	100,00	100,00

We can see that a second group shows slightly better , but this is a quite small difference, especially if we take into consideration a fact that the second group is a little bigger than the first one. So as final conclusion we can say that there is no important difference between number of attempts for these two groups.

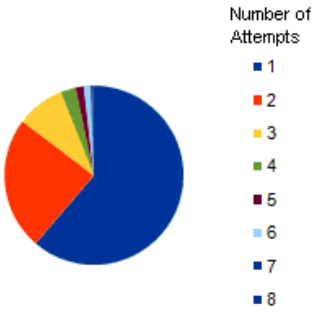

Figure 3. Percentages of attempts for first group

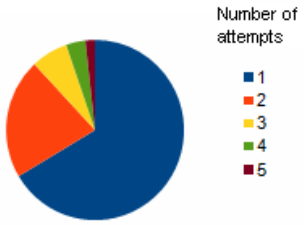

Figure 4. Percentages of attempts for Second group

If we analyze success of these two groups we find out that second group has a better result then first one. This can be related to the fact that second group consists of students that might have already had some previous knowledge about computer networks and therefore they more easily acquired this knowledge. There is also a small number of students that can be discard in this research because of really big number of attempts. As we can see in Table 1. there is total of one percent for students with number of attempts higher then five times. But since they do not have bigger influence on final results they are also presented.

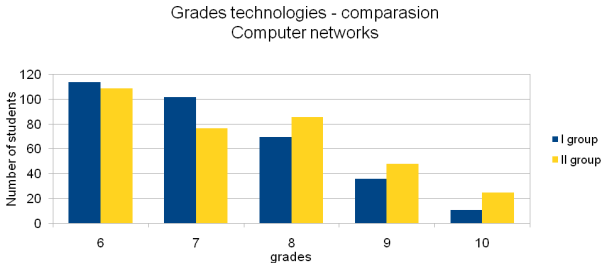

Figure 5. Achieved grades from both groups

B. *Course: Communication technologies*

Second parts of research shows data related to the course of Communication Technologies.

TABLE II. COLLECTED DATA FOR COMMUNICATION TECHNOLOGIES

No of attempts	I group	II group	I group [%]	II group [%]
1	208	249	62,46	72,17
2	75	45	22,52	13,04
3	32	32	9,61	9,28
4	14	12	4,20	3,48
5	4	7	1,20	2,03
Total	333	345	100,00	100,00

Results are collected and presented in table, and we can see that second group that was taught with OPNET IT Guru, needed smaller number of attempts before passing an exam. Presented graph shows that the number of students who managed to pass this exam with the smaller number of attempts is higher. This points out the fact that for students who had OPNET IT Guru as simulation tool included in teaching, lessons where easier to understand and acquire, so they passed the exam with smaller number of attempts.

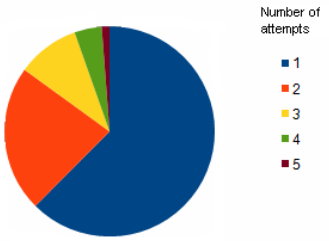

Figure 6. Percentages of attempts for first group

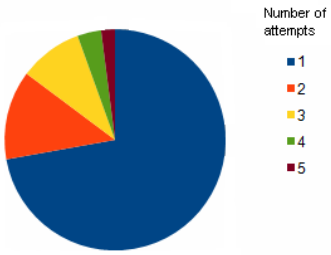

Figure 7. Percentages of attempts for second group

This still does not mean that students from second group had better success and higher grades. If we compare these data with the data collected for the course of Computer Networks, as a reference course, we come to conclusion that second group has better results, but trend is similar to the one discovered for the course of Computer networks.

Based on collected facts, it is clearly visible that for the course of Computer Networks the average grade was improved from 7,2 to 7,4, and for the course of Communication Technologies it raised up from 7,1 to 7,5.

IV. CONCLUSION

Usage of simulation tool in the teaching process for the course of Communication Technologies is meaningful in order to provide students with a tool for better understanding of principles and functionality of computer networks. Simulators provide visualization component of processes taking place inside computer networks that students often have difficulties imagining and understanding as well as the processes that can't be simulated in laboratories using psychical equipment. Simulators are also a cheap alternative to psychical equipment, and they are more flexible in adapting to new technologies. This is why many faculties accept concept of teaching using simulators.

Our two test groups showed that simulators enable students to acquire knowledge of course of Communication Technologies and to pass the exam much faster. We also noticed positive trend of increasing total level of knowledge.

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OFFER STATE UNIVERSITY CURRICULUM AND SOCIAL NEEDS IN MACEDONIA

S. Meta
Fakulty of Applied Sciences
State University Tetovo, Tetovo, Macedonia
metas59@yahoo.com

Abstract – With the opening of new state universities, faculties and study programs in Macedonia has led to a broad selection of curriculum is to question whether they agreed the social needs of the market and offer university curriculum. This paper discusses some aspects that directly affect the validity, effectiveness and needs of large companies offer the curriculum, their impact on the labor market and the further development of the situation that created in higher education. With the opening of new universities, faculties and academic programs, has lead to the same dispersion process which led to increased coverage of high school seniors, with the protagonists of these ideas have not acquired the necessary conditions for quality teaching. It was found that there is a large discrepancy between the real social needs and the number of curriculum offer, as well as inadequacy of the same quality at all state universities and faculties.

I. INTRODUCTION

Last few years in higher education in Macedonia, the processes occurring opening of new universities, faculties and study programs, and soon all cities. This process is the dispersion of higher education, and called it a disraction, but the same thing in an existing system logs. Besides the desire to open as many new faculities and to introduce and implement new programs to increase coverage of generations of graduates, the protagonists of these ideas have not done almost nothing to provide adequate conditions for quality education in the dispersed and new studies. One gets the impression that the dispersion studies strongly enforced by the state, while state universities half-heartedly accepted the orders and the same is now implemented with great difficulty.

The main reason for dispersion studies that suggest the promoters of this idea is that higher education come closer to citizens. But there are hidden for other reasons, such as:

- Request to download as many students,
- Disposal of unemployment,
- The seeming contribution to the development of local communities and rural regions,
- The fulfillment of individual ambition for academic careers and recruitment potential selector is in units of local government,
- Creation of preconditions for the fabrication of new staff needed for filling gaps in party staff structure state.

In addition to the dispersion of higher education is a serious organizational and financial problems, it has never been the subject of serious debate in public, nor is it based on the basis of serious analysis relating to the labor market and the needs of the company on.

II. OFFER CURRICULUM

In Macedonia until 2004, there were only two state universities, University “St. Cyril and Methodius” in Skopje and “St. Kliment Ohridski” in Bitola, the same year foundet the State University of Tetovo, then University “Goce Delcev” in Shtip (2007), and the University “St. Paul and Apostle” in Ohrid, founded in 2009. The establishment of new universities, there was an increase in the supply of education curricula on the market.

The tables that follow (I-VI), is given individual and common view of the curriculum offered.

TABLE I. OVERVIEW OF THE CURRICULUM AND ENROLLMENT OF STUDENTS AT THE UNIVERSITY IN SKOPJE

Name and number	University (Faculty)	Number of curriculum	Number of dispersed curriculum	Estimated number of students enrolling	Estimated number of students enrolling of the dispersed studies
I	University St. Cyril and Methodius-Skopje	219	19	12351	1670
1	Faculty of Architecture	1	/	120	/
2	Faculty of Civil Engineering	8	2	470	200
3	Faculty of Information Technology and Electrical Engineering	8	/	680	/
4	Faculty of Information Science and Computer Engineering	11	3	1020	270
5	Faculty of Mechanical Engineering	17	2	805	200
6	Faculty of Technology and Metallurgy	9	3	565	300
7	Faculty of Science	36	/	1290	/
8	Faculty of Economics	10	3	1256	200
9	Law Faculty	5	2	875	100
10	Faculty of Philosophy	13	/	905	/
11	Faculty of Philology	27	/	1500	/
12	Faculty of Education	9	/	253	/
13	Faculty of Medicine	5	/	495	/
14	Faculty of Pharmacy	2	/	140	/
15	Faculty of Dentistry	3	/	130	/
16	Faculty of Physical Education	2	/	140	/
17	Agricultural Science and Nutrition Faculty	16	4	1125	400
18	Faculty of Forestry	2	/	90	/
19	Faculty of Design and Technologies for Furniture and Interior	2	/	130	/
20	Faculty of Veterinary Medicine	2	/	60	/
21	Faculty of Dramatic Arts	4	/	60	/
22	Faculty of Music	27	/	185	/

TABLE II. OVERVIEW OF THE CURRICULUM AND ENROLLMENT OF STUDENTS AT THE UNIVERSITY IN BITOLA

Name and number	University (Faculty)	Number of curriculum	Number of dispersed curriculum	Estimated number of students enrolling	Estimated number of students enrolling of the dispersed studies
II	University of St. Kliment Ohridski-Bitola	75	18	4073	865
1	Technical University-Bitola	16	2	1010	170
2	Faculty of Economics-Prilep	9	2	765	200
3	Faculty of Tourism and Hospitality-Ohrid	14	7	320	95
4	Faculty of Education-Bitola	11	3	353	/
5	Faculty of Administration and Management information Systems-Bitola	7	/	190	/
6	Faculty of Biotechnical Sciences	3	/	260	/
7	High-Bitola Medical School	5	/	260	/
8	Safety Faculty in Skopje	2	/	210	/
9	Law Faculty-Kičevo	3	2	390	320
10	Faculty of Engineering Technology-Veles	4	2	265	80
11	Veterinary Faculty-Bitola	1	/	50	/

TABLE III. OVERVIEW OF THE CURRICULUM AND ENROLLMENT OF STUDENTS AT THE UNIVERSITY IN TETOVO

Name and number	University (Faculty)	Number of curriculum	Number of dispersed curriculum	Estimated number of students enrolling	Estimated number of students enrolling of the dispersed studies
III	State University of Tetovo	123	28	5170	1830
1	Faculty of Science	26	6	640	240
2	Faculty of Philosophy	21	2	270	60
3	Faculty of Philology	34	10	1035	505
4	Faculty of Arts	5	/	95	/
5	Faculty of Physical Education	1	/	60	/
6	Faculty of Law	9	5	935	470
7	Faculty of Economics	8	2	765	235
8	Faculty of Applied Sciences	8	/	280	/
9	Faculty of Food Technology and Nutrition-Gostivar	2	/	100	/
10	Faculty of Medical Sciences	5	1	450	110
11	Faculty of Business Administration-Kumanovo	4	2	540	210

TABLE IV. OVERVIEW OF THE CURRICULUM AND ENROLLMENT OF STUDENTS AT THE UNIVERSITY IN STIP

Name and number	University (Faculty)	Number of curriculum	Number of dispersed curriculum	Estimated number of students enrolling	Estimated number of students enrolling of the dispersed studies
IV	University Goce Delcev-Stip	115	38	7149	2935
1	Faculty of Law-Štip	10	4	610	120
2	Faculty of Economics-Kočani	9	4	820	440
3	Faculty of Agriculture-Štip	8	5	730	550
4	Faculty of Music Arts-Štip	28	/	216	/
5	Faculty of Informatics-Štip	5	2	490	120
6	Faculty of Natural and technical Sciences-Štip	19	9	920	410
7	Faculty of Philology-Štip	7	1	830	70
8	Faculty of Medical Sciences-Štip	9	/	603	/
9	Faculty of Tourism and Business Logistics-Gevgelija	7	5	900	580
10	Faculty of Electrical Engineering-Radoviš	3	2	250	175
11	Faculty of Mechanical-Vinica	5	3	360	220
12	Technology-Technical Faculty-Probištip	5	3	350	250

TABLE V. OVERVIEW OF THE CURRICULUM AND ENROLLMENT OF STUDENTS AT THE UNIVERSITY IN OHRID

Name and number	University (Faculty)	Number of curriculum	Number of dispersed curriculum	Estimated number of students enrolling	Estimated number of students enrolling of the dispersed studies
V	University of Information Sciences and Technology St. Apostle Paul-Ohrid	5	/	300	/
1	Faculty of Computer Science and Engineering	1	/	60	/
2	Faculty of Communication Networks and Security	1	/	60	/
3	Faculty of Mechanical Intelligence and Robotics	1	/	60	/
4	Faculty of Informatics, Visualization, Multimedia and Animation	1	/	60	/
5	Faculty of Information and Analysis	1	/	60	/

TABLICA VI. PRIKAZ UKUPNOG BROJA KURIKULUMA I UPISA STUDENATA NA DRŽAVNIM UNIVERZITETIMA U MAKEDONIJI

State universities	The total number of curriculum	The total number of dispersed curriculum	The total estimated number of students enrolling	The total estimated number of students enrolling of the dispersed studies
Skopje, Bitola, Tetovo, Štip and Ohrid	537	103	29043	7300

Analyzing all the information about the curriculum offered at all state universities, leads to the conclusion that the total number of offered curriculum 537, of which the dispersive studies were 103, while the enrollment of students in the first year are provided free 29043 seats, of which the studies should be dispersed 7300 students to study. All curricula are arranged and conducted on 61 college, one of which carried a good part of the dispersed studies.

III. COMMUNITY NEEDS

With the opening of new universities and colleges by state and enormously increasing academic programs, raises the logical question: what are the needs of social importance, and whether there is justification for such measures.

To identify the needs of society for higher education staff, especially that there must be a national curriculum as well as long-term planning that is correlated with the real needs of the economy and job market.

The National Program me for the Development of Education in the Republic of Macedonia 2005-2015 with adjoining programming documents, which was compiled by the Government of Macedonia and the Ministry of Education and Science, among other things, gives his vision of development, and advocates that states should create the conditions for higher education becomes part of the European space. It also states that the Ministry of Education and Science in cooperation with universities, to work on creating the conditions for implementing the principles of the Bologna process, which should be conducted following the realization of objectives:

1. Increasing number of highly educated persons;
2. Structural adjustment of higher education the Bologna process;
3. Harmonization of legislation, norms and standards with the recommendations of the Bologna process;
4. Creating an efficient system of scholarships;
5. Promotion of European cooperation in the provision of quality;
6. Strengthening system externals self-evaluation and quality evaluation;
7. Defining and strict compliance with the standards for establishment and accreditation;
8. Creating an efficient financial system and the allocation of governmental financial resources;
9. Improving the capacity of strategic planning and strengthening managing capacity;
10. The development strategy for scientific and technological development;
11. Transparent funding of scientific research activities;
12. Establishing a national database system for innovation in higher education sector.

As a first goal appears to increase the number of highly educated persons, and in order to achieve this began with the expansion of university capacities in which they founded three new universities with an enormously large number of curriculum. A bid opening for admission of students from year to year has been bigger and bigger, which is clearly seen in graph 1. To achieve the first objective, invitations announcement was to increase the number of students on an annual basis, as is clearly seen in graph 2. If we analyze data from the chart, it becomes clear that the educational offer is much higher than the demand, for more than 60% (academic 2010/2011 year).

Highly overloaded deals on the market, and has led to the fact that in some of the curriculum is not a sufficient number of enrolled students and the same have become latent, some years are more active and have become fictional.How to win as many students, all state universities increased the number of students for admission to “attractive” college. This has led to major imbalances in the diversity of graduate staff, as well as to the fact that some of the profession from day to day has less and less inflow of fresh staff.

If we take into account the higher education and offer 17 private universities, which are accredited to Macedonia, it is clear that there is a big difference between supply and demand, which is more than 2:1.

Today the territory of Macedonia to more than 25 locations, are taught in law schools and more than 20 locations in economics faculties.

There are many inconsistencies in the establishment of new universities and their faculties, in which even though not created the necessary space, other conditions, shall be entered more than university students who have been active for

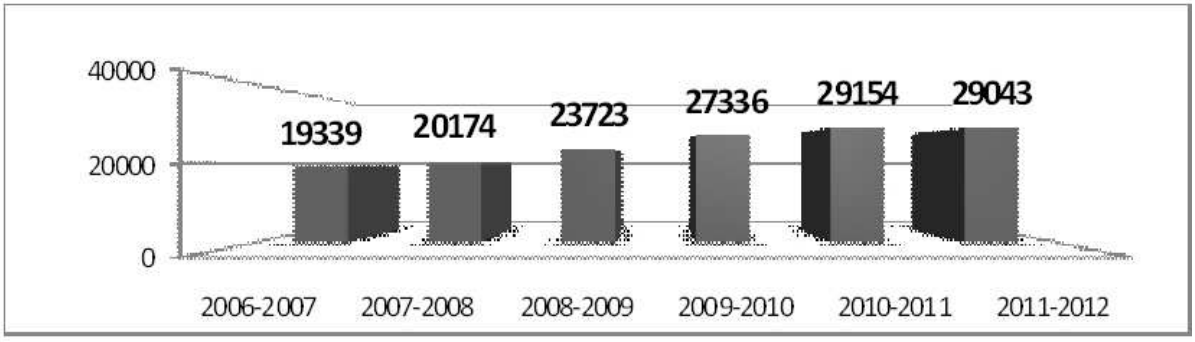

Figure1. Vacancies for enrollment of students at state universities in Macedonia

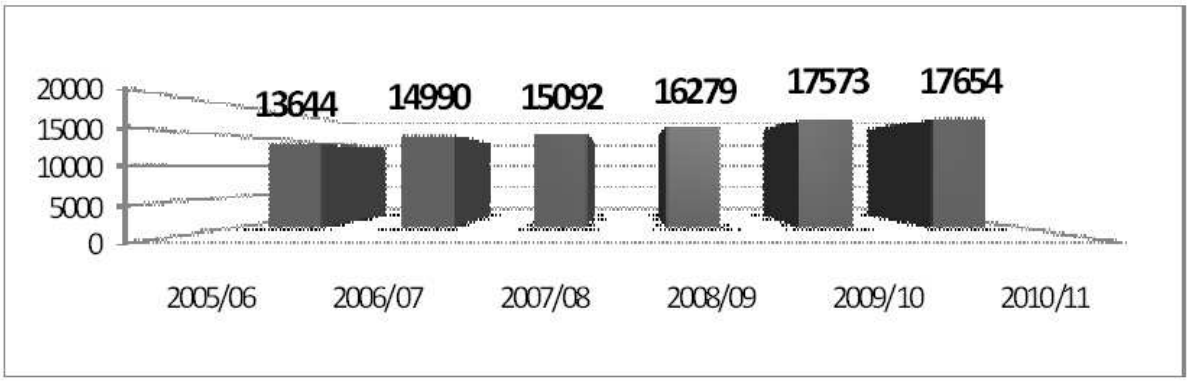

Figure2. Enrolment of students in their first year at state universities in Macedonia

decades. As an example, here is a Medical Faculty in Skopje, which was first founded for more than six decades, and enrolled 495 students, while new universities in Tetovo and Stip, who only a few years ago opened a medical study, enrolling 450 students or 603?!. All public (and private) dispersive universities are on all sides of cities, even in very small places, while some colleges with provincial cities dispersed in Skopje (the capital and largest city in Macedonia). From what was stated, the question whether Macedonia to the list since 2002 is 2.022.574 inhabitants, should be so many higher education institutions, and whether the curriculum needs social agreed with the market?. From the results shown previously, can clearly be seen that there is great unemployment in Macedonia is the largest in Europe and is officialy over 33%, despite the fact that the state wants to reduce the apparent number of unemployed youth by the page gives a chance to study (coverage graduates from more than 98,7%). In the future will change the structure of unemployed so that in the following years new unemployed will be a high school education.

IV. CONCLUSION

A large selection of curriculum to state universities, which is not based on the needs of society will inevitably lead to large inconsistencies, especially in the labor market where selection will be made redundant and inadequate staff, while others economics parameters will lead to the fact that changes must be made and the structure offered curriculum of the university, which will have to be harmonized with the needs of the market and society.

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GRAPHENE TRANSISTORS – A NEW CHALLENGE FOR NANOELECTRONICS

D. Čabarkapa*, P. Pecev **, B. Markoski***, D. Mackic**** and S. Arsovski*****

*Faculty of Electrical Engineering, Niš, Republic of Serbia

**Faculty of Sciences, Department of Mathematics and Informatics, Novi Sad, Republic of Serbia

***Technical Faculty "Mihajlo Pupin", Zrenjanin, Republic of Serbia

****National assembly of the republic of Serbia

***** Guarantee Fund of the Autonomous Province of Vojvodina

d.cabarkapa@gmail.com, predrag.pecev@gmail.com, markoni@uns.ac.rs, darijo.mackic@gmail.com, garfondapv@neobee.net

Abstract - In the last fifteen years and so, the most significant growth area of the electronic industry has been in CMOS VLSI technology. The extraordinary growth in CMOS VLSI technology is powered by a continued shrinking of transistors to ever smaller dimensions. The benefits of miniaturization are higher packing densities, higher circuit speeds, and lower power dissipation. However, computing industry must look elsewhere for the means to sustain the rapid increase in capability that has enabled the development of a wide range of new applications. Graphene seem to be the most promising successor to lithographic based integrated circuits. Outstanding challenges for graphene include making graphene field-effect transistors and similar nanodevices with channels that are extremely thin. That allows graphene transistors to be scaled to shorter channel lengths and higher speeds.

This paper examines issues related to the facts about scaling of conventional MOSFETs and several evolving opportunities for the future graphene nano-devices, including nanowire FETs, carbon nanotube FETs and graphene nanoribbon transistors (GNRs).

I. INTRODUCTION

Since the invention of the integrated electronic circuit at 1958th, Moore's Law has been the basic guidelines for long-term planning and development of semiconductor industry. In accordance with this law, the number of transistors that could be placed in the integrated circuit is increasing exponentially, doubling approximately every two years [1]. Progressively decreasing size of semiconductor chips causes increasing the number of basic components in them.

For the last few decades the main goal of reducing consumption and chip size can be achieved by technology scaling or reduction of components. Scaling techniques using conventional lithography on silicon substrates have enabled an easy and inexpensive way of miniaturization of components, as well as a huge improvement in performance, cost, efficiency and energy density chip packaging. Since early 80th to nowadays, MOSFET transistor channel length is reduced from 1.5 μm to 22nm, while the processor clock speed increased from 6MHz to approximately 4GHz. Nowadays the number of transistors on processor chips increased enormously , with about from 130000 in Intel 286 processors and 2.27 billion in Intel's Sandy Bridge-E processors [2][3] (Fig. 1)

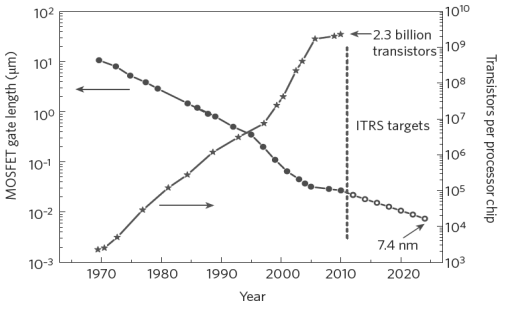

Figure 1. Evolution of MOSFET gate length (filled circles), ITRS[1] targets (open circles) and number of transistors per processor chip (stars) [3]

Fabrication of integrated circuits (ICs) is highly complex process. Scaling has provided the needed performance improvements from one generation of ICs to the next, there has been little motivation for the chip-makers to introduce devices based on a fundamentally different physics or on a material other than silicon. However, MOSFET scaling is approaching its limits and that it will be necessary to introduce new material and device concepts to ensure that performance continues to improve.

[1] ITRS (International Technology Roadmap for Semiconductors)

II. CONVENTIONAL MOSFET AND SCALING LIMITS

It is very important to have a solid understanding of the phenomena that occurs in conventional MOSFETs since it not only provides useful interpretation of the anomalies that we might encounter in their structures but also provides us the future possibilities and limitations of the device scaling. This section of paper discuss the scale thory for two-dimensional (2D) effects in MOSFETs and starting from a brief overview of conventional MOSFET scaling principles and limitations.

Recently technologies of MOSFET scaling cannot be maintained only by the conventional scaling theory. Generated higher electric fields inside of the transistor worsen device reliability and increase leakage currents. Moreover, the required high channel doping causes significant challenges such as mobility degradation, increased band-to-band tunneling (BTBT), gate induced drain leakage (GIDL) and random dopants induced threshold voltage fluctuations. Increasing leakage current does not allow further reduction of threshold voltage, which in turn impedes further supply voltage scaling.

Continuing progress in CMOS technology is based on the physics of scaling MOSFETs. These scaling principles were originally developed by Dennard in the early 1970s, [4]. Basic principle include scaling of a power-supply voltage (V or V_{DD}), threshold voltage (Vth), doping concentration (N_A) and device dimensions gate-oxide thickness (t_{ox}), channel length (L_g) and channel width (W). If this paramters are scaled down by the factor of α with the increased doping concentration by α (>1), all electric fields in the scaled transistor will remain the same as it was in the original device, hence named ″constant-field scaling″

In real practice basic problem is seen in the supply voltage (V_{DD}) scaling, which has been scaled more slowly than MOSFET dimensions. This was because of the difficulty of changing industry-wide standard supply voltages and because of difficulty of lowering the threshold voltage (V_{th}) any further. The problem is that the subthreshold slope does not scale except by lowering the temperature. Nonscalable characteristic of the thermal voltage (V_T = kT/q) makes the relatively fixed sub-threshold swing at the constant temperature [5].

Since the subthreshold slope is relatively fixed, the MOSFET off-state leakage current increases exponentially as the threshold voltage V_{th} is reduced. This is a basic scaling problem. This puts a limit on how lowest possible value of V_{th} can be without using up all of the available power for leakage dissipation. With the knowledge of increased V_{th} variation in MOSFETs, it is necessary to make an enough margin for Vth variation to ensure that Vth stays well away from the lowest possible value of Vth. To obtain high performance, it is generally necessary for the supply voltage V_{DD} to exceed V_{th} by a ratio of 3 or 4 to 1, so the limit on V_{th} also tends to limit V_{DD}. Consequently, supply voltage scaling cannot proceed much further. It is required to keep a certain level of V_{DD}-V_{th}, which determines the drive current and hence performance in a chip (Fig. 2)

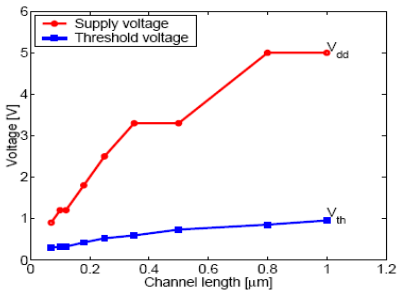

Figure 2. Trend of the MOSFET supply voltage V_{DD} and treshold voltage V_{th} scaling

A. *Sub-treshold leakage current*

It is considered as one of non-ideal characteristics of MOSFET and contributes major portions of the standby leakage power dissipation. Because of small MOSFET geometries, the voltages that can be applied to the gate must be reduced as well to maintain reliability. As threshold voltage is reduced as well, the transistor cannot be completely turned off. The MOSFET operates in a weak-inversion mode, with a subthreshold leakage between source and drain.

The standby power of a CMOS chip due to source-to-drain subthreshold leakage is given by equation (1):

$$P_{off} = W_{tot} V_{DD} I_{off} = W_{tot} V_{DD} I_0 exp\left(-\frac{qV_{th}}{mkT}\right) \quad (1)$$

where W_{tot} is the total turned-off device width with V_{dd} across the source and drain, I_{off} is the average off-current per device, I_0 is the extrapolated current per width at threshold voltage, m is a dimensionless ideality factor, and V_{th} is the

threshold voltage. The off-state leakage current would increase by about ten times for every 0.1V reduction of V_{th}. For a chip with an integration level of 100 million transistors, the average leakage current of turned-off devices should not exceed a few times 10^{-8} A. This constraint holds the threshold voltage to a minimum of about ~0.2V at the operating temperature (100°C worst case).

B. Treshold voltage variation

The transistors with a different channel length in the same wafer, even in the same die, yield difference trshold voltage V_{th}. Further V_{th} reduction caused by increasing drain voltage describes drain-induced-barrier-lowering (DIBL). This phenomena stem from the lowered potential barrier between the drain and source due to the relatively increased charge-sharing effect between the channel depletion region and source/drain depletion regions comparing to long-channel device case. This charge-sharing effect makes a transistor require less gate voltage to deplete the substrate beneath the gate dielectric and makes V_{th} decrease [6].

C. Gate dielectric tunelling

The voltage of the gate electrode above it controls the flow of electric current across the transistor. The gate dielectric should be made as thin as possible to increase the channel conductivity and to keep short-channel effects under control when a transistor is on, and to reduce subtreshold leakage when a transistor is off. The gate dielectric (currently made of SiO_2) thickness of today's high-end microprocessors in a 65 nm transistor is 1.2nm, which represents a thickness of only five atomic layers [7]. These tunneling currents can initiate damage, leading to unexpected reliability concerns in very thin gate dielectrics. New device structures or a new gate oxide with a higher dielectric constant will have to be developed to enhance performance without further reduction of the gate-oxide thickness. No scaling theory exists to guide either development. In this sense, we will indeed soon reach the limits of CMOS scaling

D. Hot-carrier effects (HCEs)

The high electric fields in a device cause trans-conductance degradation due to hot-carrier effects (HCEs). As the average velocity of carriers in the channel saturates by the increased scattering rate at the high electric fields, the carriers can attain high kinetic energy. Once those hot carriers obtain sufficient energy to overcome barriers, they might migrate into the unwanted area such as the gate dielectric, gate, or substrate of a transistor. Highly accelerated hot carriers near the drain region can generate new electron-hole pairs by collision with the silicon atoms, which is called ″impact ionization″. Impact ionization can cause significant increase in substrate current or carrier injection into the gate dielectric, which causes charges to get trapped in the gate oxide. This causes threshold voltage shifts and therefore the device becomes unstable and even can fail [8]. The conventional device scaling trend, which is mostly based on reducing its physical size, is no longer valid for the future technology generations. Several new strategies have been introduced to extend Moore's Law. There are a number of nanoelectronic devices that can possibly supplement or replace current CMOS devices. These include graphene nanotube, nanowire or nanoribbon FETs. These devices offer sizes of a few nanometers and can be self-assembled.

III. GRAPHENE-BASED TRANSISTORS

A. Graphene properties

Graphene is one of the best known allotropes of carbon with a single atomic plane of graphite. Single-layer graphene is a purely two-dimensional (2D) material. Its lattice consists of regular hexagons with a carbon atom at each corner (Fig. 3 left). The bond length between adjacent carbon atoms is 1.42Å and the lattice constant is a=2.46Å. Carbon nanotubes (CNT) are cylindrical carbon molecules that exhibit unique properties. A important property of nanotubes that affects their electrical properties is the number of walls. There are nanotubes in two different configurations: single-walled (SWCNT) and multi-walled (MWCNT). The main difference between the two varieties is the diameter of the tubes. The diameter of single-wall carbon nanotubes are generally between 0.7-2nm while multi-wall carbon nanotubes are typically between 10-20nm, depending on the number of walls. Figure 3 right represents band structure around the K point of (i) large-area graphene, (ii) graphene nanoribbons (GNR), (iii) unbiased bilayer graphene and (iv) bilayer graphene with an applied perpendicular field. Large-area graphene and unbiased bilayer graphene do not have a bandgap, which makes them less useful for digital electronics. The band structure of graphene can be modified, and it is possible to open a bandgap in three ways: by

constraining large-area graphene in one dimension to form graphene nanoribbons, by biasing bilayer graphene and by applying strain to graphene [9].

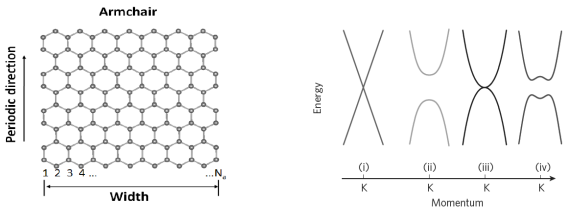

Figure 3. (left) Armchair graphen nanostructure. (right) Graphene band structure-spectrum of energy (E) versus wavevector (K)

The bandgap energy is inversely proportional to the diameter of the nanotube and represents the minimum energy required to break a covalent bond in the semiconductor crystal, thus freeing an electron for conduction. The lower the bandgap energy means the better a conducting material. The diameter of single wall nanotubes puts their bandgap energy at levels that are good for transistor or diode applications. The larger diameter of MWCNTs decreases their bandgap energy so low that they behave like metals regardless of their chirality. Since graphene is a zero bandgap material, which is not preferred in digital applications, this paper summarize the techniques that have been proposed to open a bandgap and also covers the specifics of graphene transistors for digital applications. Analog circuits focus on other parameters (such as gain and transconductance) and operation principles based on using zero bandgap graphene transistors. Since digital applications require a sufficiently large I_{on}/I_{off} ratio for reliable and efficient operation, only transistors built using graphene with a bandgap are considered for digital applications.

B. Carbon nanotube FET transistors (CNTFETs)

Carbon nanotubes are graphene, which is a two dimensional honeycomb lattice of carbon atoms, sheets rolled up into cylinders (Fig. 4 left).

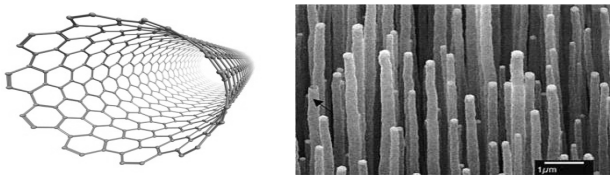

Figure 4. Single-wall carbon nanotube(left) SEM sequence of nanotubes alignment obtained in plasma-CVD (right)

They have either metallic or semiconducting properties depending on the direction how CNT are rolled up (chirality). Chirality vector is represented by the integer pair (n, m). If n-m is not a multiple of 3 then it is semiconducting carbon tube. The diameter of the CNT based on the following eqauation (2) [10]:

$$D_{CNT} = \frac{\sqrt{3}}{\pi} a_0 \sqrt{n^2 + nm + m^2} \quad (2)$$

where a_0=0.142nm is the inter-atomic distance between each carbon atom and its neighbour.

SWCNTs typically have a diameter of 1–2 nm and a length of several micrometers. The large aspect ratio makes the nanotubes nearly ideal one-dimensional (1D) objects, and as such the SWCNTs are expected to have all the unique properties predicted for low-dimensional structures.

CNTFETs are very similar to MOSFETs, with the silicon channel replaced with a CNT. SWCNTs was used to bridge two metal electrodes prefabricated by lithography on an oxidized silicon wafer as shown in Fig. 5 (left). The SWCNT played the role of the ″channel″, while the two metal electrodes functioned as the source and drain electrodes. Channel is intrinsic, where source and drain are doped. An electrostatic potential barrier, prevents flowing electrons through the channel. By a positive gate voltage the barrier is passed down and current will flow across the semiconducting nanotube. Since the bandgap of semiconducting CNTs is inversely proportional to their diameters, threshold voltage can be easily controlled. The threshold voltage is defined as the voltage required to turn on the transistor. The threshold voltage of the intrinsic CNT channel can be approximated to the first order as the half bandgap that is an inverse function of the diameter [11].

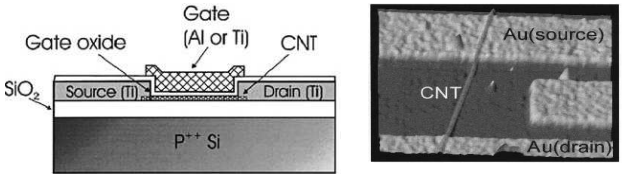

Figure 5. Sross-section of a top-gated CNFET (left), AFM image of one early CNTFET

The small diameter of the CNT means that all parts of the channel are close to the gate, and they are easier to control. Advantage of using CNTs is that they exhibit ballistic transport of electrons because of the tube structure. Since all of the atoms in the tube are bonded to the same number of neighbors, there is no electron backscattering. This is in contrast to a wire made of a crystal, which has irregular bonds at the surface. The

current-voltage (I-V) characteristics of the CNTFET with different channel lengths are shown in Fig. 5 (with power supply of 0.9V and room temperature) and they are similar to those of MOSFET. The CNTFET device current I_D is saturated at higher V_{DS} voltage as channel length increases and the ON-current decreases due to energy quantization in the axial direction at 32 nm (or less) gate length [10]. The current of the CNTFET can be increased by increasing the number of tubes in a CNTFET. As shown in Fig. 6 the current level of the CNTFET decreases with channel length (when the channel length is very short) due to the energy quantization in the axial direction (as limited by optical phonon scattering).

As the chirality vector changes, the threshold voltage of the CNTFET will also change. The threshold voltage of the CNTFET is inversely proportional to the chirality vector of the CNT. For example, the threshold voltage of the CNTFET using (13, 0) CNTs is 0.423V while the threshold voltage of the CNTFET using (19, 0) is 0.289V [10]. There are several difficult problems to be solved. No existing processes for synthesis or growth of nanotubes can produce tubes with identical diameters and chiralities. There is still a big gap between promising early results and the extremely tight control of placement that would be needed. Furthermore, an even tighter gate control through ultrathin high-k gate dielectrics and extremely abrupt doping profiles are required for the device fabrication.

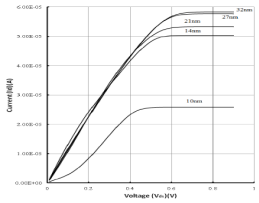

Figure 6. Current-Voltage Characteristic of CNTFET

C. Nanowire FET transistors (NWFETs)

Atomic-scale nanowires (NWs) can be engineered to have a variety of conduction properties from insulating to semiconducting to metallic. Semiconducting nanowires can be grown to controlled dimensions on the nanometer scale using seed catalysts (gold balls) to define their diameter (6-20nm) and legths ranging ftom 1-30μm. By controlling the mix of elements in the environment during growth, semiconducting NWs can be doped to control their electrical properties. Heavily doped NWs are conducting. Conduction through lightly doped NWs can be controlled via an electrical field like FETs.

While one CNT is either an active device or a wire, a single NW can be both an active devices and an interconnect wire. At first glance, NWs and CNTs seem to be very similar. Both are capable of forming active devices and interconnect wires with dimensions of a few nanometers. However, there are some differences that make NWs more promising than CNTs. While CNTs are physically strong, and their metallic form has excellent conduction properties, the inability to grow CNTs with desired properties is a major obstacle to their large-scale usage. Current methods for creating CNTs produce both semiconducting and metallic structures, and their semiconducting characteristics even vary from tube to tube. On the other hand, the doping levels of NWs, and thus their conduction properties, can be very tightly controlled. The doping levels can also be varied along the length of a NW, while a CNT is either all semiconducting or all metallic [12]. NWFETs, gate-allaround or surround gate FETs with a thin nanowire channel, have drawn much attention and have been considered as promising candidates for continuous CMOS scaling since their nonplanar geometry provides superior electrostatic control of the channel than the conventional planar structures. The increasing attention in nanowire research stems from several key factors: their high-yield reproducible electronic properties, cost-effective "bottom–up" fabrication, higher carrier mobility by means of the reduction of scattering resulting from the crystalline structure, smooth surfaces and the ability to produce radial and axial nanowire heterostructures, better scalability resulting from the fact that diameter of nanowires can be controlled down to well below 10 nm [13]. Figure 7 is SEM image of a 50nm thick NW. The current–voltage of drain and source (I_{DS}-V_{DS}) data of the back-gate NWFET are shown in Fig. 6. The gate voltages were applied from 0 to 9V and the drain voltages were from -1.0 to 1.0V for room temperature samples.

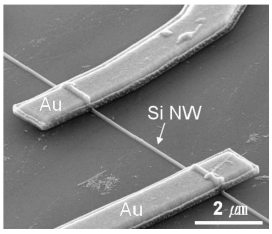

Figure 7. A SEM image of a 50-nm-thick Si nanowire device with Ti/Au contacts for electrical transport measurements

It is shown that the conductance increased with the increase of the back gate voltage, which indicates an n-type property for the S_nO_2 nanowire. The possible reason is due to oxygen vacancies and extra gallium interstitial atoms in the lattice during the synthesis process [14]. An on/off current ratio (I_{on}/I_{off}) of more than 10^5 has been achieved at V_{gs} from -1 to 1V with V_{ds} of 0.2 V. The FETs based on single S_nO_2 nanowire exhibited better electrical properties, which affected both on/off current ratio and threshold voltage of the devices. Fig. 8 shows a typical I_{DS}-V_{DS} characteristic of single S_nO_2 NWFETs.

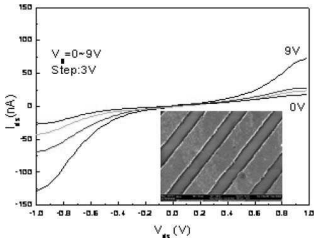

Figure 8. Transistor characteristic of back-gated single S_nO_2 NWFET devices on silicon substrates: Ids–Vds curves for gate voltages with Vgs = 9V to 0 in 3V steps from top to bottom. The inset is the SEM image of the as-fabricated single S_nO_2 nanowire

Variations in nanowire dimensions due to fabrication imperfections can lead to perturbations in the carrier potential and scattering that degrade the charge transport characteristics. Also, variations in nanowire diameters may lead to a variation in FET threshold voltage. Reducing variability is therefore a key challenge in making nanowire FETs a viable technology. Furthermore, quantum confinement effects make modeling of nanowire transistors a complex problem.

D. Graphene nanoribbon FETs (GNRFETs)

Graphene nanoribbons (GNRs) have one-dimensional structures with hexagonal twodimensional carbon sheets, which are stripes of graphene. Depends on the termination style, nonchiral GNR can be divided into two kinds: AGNRs (armchair) and ZGNRs (zigzag). Fig. 9 (left) shows the structures of armchair GNRs. Adopting the standard convention, the width of armchair GNRs is classified by the number of dimer lines (Na) across the ribbons. Likewise, the one of zigzag GNRs is classified by the number of zigzag chains (Nz) across the ribbons. Perpendicular to the direction of defined width, GNRs repeat their geometric structures, and form one-dimensional periodic structures.

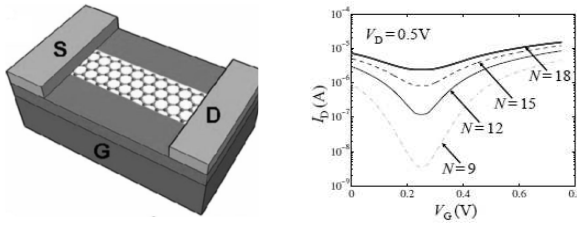

Figure 9. Schematic of back-gated GNRFET (left), I-V characteristic for different GNR widths (right)

Fig. 9 (right) illustrates how variability in GNR width affects device I_D-V_G characteristics. The band-gap of the N=18 GNR is too small to achieve a small leakage current, whereas that of the N=9 GNR is sufficiently large so that I_{on}/I_{off} is as high as 1000X. However, the capacitance of a wider GNRFET is large due to the larger surface of the GNR channel. The N=18 GNRFET has 50% larger intrinsic channel capacitance than the N=9 GNRFET in the on state, which can affect performance [15].

Two-dimensional (2D) graphene sheets are nearly metallic, while ultrathin graphene nanoribbons can show semiconducting properties with the energy bandgap scaling inversely with the ribbon width. The achievable energy bandgap, superior transport properties, and the planar manufacturability establish GNRs as promising technology beyond the Si CMOS technology. Unlike CNTs, which are mixtures of metallic and semiconducting materials, a recent research results demonstrated that all sub-10nm GNRs are semiconducting due to the edge effect, which make them more attractive for electronic device applications. The electronic properties of the channel material play an important role on GNRFET characteristics.

Although the GNR material promises ultra-small, fast, and low-energy FETs, two key effects of variability and defects - leakage and low noise margins are significant. For example, the variation of the channel width by a couple of angstrom changes the leakage current by orders of magnitude, and a single Coulomb charge impurity can lower the FET on-current by about 30%. Dense memories, which are the biggest prospect for graphene-based devices, are particularly susceptible to variations and defects with near-zero noise margins and an increase in leakage power of over 5 X. This assessment of the effects of variability, defects, and parasitics indicate their important role on circuit performance.

IV. CONCLUSION

As dimensional scaling of CMOS transistors is reaching its fundamental limits, various researches have been actively carried out to find an alternative way to continue to follow Moore's law. Graphene and CNTs are new materials with outstanding electrical properties. The high conductivity and exceptional stability of metallic nanotubes makes them excellent candidates for future use as interconnects in nanodevices and circuits. FETs using semiconducting CNTs and NWs have operating characteristics that are as good as or better than state-of-the-art silicon devices, and significant improvements should be expected in the near future. Graphene nanodevices take advantage of the quantum mechanical phenomena and ballistic transport characteristics under lower supply voltage and hence low power consumption. Moreover, due to their extremely small size, those devices are expected to be used for ultradensity integrated electronic computers. While nanoelectronics presents the opportunity to incorporate billions of devices into a single system, it also increases defects and variations both during manufacturing and chip operations. However, while graphene based FETs are one of the most promising devices for molecular electronics, many challenges remain before they can become a successful technology.

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INTRODUCING NEWLY DEVELOPED TEXTILES IN EDUCATION

T. Dudas and J. Pitrik
SZTE JGYPK Szeged, Hungary
dudas@gypk.u-szeged.hu, pitrik@jgypk.u-szeged.hu

Abstract – With the development of science and technology newly developed textiles appear on the market. In education we deal with the presentation of traditional textiles and technologies in the first place. In my thesis I would like to point at where and what novelties can be introduced in some courses of the SZTE JGYPK. This way we can broaden the knowledge of future teachers by raising their curiosity towards new achievements and future textile and hoping that they will pass this onto the new generation.

I. INTRODUCTION

What comes into our mind about textiles in general is that of clothing and interior materials, however products of the textile industry are present at all areas of today's life. Newer and newer succesful developments come to light, thanks to which, using textiles makes the employees life easier, more enjoyable and safer in several industries.

Textiles are present in many areas of economical and everyday life. Textile-based supporting structures are used in building roads and dams. Light-weight constructions made of fabric are known, concrete is made using glass fiber, geotextiles are used at the landfills.

We come across products of the textile industry in healthcare, health preservation and curing, such as implants, artificial veins and surgical dressings.

The so called "clever products" gain ground which help protecting health of disabled or elderly people, developing telemedicine and preventing diseases.

Clothing are made for the visually impaired or blind people which includes a position sensor and a vibrational device. When the sensor detects an obsatcle it makes the vibrational indication system work thereby helping the blind person's movement.

Analyzers built in the clothing are capable of measuring heart rate and blood pressure. Based on the skin's biological information and sweatness they can diagnose illnesses, secure the monitoring of the treatment or even call the doctor if necessary.

It is difficult to name an area where products of the textile industry have not gained ground yet. Today's technology makes it possible for our clothing to change its colour depending on the external temperature. By using solars our clothes or accessories can glow, heat, cool or can even be antibacterial.

There is a demand on the market for entertaining electronics, GPS, computer and telephone built in everyday clothing. Microelectronical position sensors and diagnostic sensors are built in clothes worn in case of disasters for the safety of the rescue people.

Textiles, which are capable of adapting the changes of the external environment and alter accordingly, are called intelligent textiles. Such fabrics are known, which are soft, silky and flexible, but become solid once beaten. There are special textiles of which curtains or safety clothings are made. These textiles not only open pores and let energy through at explosion, but at the same time they thicken and get hold of the chippings or give protection against UV radiation or mechanical effects (e.g.: cuts or stings).

Sportlife is not only using intelligent textiles but also it is becoming an outstanding market for them. Sportmen are wearing shape-memorizing T-shirts and sports clothing which helps them taking up the appropriate pose thus making them easier to perform the required movement (e.g.: strike).

Wide range of fireproof, dirt resistant, antistatic and odor-absorbing furnishings can be found to satisfy everyday needs.

Textile-based, built-in, chip-system equipped "intelligent carpets" can function as motion detectors, fire alarms or thermostats for air conditionings. Leds built in wall-to-wall carpets can designate an escape route or serve as an emergency lighting. The information exchange

with nearby electronical devices can form a self-learning network and this way in case of a custom-made carpet the complexity of the system remains intact. Radio Frequency Identification (RFID) chip built in flooring is able to maintain several functions: control or identify. Such control of the buildings can increase safety and intesify well-being.

Man very often gets inspiration from nature, engineers use the nature's inventions for their work and innovations.

We attempt to get to know and learn the obvious phenomena of nature through modelling. However we cannot forget that modelling not only means similarity but also diversity. Ignoring this can lead to the fault of wrong analogy. This happens, when studying the modell, we want to come to such conclusions about the properties of the modelled, according to which they are not analogous.[1]

Biomimicri or biomethics (coming from the Greek bios = life and mimezis = mimicri) is a discipline based on the study of nature which is intented to combine biology and engineering. Its major aim is to bring, in practice, the structure and mechanism of organisms into effect in artificial materials, machines thus copying natural organisms having been improved for millions of years.

In 1948 George Maestral invented the velcro while examining the thistle, self-cleaning, water-resistant clothing was developed when studying the leaves of the lotus. Bodies of sharks are covered with tiny, placoid scales. Swimsuits are made imitating this. Blades of the wind turbines resemble to the humpback whale's gnarled flipper. The prototypes of these turbines provided twice as much output at 27km/h wind speed as the traditional wind turbines.[2]

Many other examples could be listed here.

II. COURSES

Examine how this knowledge can be incorporated in the courses of the University of Szeged Faculty of Education, Department of Technology.

A. Name of course: B-TAKT06 Technology, life management, home economics and subject pedagogy

Subject elements: B-TAKT061 Technology

Topics: Principles of the relationship between people and technical products. Development. Description of consumer society. Environmental impacts of production and consumption.

Eco-textiles play an important role among textile technologies.

Picture 1. Oeko-Tex® Standard label (Trust in textile, tested for harmful substances according to Oeko-Tex Standard 100)

„At the beginning of the 1990's Oeko-Tex® Standard 100 was developed for the need of healthy and skin-friendly products. This was the time of the "poison in textile" and other negative slogans which denounced the chemicals used in the textile industry being harmful to health." [3]

At the same time it is impossible to fulfill our expectations towards modern textiles without using chemicals. However it is not all the same how we obtain the required colour stability, fabric structure or touch etc.

„ The testing and certification system of the Oeko-Tex® Standard 100 satisfies the many and varied requirements consumers make of modern textile products and at the same time takes into account the complex production conditions in the textile industry: global organisation, a strong tendency towards the international division of labour, different mentalities with respect to the use of potentially harmful substances.

- Manufacturing textile products of all types, ecologically harmless for humans.
- Simplifying and accelerating terms of delivery for manufacturers and retailers who wish to offer their customers textile products which pose no risk whatsoever to health.
- A reliable product label for consumers who specifically aim to buy textiles which are harmless to health." [3]

Newly developed textiles can have properties thanks to which they are resistant to stain and dirt, and antibacterial. Due to these qualities they need less washing, it is easier to maintain and handle them. Dirt resistant feature makes washing easier.

Picture 2. Demonstration of different types of water-resistancy of textiles in class

Self-cleaning textiles are covered with a photocatalyst layer (nano-sized titanium dioxide) thanks to which dirt decomposes if exposed to light. It can also, just like the lotus leaf, repel to water and dirt, because by using polymer grains or laser technology they can produce such super hidrophobic surfaces which push off all kinds of pollution. [4]

Demonstration:

We can introduce some examples on the two types of textiles. One is that repels water and the other which absorbs it. While the first is called hydrophobic, the second is hidrophilic (Picture 2.)

When you want to buy water- or dirt-resistant table cloths or other textiles, they are not necessarily labelled with these two expressions, however you are likely to meet the term "sol release" which also refers to these types of fabrics.

Due to these simple solutions the use of water and detergent decreases so less wastewater gets into our environment. In order to save our surroundings we need to use textile filtration systems. Polymer Composite Department of the Bay Zoltan Institute of Materials Science and Technology is working on developing special filtration systems. " Most of the drug substances get through the two-step, traditional wastewater plants changeless and gets into rivers, lakes and other water suppliers. In order to stop this they develop special filtration systems mentioned above.

Destruction of slowly decomposing plastic causes an ongoing problem so they started developing biologically partly or/and fully degradable polymers. "Goal: developing biologically fully dessolvable composite using caseinate matrix and nano-cellulose reinforcement. As a reference material they use PVC matrix and microcrystalline cellulose. They intend to use the biologically decomposable composite in packaging industry, primarily packing food."[4]

Hopefully there will be an adequate solution for this in the near future as it is very important what kind of packaging we use.

B. Topics: Technical information transfer systems and subsystems. (Sources of information, transmission channel, devices for information desplay. Radio, television, computer.)

We already know textiles which, with the help of optical fiber or fiber-optic screens, can visualise pictures or writings on the fabric. Luminous fabric can be made in different colours by using fiber-shaped leds and conductive fibers. The colour of these can be changed by computer.

"We can find several examples of using information technology in everyday clothing. Fashion companies, research institues and other corporations deal with the development and marketing of such products. These products hardly differ from the normal, everyday clothing by look. They can be washed in a washing machine, even it is a foldable textile-based keyboard, led-light screen built in clothing with the help of an optical cabel or a jacket, which has a communication device in its collar (e.g.: microphone, MP3, bluetooth, I-pod or GPS)."[4]

Now we can say that "computer can be worn". Built in solars provide and store energy thus they can operate electronical devices.

C. Name of course: B-TAKT06 Techinology, life management, home economics and subject pedagogy

Subejct element: B-TAKT062 Life management

Topics: Basic human needs. Well-being. Factors affecting well-being.

Our comfort has a great influence on our well-being.

"The comfort of wearing is a measure, with which our clothing supports the body's functions – or it interferes with them as little as possible. Here

we can mention freedom of movement, expedience of shape, keeping the body and its close environment at a convenient temperature and that wearing the clothing should have a pleasant feeling on our skin. The insulation and moisture-wicking ability of the clothing and also the size of the covered body surface play a major role in the body's heat."[4]

Nowdays we can find an "intelligent" solution for easing the extremities of the external temperature. The so called Phase Change Material (PCM) is used which is able to change consistency between 35-37˚C or they inveave "thermo strings" in the base material, which, due to their electrical conductivity (carbon fiber core, metal powder additive), produces heat when effected by electricity.

"Hygroscopic and moisture-wicking ability

A very important property of a clothing worn right on our skin is its hygroscopic ability and at the same time how fast it can absorb moisture from the skin and pass it onto the outer layers.

The air permeability of the clothing

It can increase wearing comfort if the air inside the clothing can change and water vapor can leave free. Air permeability comes into account when the clothing needs to be water-resistant. This can be helped with a polymer membrane through which liquid cannot get in, but vapor can get out. This property has a great importance in safety and outdoor clothing.

Flexibility which increases clothing physiological comfort

To increase wearing comfort they use 2-10% (or even more depending on the target) quantity high-density elastane fiber (e.g.:Lycra). The close fitting, comfortable piece of garment lives and moves together its bearer. They have become common in underwear, outerwear, lingerie, tights, gloves, sport and leasure clothing, but they are also used in healthcare (e.g.: elastic bandages and medical tights)."[4]

Demonstration:

We can introduce a traditional and a medical pair of tights, compare their flexibility, give an example for the compression effect (Picture 3.).

"Skin sensory effect

A piece of clothing's effect on the skin, when it's in direct contact with it, is primarily influenced

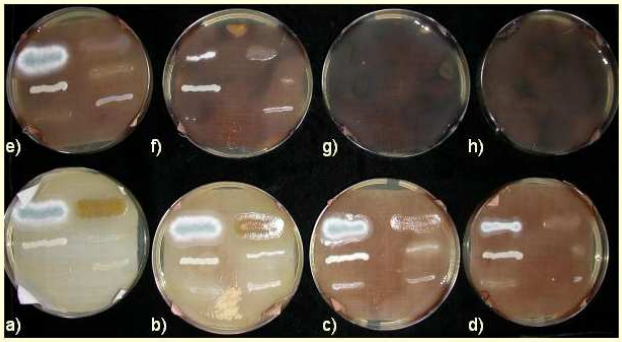
Picture 3. Medical tights do not show a big difference from the traditional tights at first sight

by the base material, the textile design and the finishing operations in production."

Anti-odor fabrics

Smell of perspiration and body odor are caused by bacteria on the skin. Reproduction of bacteria can be prevented in different ways. Using nano-silver became popular recently. Nano-silver treated textiles stop the multiplication of bacteria and microbes, so we can just as well call these textiles antibacterial. On Picture 4. we can see that with the growth of concentration of nano molecules the antibacterial effect increased. In cup a) the textile is not treated, cup b) contains the less amount of silver concentration and every following contains more and more silver molecules. It is visible that by increasing the concentration the antibacterial effect has grown.

„Antibacterial underwear – including T-shirts – denote a significant future potential on the market in everyday clothing. Another way of deodorisation is when cyclodextrin molecules bind sweat, what's more, cyclodextrin filled with fragrance make clothes smell nice."



Picture 4. Antimicrobal test results.
a) Clean, white textile, b-h) AgNP covered white textiles. The concentrate of silver nitrate solution for making silver colloid was the

following: b) 0,001, c) 0,005, d) 0,01, e) 0,05, f) 0,1, g) 0,5 and h) 1 mol/dm^3 [5]

III. SUMMARY

In all areas of life, with the involvement of many sciences, interdisciplinary developments are taking place and textiles have become part of these developments.

Techincs and lifestyle, being a school subject, can also be considered interdisciplinary as it concerns all disciplines of all walks of life. This way it is easy to find points of connection between the topics and the newly developed textiles. The only question that arises is how to present these.

Both in the school system and in adult education, information should be given a greater role. With the cooperation of professions and educational institutes, inform students about new technological solutions, researches in order to achieve that they not only get to know the traditional curriculum and traditional technologies. Help students gain insight into the "loopholes of the gateways of future" as something might arouse their interest and getting through these gateways they can conquer new grounds.

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DATABASE MARKETING IN INSTITUTIONS OF HIGHER EDUCATION

V. Rodić, N. Lukić
University of Novi Sad, Faculty of Education, Sombor, Serbia
vesnarodic.pef@gmail.com, luknem@yahoo.com

Abstract - Underlying philosophy of the relationship marketing is based on the premise of retaining existing customers with long-term profitability. When reffering on institutions of higher education, students are considered as consumers and beside them there is a great number of stakeholders, whose needs should be satisfied. Relationship marketing can be considered on several levels. On the first level, relationship marketing is considered as database marketing. Database marketing uses a database for storing and analysis of consumer information, which supports the formulation and implementation of marketing strategies. In institutions of higher education database marketing can be used for developing long term relationships with existing students but also for attracting potential students as well as during their recruitment.

I. INTRODUCTION

Marketing represent a relatively new area of business economics. It's of great importance for enterprises engaged in economic activity, but not just for them. In terms of defining the concept of marketing, it should be noted that there is no single accepted definition of marketing [8]. According to Kotler and Keller [3] marketing management can be defined as *"art and science of choice of target markets and the ability of acquiring, retaining and increasing the number of customers through the creation, delivery and communicating of superior value for customers."*

Initially, marketing has been applied in for-profit organizations. The main difference between for-profit and nonprofit organizations is that their primary purpose is not profit but some other social goal. It is not true that the latter do not generate profit, on the contrary, they could generate profit but they would use that profit for some other purpose. The beginnings of the application of marketing in organizations that do not generate profits primarily began in the sixties and the beginning of fundamental theoretical and practical research is linked to Kotler and Levy [4]. They argued that marketing is generic activity for all organizations. Thus marketing has slowly begun applying in the nonprofit organizations, such as educational institutions.

Important turning point in overall development of the theory of marketing is development of relationship marketing. Relationship marketing presents the latest innovation in marketing and it is the most important innovation of marketing which appears in the 20th century. Relationship marketing (RM) appeared in 1980's and as an alternative to the prevailing view of marketing. At the time, marketing is regarded as a series of transactions and that was because many exchanges, especially in the service sector, are relational by nature [5].

II. RELATIONSHIP MARKETING IN INSTITUTIONS OF HIGHER EDUCATION

Underlying philosophy of the relationship marketing is based on the premise of retaining existing customers with long-term profitability. Keeping customers (consumers) through the development of long-term and comprehensive relationship with them means a critical element for achieving and maintaining long-term competitive advantage. The development of the concept of relationship marketing significantly changed the traditional approach in the study of marketing. Significant change are manifested in the following six dimensions [6]:

- Relationship marketing seeks to create a new value for consumers and then to participate in it with certain customer;
- Relationship marketing recognizes that consumers have a dual role, both as costumers and as direct participants, in defining the values that they want to achieve;
- Relationship marketing of business entities are observed through the prism of designing and active involvement in processes, communication, technology and people in support of creating value to consumers;

- Relationship marketing represent continual cooperative efforts between buyers and sellers;
- Relationship marketing recognizes consumer value during the life cycle of buying;
- Relationship marketing is trying to build a chain of relationships in the organization, to create value that consumers really want and to form a chain of relationships between the organization and its major stakeholders.

There are many definitions of relationship marketing. Kotler and Armstrong [1] pointed that relationship marketing "*involves creating, maintaining and enhancing strong relationships with customers and other stakeholders. Relationship marketing is oriented to the long term. The goal is to deliver long-term value to customers and the measure of success is long-term customer satisfaction.*" Gibbs [2] pointed out that those involved in higher education "seek to develop educational relationships rather than transactional deals between traders". The same author argued that the "economic market commodities higher education on the basis of the accreditations earned at higher education institutions".

When reffering on educational institutions, students are considered as consumers and beside them there is a great number of stakeholders, whose needs should be satisfied. When comes to apllying relationship marketing in educational institutions, there is a need to form chain of relationship between institution and its mayor stakeholders (business entities, donors, faculty staff, alumni, ministry of education, local community, labor market etc.). That is a great task for institution like educational one. Because of that, there is a need to involve all of staff members in fullfilment of this task.

Authors [7] of multiple stakeholder model (fig. 1) indicate that there are seven groups of stakeholders in higher education. Those groups are:

- potential students;
- students;
- educational personnel;
- economic sector;
- competition and other higher education institutions;
- government ministry and other state institutions;
- parents of existing and potential students.

According to the conclusions made by the authors [7] of this model, an adequate orientation to the users/customers in education implies that culture, structure, systems and procedures must be established in a manner that ensures success in developing long term relationships with stakeholders, in order to ensure long-term survival of the institution.

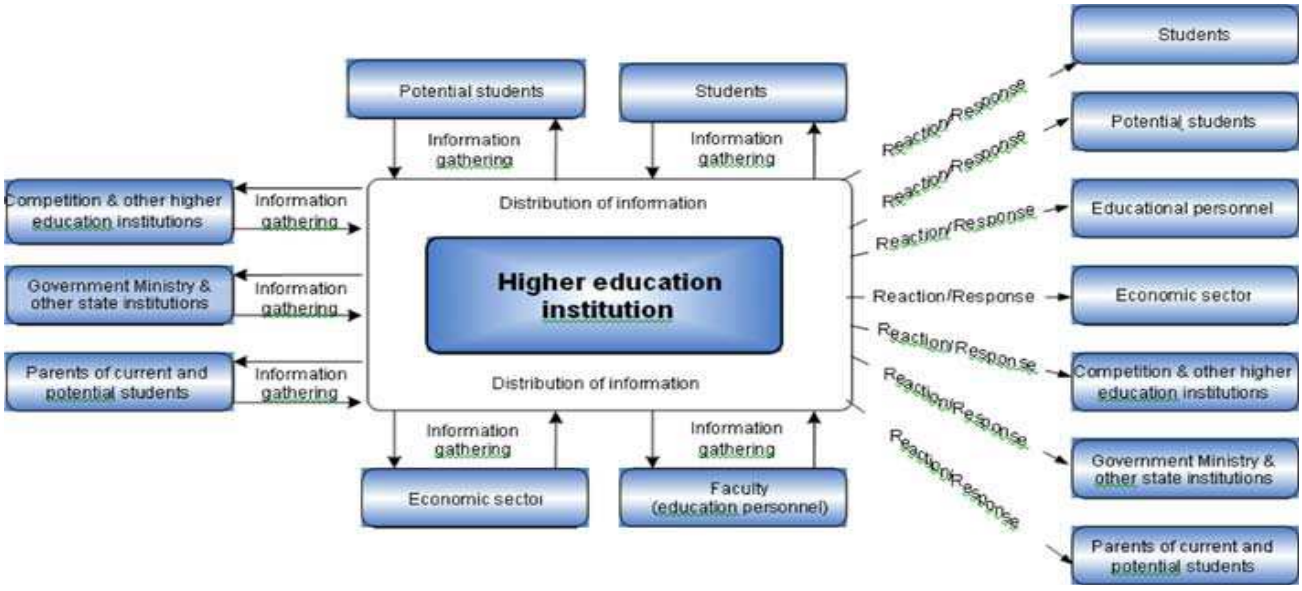

Figure 1. Multiple stakeholder (constituency) model for the implementation of market orientation [7]

Regardless of the type of organization that has been applied, process of relationship marketing is conducted in the following stages [6]:

- *Awareness* - members in the process of exchange identify other potential partners;
- *Research* - analyze the obligations, benefits, subject and possibility of exchange;
- *Expansion* - by increasing interdependence between partners, it is realized additional benefits from their relationships;
- *Obligation* - partners implicitly or explicitly give the word that cooperation will be continued;
- *Leave-taking* - interrupt the established relations.

Some authors [2] claim that marketers in institutions of higher education have to encourage students to be actively involved in faculty activities. They pointed that is nessecary to work on improving university image, because that affect on development of a university identity. If university have good image in public and established identity, that will encourage students to engage in supportive behaviours in the future. At first, authors considered that relationship marketing can be a viable strategy in the context of higher education. What is required of these institutions is to change their paradigm and do not be only focused on profit, but also to emphasize the social benefits like other non-profit organizations do. Those benefits include emotional satisfaction of the costumers, spiritual values and many other humanitary ideals.

III. DATABASE MARKETING IN INSTITUTIONS OF HIGHER EDUCATION

Relationship marketing can be considered on several levels. On the first level, relationship marketing is considered as database marketing. When it comes to database marketing, it is about technology-based means by which companies make it easy to acquire customers and directed them towards efficient management. This is a new approach to the regulation of transactions with clients [6].

Database marketing uses a database for storing and analysis of consumer information, which supports the formulation and implementation of marketing strategies. Another term for database marketing is "electronic file cabinet" which generally contains the following information [9]:

- list of names,
- addresses,
- phone numbers,
- the life styles,
- consumer transactions,
- types of purchase,
- frequency of purchase,
- value of purchase,
- reactions to promotional messages
- other specific information.

It is necessary to distinguish between the list of customer and database. List of customers is just a list of specific characteristics of the consumer, while the database is a much wider concept than the list because it contains much more information about consumers who are obtained through transactions, surveys or other methods of collecting. Courtheux [9] has defined database marketing in a manner it presents "the sum of the detailed inter-related data, which has more goals, and allows the relevant information in time and if necessary re-locate." Kotler and Keller [3] have defined database marketing *as "the process of construction, maintenance and use of customer database and other databases with the purpose of contracting, transactions, and building relationships with customers."*

The database marketing should primarily be used for better understanding of consumers (existing and potential). When it has a large number of data (demographic, psychographic, purchasing and other consumer characteristics) from the base can be derived very important conclusions about so-called typical existing customers. When they understand the needs of a typical consumer, it is possible to adjust their operations to this type of consumer. Some of the ways in which database marketing can be used are [11]:

- selection of target market;
- initiation of repeat purchases;
- building long term relationships with customers.
- identification of potential buyers;

- personalized direct mail;
- as a basis for further research;
- creating a report on the effectiveness of certain media.

Most of the institutions of higher education have formed database with information of its students. If some institutions are not yet done that, Student Affairs Office (SAO) can create a unique database since there is a large amount of data. Every year, students during enrollment submit new information to their current data related to the residence, phone numbers, marital status, occupational engagement of students and their parents and so on. In addition to this information, Student Affairs Office have access to students information such as:

- completed secondary school;
- average grade;
- performance at entrance exam;
- his current status;
- GPA (Great Point Average) while studying etc.

Only on the bases of these data, Student Affairs Office could have the insight into who are the potential students of the particular faculty or from which cities and which schools prospective students most often come.

On the bases of grouped and aggregated data of the student database, the faculty could create a more effective strategy of faculty promotion. If it is already carried out promotions one year earlier, it can be create a report on the effectiveness of promotion strategies implemented in specific high schools. Reports of this type could be created even if the database contains information of student opinion about faculty promotion that they attended. This would greatly reduce the costs of promotion for next year because they would have become aware of mistakes or overlooked elements that have significantly influenced the selection of faculty by students. One way of building relationships with students is personalized direct mail, which could be applied because Student Affairs Office has data related to resident of students. Informing students about the various events or terms relevant to their studying may be just one of the first steps of personalizing of relationship between Student Affairs Office and student.

Beside developing long term relationships with existing students, database marketing can be used to attract potential students as well as during their recruitment. Authors [10] indicated that direct and database marketing both can be implemented in recruitment processes of institutions of higher education. They concluded that “direct and database marketing has distinct potential in attracting more students cost-effectively, and improving the precision and control with which the whole recruitment process is managed. [10]”

When they are collected and stored, data are not sufficient. The database must be constantly updated with new information, to avoid erroneous conclusions and decisions of the faculty management. When updating the base it is not enough to pay attention only to adding data about new students, but also includes refreshing data of existing students.

IV. CONCLUSION

Institutions of higher education have an extensive network of relationships with different groups of stakeholders who require developing and maintaining long term relationships with all of them. Students are considered as costumers, so it is necessary to develop relationship with them at first.

Relationship marketing is oriented to the long term. The goal is to deliver long-term value to customers and the measure of success is long-term customer satisfaction. Considering the nature of relationships that occur in institutions of higher education, relationship marketing can be applied in these institutions in the full sense.

On the first level, relationship marketing is considered as database marketing. Database marketing uses a database for storing and analysis of consumer information, which supports the formulation and implementation of marketing strategies. Database marketing in combination with direct marketing can be of great help in attracting prospective students as well as retaining existing students. On the base of information which every Student Affairs Office have, institutions of higher education can develop more effective strategy of promotion as well as strategies for retaining existing students.

Faculty management has a key role in understanding the need of developing these strategies on their faculty as well. When this happens employees of these institutions will easier

comprehend the need to apply these concepts as well as understand their important role in it. Employees at Student Affairs Office play a crucial role in the development of long-term relationships with prospective and existing students, so those should be aware of it because survival of institutions depends largely on implementation of these concepts in the future.

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POSSIBILITIES AND IMPLEMENTATION OF RFID TECHNOLOGY

P. Lukić *, D. Radosav ** and S. Milutinović *

* Faculty of Transport, Doboj, Bosnia and Herzegovina
** Mihajlo Pupin Technical Faculty, Zrenjanin, Republic of Serbia
lukicperica@hotmail.com, dolores023@open.telekom.re, s.milutinovic@hotmail.com

Abstract – Constant development of society and social relations strives to increase productivity. In the goal of improving sale, monitoring and identification, RFID technology imposes itself as a primary technology, which will replace classic forms of identification. In this paper, basic characteristics of this technology are given, as well as the possibilities of its wide range implementation.

I. INTRODUCTION

Identification systems based on ″smart″ identificators are becoming more and more popular today and are replacing other traditional identification systems. They are used worldwide in financial transactions, telecommunications, transport, retail sale, health care system, access control etc.

Owing to its advantages, such as absence of contact, absence of demand for direct visibility, resistance to dirt and scratches, these identification techniques are lately being implemented more and more.

Existing identification techniques can be divided into two basic groups:

-Traditional identification techniques and

-Biometric identification techniques.

In traditional identification techniques, an identifier is given to the object being identified. In biometric identification techniques, identification of a person is done based on their unique physical and/or behavioural characteristics [6].

Most frequently used traditional identification techniques as an identifier use:

-Bar code,

-Magnetic data,

-″Smart″ identifier.

Classical identification systems are used for identification of objects, animals and people. Every object, in these systems, has to have an identifier. An identifier can be of any shape and size. In identifying products in supermarkets, an identifier with a bar code is printed on the product cover.

With the development of information-communication technologies, new possibilites, which affect all aspects of living, have opened. RFID wirelessly receives series of data, from a device called tag or transcoder. RFID tag is a small object which can be put or build into a product, animal or person. One of technologies which has had the biggest expansion is definitely RFID, since it provides easier and faster access to information, and information has immeasurable value. Nowadays, in developed technological systems, different systems for electronic access control are used, with a computer or controller as a controlling unit [7].

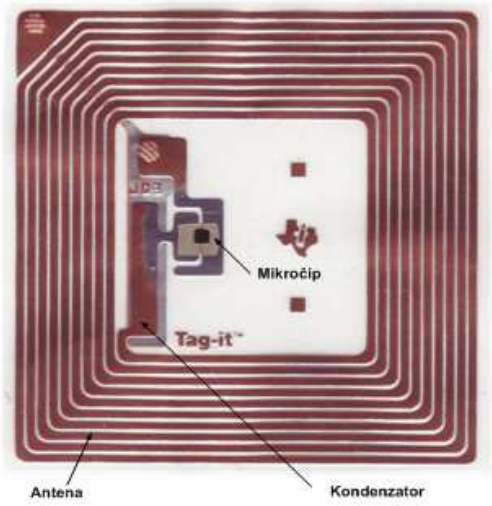
II. RFID TECHNOLOGY

RFID (eng. Radio Frequency IDentification) is wireless technology for identification and monitoring of objects via radio waves. In a broad sense, RFID systems are all systems which use radio waves for collecting information, for identification of objects and people, whereas in a narrow sense RFID system is a system which consists of RFID reader, antenna, data processing system and RFID tags which are carriers of information for identification.

RFID tag is the carrier of data for object identification within a RFID system, and after receiving radio-frequent signal from a reader, a tag sends the requested information. A tag usually consists of a microchip with memory and an antenna, which are built in a housing resistant to environmental conditions. Housing can be in the shape of a disc, glass housing (tube), plastic housing, key-ring, ID (identification) card, watch, label, sticker, or some other specific shape for a specific purpose.

According to power supply, tags are divided into passive, semi-passive and active tags.

Passive tags have very simple construction – they consist only of a microchip (with or wihout memory), an antenna and possibly a capacitor. They do not have their own power supply, they use the energy from the electromagnetic field of the reader. Power supply like this is obtained with special designing of the tag's antenna, which receives radio waves and ensures power supply to the microchip long enough to process the request from the reader and send the response with the required data [2]. Usually, tags like these have a built-in capacitor of certain capacity, for more stable power supply of the microchip. Typical look of a passive tag is shown in picture 1.



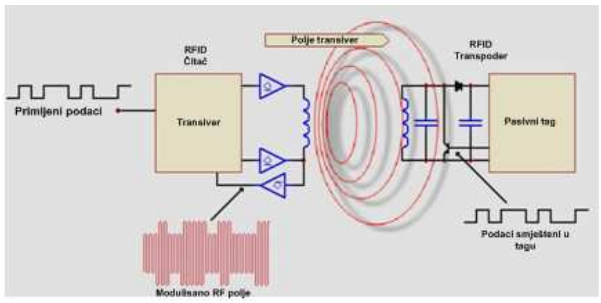
Picture 1. Typical look of a passive RFID tag and its components

Active tags, unlike passive ones, do not use the energy of an electromagnetic field of a reader, but they have their own source of power (battery), which ensures power supply to the microchip and the supporting electronics. Active tags have their own power supply, and it is not necessary for them to be in an electromagnetic field of a reader to communicate, which ensures large range of data reading – up to several hundred meters. Table 1 shows characteristics of different tag types.

TABLE 1. CHARACTERISTICS OF DIFFERENT TAG TYPES

Name	Source of supply	Transfer regime	Range	Durability Years
Passive	Radio waves	Reflecting	3 m	Unlimited
Semi-passive	Battery	Reflecting	10 m	5-10
Active	Battery	Active	100 m	1-5

Semi-passive tags have their own source of supply (battery). However, unlike active tags, this power supply is only used for supplying tag operations. For receiving orders from a reader, as well as for sending data to a reader, semi-passive tags use the energy of an electromagnetic field of a reader, as shown in picture 2. Since semi-passive tags use their own power supply for most of the operations they can be read with greater speed and from bigger distances (up to 30 m) than passive tags.



Picture 2. Principle of reading a RFID tag

Other classification of tags is based on the possibility of writing data on a tag, and according to this criteria there are: RO (eng. read-only – it is only possible to read data), WORM (eng. write once read many – it is possible to write data on a tag once, and read many times), and RW tags (eng. read-write – it is possible to write and read data).

Data can be written into an RO tag just once, during production. Data is written with a laser, and cannot be altered later. Most frequently, the only data is UID (eng. Unique IDentifier), serial number which totally determines the tag. Tags like this can only be used for simple implementation, when it is not necessary to save any additional information about the user or product which is the tag carrier [1].

Also, data can be written into a WORM tag only once, but, the difference in relation to an RO tag is that it is written by the tag user not the producer. With some WORM tags, data can be written lots of times (up to 100). This type of tags has a good ratio of price and performance with satisfying safety of data, and represents the most frequently used tag category which are used today.

Data can be written into an RW tag lots of times. A large number of possible inputs gives enormous advantage to this type of tags, since in different implementations it is necessary to renew data on a tag. A big disadvantage of RW tags is insufficient safety, i.e. data can be deleted, as well as high price comparing to other tag types. Due to

these drawbacks, RW tags are the least used ones today.

Some tags can have both RO and RW memory at the same time. For instance, a serial number was written into an RO memory during production, which cannot be altered, but there is also a RW memory for user's data.

The main component of RFID system is RFID reader. The main components of a reader are: controlling unit (microcontroller), antenna and communicating interface. Picture 3 shows one RFID reader.

Picture 3. Example of an RFID reader

Within the controlling unit, there is a transciever, which is used for communication with an antenna, coder and decoder, which are used for analog/digital and digital/analog conversions and implementing communication protocol, logical unit, which tests and processes the signal, and memory, which is used for storing parameters for adjusting the reader. Within the controlling unit there can be input-output interface, which enables possible adding of a sensor, actuator or identificator.

The antenna of a reader is used for sending an RF signal into its surroundings, as well as for receiving replies from tags. The antenna can be an integral part of a reader or separate part which is attached to a reader with a cable. A reader can have one or more antennas. Also, a reader can have separate antennas for sending and receiving data.

Electromagnetic field around the antenna determines the zone in which tags can be read. Generally, electromagnetic field is the strongest in the region in the form of an ellipsoid. This ellipsoid represents an ideal case. However, in a real system, due to the physical characteristics of an antenna, a region in which electromagnetic field is the strongest, does not have a uniform shape, but it has certain deformities and bulges. If a tag is in the sphere of deformity, it is possible for a reader to read it.

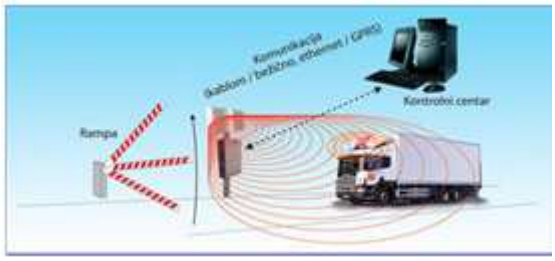
However, if a tag is in a dead zone between deformities, it won't be read. During the projecting of an RFID system, one should not take into account deformities of fields in order to increase the range of an antenna, because it is possible, with the minimum of tag movement, for it to get into a dead zone, where it is impossible to read it. The field, in which tags will be read should be within the main ellipsoid, in order not to make mistakes while reading it.

The field in which reading of tags is possible depends on polarisation of an antenna. Polarisation represents a change in electric field vector angle of radio waves in a plane normal to the direction of radio waves propagation during time. Antenna can be linearly or circularly polarised. With linearly polarised antennas, the angle is constant during time. Linearly polarised antennas can be polarised horisontally or vertically.

III. IMPLEMENTATION OF RFID TECHNOLOGY

One of the most frequent usages of RFID systems is implementation in systems for access control. Typical implementation of RFID technology in systems for access control are in safety systems of buildings and companies, as well as in traffic – for paying parking, toll, etc.

Since reading is done from large distances, a vehicle/object can be identified without disturbances when it is arriving/leaving without unnecessary delays. Transponder is placed inside the vehicle or fastened on the undercarriage. Reader can be on a rack near the exit or the inductive – reading loop is built in under the road. Picture 4 shows the principle of vehicle identification.



Picture 4 Vehicle identification

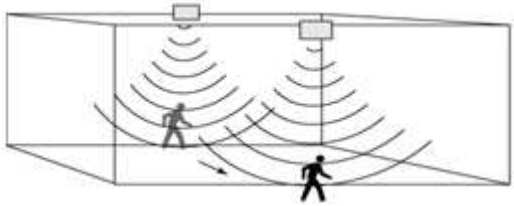
RFID technology is ideal for implementation which needs safe and unique identification as well as long life and exceptional resistance of

identificators to various specific environmental influences, without direct visibility. Regulation of electromagnetic spectrum by regulatory agencies in some countries affects the characteristics of RFID system. A lot of RFID systems work in ISM (Industrial-Scientific-Medical) scope which are available for small energy and short range systems. These scopes are defined by ITU association (International Telecommunication Union).

Implementations of RFID technology are getting more numerous. Wal-Mart and other leaders in distribution and retail sale industry of USA started introducing RFID technology into their chain of supply. Food and drug administration of USA recommended mass usage of RFID technology in pharmaceutical industry. Potential benefits for economy and consumers are huge. RFID technology can dramatically decrease expenses in managing chains of supply, improve storage business, automatise insight into stocks, increase accuracy and efficiency of re-stocking, reduce theft, improve prevention of putting into circulation couterfeit products (medicines for example), and many other advantages.

In order to illustrate benefits of RFID systems, let's observe a RFID system implemented in a storehouse, i.e. warehouse. By implementing RFID system every article in the storehouse gets an RF identifier. An RF identifier contains identification data such as producer's code, product type code, as well as a unique serial product number. In a storehouse, in which RFID system is implemented, shelves, means of handling goods and doors are equipped with RF readers. Because of that shelves ″know″ their contents and can recognise if an article is added or taken. Similarly, means of handling goods ″know″ what they have transported, and the door ″knows″ which articles have been brought in or taken out. Every activity is noted down in a database which gives a detailed description of each article complete history. Additional information like product information, bills and other can be monitored.

For example in the system of supervising children in schools passive tags are used, picture 5. They are better in such systems because they work without a battery, and their life span is 20 years or more. They are much cheaper for production and are a lot smaller, some of them are the size of rice grain. Tags almost have an unlimited implementation in consumer goods and other areas.



Picture 5 Principle of students' monitoring

As can be seen from the previous picture, the whole school is covered with RFID sensors which are divided into various zones. Systems like these are gradually being introduced to high schools in the USA. They are mainly intended for parents of students who attend that school, because, with this technology, they will have an insight into where their children are.

Food and Drug Administration - FDA approved the production of VeriChip - RFID chip which will be installed into people, which is shown in picture 6.

Picture 6. VeriChip compared to a grain of rice

There are similar chips which are currently used for pets. VeriChip advertises chips which can be implemented in medical applications, which can save our lives in certain situations, because there is important information in a chip. When this data is scanned at the doctor's, they can reveal information like patient's allergies and medical history [4].

In October 2002, FDA said that the Agency would regulate health protection most probably through applications related to VeriChip. In the meantime, chip was used for some safety tasks, like smart cards implemented in disco clubs in Barcelona, for ordering and paying for drinks.

These chips are like regular credit cards, the only thing is they can be read from a distance. A

receiver can "talk" to the chip without any need for physical contact, and find out any information they need, which is stored on a RFID chip. Officers working on passport control have predicted that they will be able to download information from a chip by approaching only couple of centimetres to the electronic reader. This means the owners of passports will be able to send their name, nationality, age, address and anything else which will be on RFID chip.

Combination of RFID and wi-fi technologies enables tracking people and objects inside a wireless net in real time. Motorola i Siemens participated "The Wireless Event" fair in Londonu, and presented their new products for locating in real time. Siemens is developing a complete system for monitoring. Battery RFID tag is put on a person or an object we want to monitor, it communicates with at least three wireless access points within the net and enables position triangulation. Tags have a programme which detects the signal strength from various points. The information is then sent back to the server which models tag motion related to the change of signal strength [1]. In order to effectively find required objects, it is necessary to have an access point every 30 metres, and they say in Siemens that they could disclose its location with deviation of max one meter. Also, it could be used in devices equipped with wi-fi, like portable computers and cell phones. Additionally, an alarm could be built in which would turn on if the protected devise left the given area. Technology could be used for monitoring of students. However, there is certain dissidence regarding privacy of an individual and RFID tags, especially about its possible usage in shops, where consumers' habits could be monitored. Those who are pro RFID technology say these tags cannot be read from big distances, but by combining it with wi-fi technology, monitoring from greater distanced would be enabled. Tags on products are normally passive, being activated in close proximity to the reader. Such tags only have their identification number, thus being small in size. RFID tags used with wi-fi net have to be active, they need an energy source and a software for communicating with wireless access points.

IV. CONCLUSION

RFID is technology used in various areas of general activity. In monitoring systems it started being used as a replacement for bar code, but the possibilities of implementation of this technology go far beyond the abilities which bar code identification had. This technology has been present in practice for a number of years.

Possibilities of using RFID technology are vast and limitless. They are used in identification applications of people and objects.

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UML MODEL OF AUXILIARY APPLICATION IN MACHINE LEARNING

Z. Ivankovic*, D. Radosav*, B. Markoski*, D. Savicevic** and P. Pecev***

* University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia

** Preschool Teacher Training College, Sremska Mitrovica, Serbia

***Faculty of Science, Department of Mathematics and Informatics, Novi Sad, Serbia

zdravko.ivankovic@tfzr.rs

Abstract - This paper describes the process of UML modeling applied to the SampleCreator application. It is an application implemented in C# programming language and .NET 4.0 framework, which is used to create a training set required by AdaBoost algorithm. Training set is created based on images that are obtained by converting video clips from basketball games in the series of images that are stored on the user's computer. In this way we obtain a set of images that include basketball players (positive examples) and the sets which contain no basketball players (negative examples). The application provides more functionality- save frames from video content provided on the location on user's computer, marking the objects of interest on stored images, to be trained by them, and parse the parameters from the XML file that results from the application of AdaBoost algorithm on training objects.

I. INTRODUCTION

Modeling is used in many aspects of life. It was first encountered in ancient civilizations such as Egypt, Greece and Rome, where the modeling was used in creating models for art and architecture. Today modeling is widely used in science and engineering in order to provide an abstraction of the system at a certain level of accuracy and with a certain degree of detail. Then the model is analyzed to provide a better understanding of the system being developed. According to the OMG (Object Modeling Group), "modeling is the development of software applications before coding."

In software design and development based on a model, modeling is used as a basic part of the software development process. Models are created and analyzed before implementation of the system, and serve to direct the implementation that will follow.

Better understanding of the system can be achieved if development is viewed from multiple perspectives (different views) [1] [2] as the requirements modeling, static and dynamic modeling of software systems. Graphical modeling languages like UML, assist in the development, understanding and communication between different views.

II. OBJECT-ORIENTED METHODS AND UML

Principles of object-oriented programming, play a crucial role in the software analysis and design because they focus on key questions about the possibility of changing the software, its adaptation and evolution. Object-oriented methods are based on the concepts of information hiding, classes and inheritance. Information hiding may lead to the creation of systems that are more independent and it is therefore easier to modify and maintain.

With an increasing number of notations and methods for object-oriented analysis and design of software applications, created a need for a common language for modeling. As a result, there is a UML (Unified Modeling Language) to offer a standardized language and graphical notation for describing object-oriented model. However, since UML is independent of the methodology, it must be used together with one of the methods for object-oriented analysis and design.

Modern methods for object-oriented analysis and design are based on the model and use a combination of use case modeling, static modeling, modeling of state machines and interactions between objects. Almost all modern object-oriented methods use UML notation to describe software requirements, analysis and design models [3] [4].

In the modeling of use cases, functional requirements of the system are defined in terms of usage and participants who use or interact with a given system. Static modeling provides a structural view of the system. The classes are defined according to their attributes and relations with other classes. Dynamic modeling provides a view of the system in relation to behavior. Use cases are created to show the interaction between objects

which participate in it. Interaction diagrams are created to show how objects interact with each other in order to realize the use cases.

III. DESIGN OF SOFTWARE ARCHITECTURE

Software architecture divides the overall system structure, in terms of components and their interconnection, to the internal implementation details of individual components [5]. Emphasis on the components and their interrelations are sometimes called programming-in-large, while detailed design of individual components is called programming-in-miniature.

Software architecture can be described at different levels speaking in terms of detail. At higher levels it can describe the decomposition of system into subsystems. At the lower level, it can describe the decomposition of subsystems into modules or components. In both cases, the emphasis is on an external view of the subsystem / component - that is, the interfaces provided and required, and their interconnection with other subsystems / components.

Attributes of software quality in the system must be taken into account when developing the architecture. These attributes relate to how the architecture provides the answer to the important non-functional requirements such as performance, security and the possibility of quick and easy maintenance.

Software architecture is sometimes viewed as a high-level design. It can be described using different views. It is important to ensure that the architecture meets the software requirements, both functional (what the software should do) and nonfunctional (how well it should do). It is also the starting point for detailed design and implementation, particularly in cases where development team becomes quite large.

IV. UML DIAGRAMS

UML notation has evolved since it was first adopted as a standard in 1997. The highest revision of the standard was made in 2003, and current version is 2. UML notation has consistently grown over the years and today supports a number of diagrams. The application development is usually based on following diagrams:

- Use case diagram
- Class diagram
- Object diagram
- Comunication diagram
- Sequence diagram
- State machine diagram
- Activity diagram
- Deployment diagram

A. Use-case diagrams

Use Case Modeling is an approach to describe the functional requirements of the system. Inputs and outputs of the system are given by first describing by the use case model, and then using static modeling.

In approach of modeled using use cases, functional requirements are described by the participants, who are users of the system, and use cases. Use case defines a sequence of interactions between one or more participants and systems. At the stage of processing requirements, use case model looks like a black box system and describe the interaction between participants (one or more) and system in the descriptive form that consists of inputs that are entered by users and answers provided by the system.

Use case typically consists of a series of interactions between actors and systems. Every interaction consists of entrance which provides the actor, followed by the response received from the system. Thus, the actor provides input to the system, and system gives an answer to the actor. While simple use cases consist of only one interaction between actors and systems, in most systems consist on several interactions. More complex cases may involve using more than one participant.

SampleCreator is a tool to create examples with which a training of AdaBoost algorithm will be executed. In addition, this tool has other features that are shown in Figure 1 It shows the main features of this tool:

- Parsing of XML – AdaBoost algorithm given as a result of a training process an XML file with certain values of parameters. This file is necessary to parse into a form suitable for use in an application that uses the results of training in order to detect objects of interest.
- Video display – The video is shown using DirectShow technology. During the displaying at every 0.5 seconds one frame is saved in the location provided to the user's computer. These frames are used for training set creation.

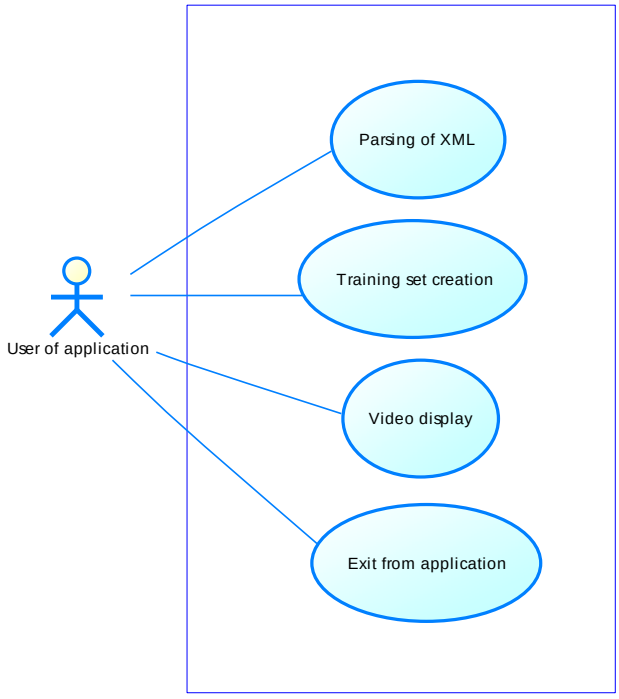

Figure 1. SampleCreator basic use cases

- Training set creation – From frames that are obtained from the video material is necessary to create a training set. This set contains positive and negative examples. Positive examples is cut from the observed images and then combined with the negative examples which represent images that certainly do not contain objects of interest.
- Exit from application – This is a functionality that stops application execution.

Creating a training set provides additional functionality as shown in Figure 2 These functionalities include:

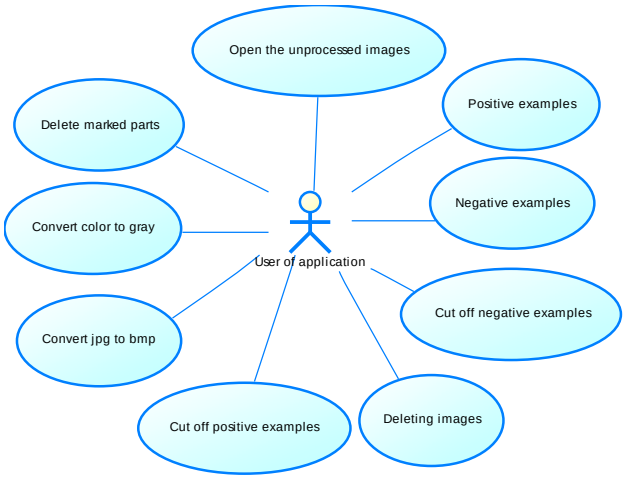

Figure 2. Training set creation

- Open the unprocessed images – Opening a set of images from which are marked objects of interest, if any, or parts of images that contain no objects of interest.
- Positive examples – Select an object of interest in the picture for which training is performed. Each object is marked by four coordinates, x and y coordinates of upper left corner, and the width and height of the object. Data objects are written into the file that could be used during training.
- Negative examples - If the image does not contain any object of interest it is considered as a negative example, and is used in the training process. During training, positive examples are placed on top of images that represent negative examples.
- Cut off negative examples – If part of the image does not contain objects of interest, it can be cut and labeled as a negative example.
- Deleting images – If the image is a not appropriate either negative or positive example, it can be deleted in order not to adversely affect the process of training.
- Cut off positive examples – This functionality enables to cut all the positive examples from the images in order to make further adjustments (increase contrast, sharpen, background subtraction, ...).
- Convert jpg to bmp – AdaBoost algorithm supports JPG and BMP format images, but jpg format can cause problems in training, so it is advisable that all images are in BMP format.
- Convert color to gray – AdaBoost algorithm works on gray images. Because of this all imagese could be converted to gray to occupy less space and make algorithm faster.
- Delete marked parts – If the labeling of positive examples marks part of the image that is not an object of interest, you can uncheck observed image and again mark objects of interest.

B. Activity diagrams

UML activity diagrams represent diagrams that show the flow and control sequences that occur during software activities. Activity diagram shows the sequence of activities, decision nodes, jumps, and even competitive activities. These diagrams are

used in the modeling of application flows, for example. in service-oriented applications.

Use case model can be described using activity diagrams. However, to show the use case, it is required only a subset of what activity diagrams can offer. More precisely, it is not necessary to model the competitive activities of the use cases [7].

Activity diagram can be used to represent the sequence of steps in use case, including the main sequence and all the alternative sequences. In other words, the activity diagram can be used in more precise description of the use case because it shows the exact location and conditions in the sequences that are required for alternative execution. Activity node can be used to display one or more steps in the use case. High level activity node can be used to display whole use case, where it can later be decomposed into a separate activity diagram.

In order to show the use cases, activity diagrams, use activity nodes, decision nodes, arcs that connect nodes of activity and jumps. Activity node is used to represent one or more steps are needed to describe the use case. Decision node is used to display situation in which, on the basisi of decision, execution may take alternative path. Depending on use case, an alternative sequence can then be connected to the main sequence.

Activity nodes could be agregated nodes that could be hierarchically decomposed to give lower-level activity diagram. This concept can be used to indicate the use cases with the inclusion and expansion. Therefore, node activity in the base use case can be used to represent a connection with the case of use which represents inclusion (or extension), which is then displayed on a separate lower-level activity diagram.

Use case "Training set creation" can be shown by activity diagram, which is shown on figure 3. It shows that first step is to check whether there are images that can be used for training. These images are created during viewing video content. If images do not exist, execution of the application breaks because there is a no set of pictures that contain training examples. If images exist, they are loaded one by one and displaed the application window. Images obtained from video content may or may not contain objects of interest. If observe basketball games, there are scenes that do not include basketball players (advertisements, announcements, crowd shots, celebrities, ...) so that they can not be used in training process. They can be used as negative examples or as examples in training set that will serve to verify that the algorithm does not mark all objects as required, or to verify the performance of the training. There are images that can not be characterized as neither positive nor as negative examples. These are usually images of basketball players that are quite unclear, so there is possibility that it will take training in the wrong direction. Such images is best to be completely left out of the training process (delete them). Sometimes parts of the image do not contain any object of interest and can be cut into a separate image to be marked as a negative example. For images that contain the required objects, they should be labeled, that is x and y coordinates of the upper left corner of the rectangle that surrounds the required objects should be specified, as well as its height and width. The process is repeated for all objects in the image, which can contribute to training. Objects that are not correctly displayed should be omitted (eg most of the object is obscured by other objects). These data are entered into the file to be used in the training process to cut only the required objects from positive images, while the rest of the image is ignored.

C. Class diagrams

The static model is related to the static structural view of the problem, which is invariable with respect to time. The static model describes the static structure of the system being modeled, which is thought to have a lower likelihood of change in relation to functions of the system. More precisely, the static model defines the system classes, class attributes, relations between classes and operations held by each class.

Object is a physical or conceptual entity in the real world that allows an understanding of the real world and, therefore, creates the basis for a software solution. Object in the real world can have physical properties (can be seen or felt); example may be the door, the motor or lamp. The conceptual object is more abstract concept, and an example of such object may be a bank account or transaction.

Object-oriented applications consist of objects. From the standpoint of design, object groups data and procedures that are performed on the data. Procedures are usually called methods or operations. Some approaches, including the UML notation, observe the operation as a specification of functions that perform a particular object, and methods as implementations of functions [8].

Object (also called an instance of the object) is a single "thing", eg. Marko's car or Petar's bank account. Class (also called a class of objects) is a collection of objects with the same characteristics, for example bank account, car, customer.

An attribute is a value that contained by object class. Each object has its own attribute values. The name attribute is unique within the class, but different classes may have attributes with the same name, eg. class Client and the Employer may have the attribute with the name address.

The operation is a specification of the functions performed by the object. The object has one or more operations. Operations manipulate the values of attributes contained in the object. Operations can have input and output parameters. All objects that belong to the same class have the same operation. For example, Account class has a read, opening and closing operation.

Object represents an instance of the class. Some objects are instantiated as needed during the execution of the application itself. Each object has its own identity under which differs from all other objects. In some cases, this identity can be an attribute (eg account number), but it is not necessary to be an attribute.

In static modeling are used three types of relationships: association, relation whole / part (aggregation and composition) and the relationship of generalization / specialization (inheritance).

Using SampleCreator tool, video material can be turned into frames. From them it is possible to perform the training of AdaBoost algorithm so that the frames mark areas of interest (positive examples), as well as images that do not contain objects of interest (negative examples). The implementation of an application that allows labeling of positive and negative examples, convert images from jpg to bmp format and converting color images to grayscale is shown in Figure 4

The form created to display frames, and any other necessary operation is TrainingForm. It contains the following attributes: initialMousePos, finalMousePos, currentMousePos (containing the positions of the mouse to enable the marking of objects of interest) and draw (logical value that tells whether the mark has already done). In addition, the class includes a number of methods:

- OpenImages – allows frames to be loaded from a location on computer
- CreateNegativeSample – mark picture as negative example
- CropNegativeSample – crop part of image that will be marked as negative example
- CreatePositiveSample – mark image as positive example nad enters objects locations in corresponding text file
- CropPositiveSamples – crop part of image that will be marked as positive example and saves those examples in corresponding folder
- CalculateNumberOfPositive – shows number of examples that are marked as

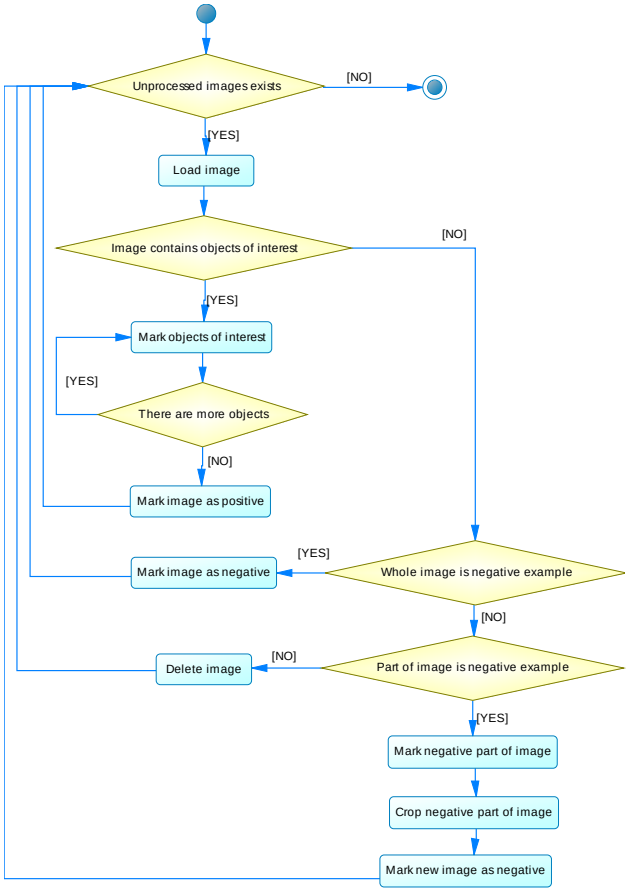

Figure 3. Training set creation

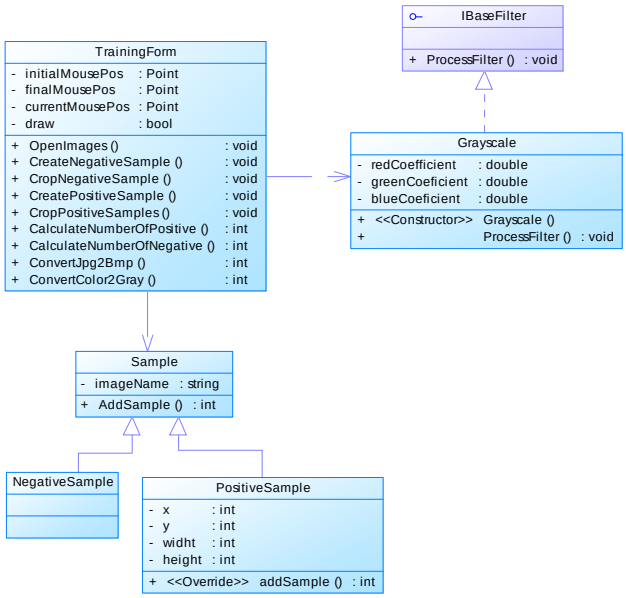

Figure 4. Magnetization as a function of applied field. Note how the caption is centered in the column

positive

- CalculateNumberOfNegative – shows number of examples that are marked as negative
- ConvertJpg2Bmp – converts frames form jpg to bmp format, because AdaBoost algorithm does not support all jpg standards
- ConvertColor2Gray – convert images from color imates to grayscale, because AdaBoost performs on grayscale images

V. CONCLUSION

This paper presents a model of SampleCrator software that serves as an auxiliary application in the process of training AdaBoost algorithm. The software is modeled using different types of diagrams that represent the required modeling and analysis. Thus was obtained a better view of the process of creating software and the functionality it provides, and the execution and implementation of these functionalities. An additional advantage is the possibility of modeling the distribution and organization of the process of creating the software between multiple teams working on its implementation. Although SampleCreator a small-scale application that serves as an auxiliary tool in the AdaBoost training, it consists of several components that are independently created, and after successful testing built into the application. Thanks to UML modeling and technology, this process is carried out in precisely defined steps that have enabled rapid and efficient integration process.

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APPLICATION OF ICT IN EVALUATION OF EDUCATION IN MATHEMATICS

D. Ranković*, M. Bjelica**
*Medical school "Dr. Miša Pantić", Valjevo
**University of Novi Sad, Technical faculty "Mihajlo Pupin" , Zrenjanin
drankovic@ptt.rs, bjelica@tfzr.uns.ac.rs

Abstract - A computer with appropriate accessory equipment, software and connection to the Internet is becoming increasingly significant and extremely important teaching tool, which with increase growth replaces conventional teaching tools so far. Because of individual preferences and interests of students in learning mathematics, the various multimedia resources which are offered in teaching mathematics have essential value for higher motivation and better results. At the time of exponential development and application of modern information technology, new criteria of evaluation and self-evaluation of the schools, teachers and students in the teaching process are letting up.

I. INTRODUCTION

The collection of all relevant data to assess knowledge evaluation, monitoring and student achievement is clearly defined in the Regulations of the evaluation, prescribed by the Ministry of Education and Science, by the detailed description of each school marks. Evaluation of students is a continued process during all phases of instruction throughout the school year, using various methods, techniques and manners. For a comprehensive and objective success, work and progress of students in mathematics, their connection and combination is necessary, what is provided in the plan of evaluation and monitoring of the success of both teachers and the work plan for each teacher.

The introduction of new information and communication technologies in teaching process leads to changes in existing methods of learning and education. The entire educational process occurs in an environment that requires application of new teaching methods and ways of learning and assessment, and evaluation of the quality of acquired knowledge.

II. OBJECTIVE

The objective of this research is focused on getting students' opinions on the use of ICT in the evaluation and assessment of knowledge in mathematics. Ability of students to use computers, the students confidence in ICT and students' opinions on the application of ICT in education, digital literacy of students, their motivations and habits, it is important for timely planning and implementation of new techniques and ways of evaluation the quality and quantity of acquired knowledge. The study was conducted in 6 different educational profiles in three secondary schools. For the data we used the standard questionnaire, the data are processed electronically, and the questionnaire contained a number of questions with multiple choices. The survey was conducted on the principle of voluntariness and impartiality.

III. AVAILABILITY AND PURPOSE OF USE OF COMPUTERS BY STUDENTS

This research find that when a computer was available to students at school - most frequently the computer uses for the subject Informatics and Computing 58%, further the use of various multimedia contents related to other professional courses 15%, various educational content from the Internet 17% for personal purposes and entertainment 9%, finally 1% had never used a computer at school.

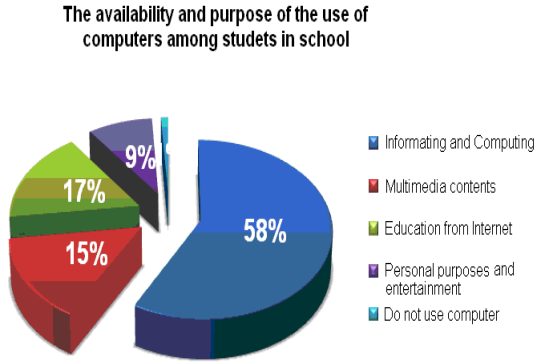

Figure 1. Availability and purpose of the use of computers by students in school

IV. STUDENT INTEREST FOR THE POSSIBILITIES OF APPLICATION OF ICT IN TEACHING OF MATHEMATICS

All tested students have shown great interest in using computers in education, a small and very little interest in showing only 4% of the students. Very large, medium and large interest expressed as much as 96% of the students.

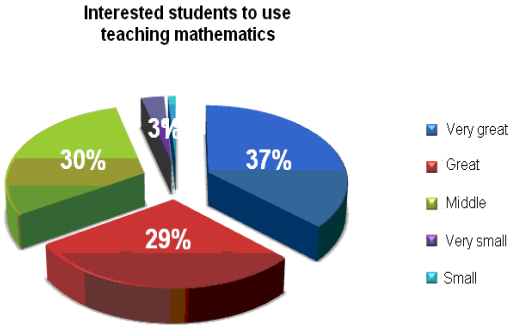

Figure 2. The interest of students for use ICT in teaching mathematics

V. TRUST OF STUDENTS IN ICT AND THEIR USE IN THE EVALUATION PROCESS

Students already use computers for teaching purposes in school in regular classes, in preparation for teaching, testing knowledge on computer, for the preparation of homework and seminar and tutor papers, participate in creating the school magazine, and they are familiar with the possibilities offered by ICT.

Almost all students have the confidence in the evaluation of knowledge among a number of forms and methods which provide modern ICT, which is a very important factor in terms of objectivity of teacher ratings. Extremely negligible number of students 3% suspects in the validity of this way of realization of this important part of the teaching process.

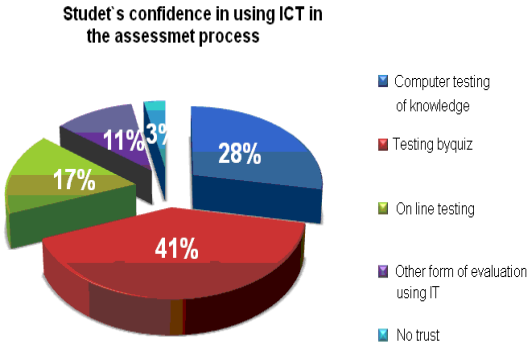

Figure 3. Confidence in the use of ICT expressed by students in the evaluation process

VI. CONCLUSION

Most of teachers of mathematics focused on finding of the objective modern methods of self-assessment and self-evaluation of both students and the teachers themselves, where the school mark itself represents a common score achieved success in mastering the curriculum, building up positive attitudes and personality development of students to real values. Assessment of pupils using ICT is just one of the new contemporary forms of assessment and measurement of quality and quantity of knowledge.

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TOOLS FOR CREATING NUMERICAL MATHEMATICS SOFTWARE WITH AN EXAMPLE

F. Kostic, V. Jevtic and J. Danikov
University of Novi Sad/Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
filip.kostic@tfzr.rs, vesna@tfzr.uns.ac.rs, danikov@tfzr.uns.ac.rs

Abstract – Nowadays there are many software tools specialized for solving mathematical problems available at the market, such as: Mathematica, Mathlab, Mathcad, etc. Also, there are tools for developing software specialized for mathematical problems solving. The latter one is appropriate for mathematics areas that are not included in the previous ones or the environment of its problem solving is too complex to use. The aim of this paper is to present the importance of creating Numerical Mathematics software for better understanding of its subjects, as well as simpler problem solving.

This paper presents preview of available tools that could be used for creating Numerical Mathematics software. Furthermore, it presents created Numerical Mathematics software with all necessary features for problems solving in this particular area. Developer tool that is used is Visual Studio 2010.

I. INTRODUCTION

Solving mathematical problems manually is time consuming and in some cases increases error probability. This indicates that automatic solvers provide many benefits. There are two types of automatic solvers: commercial or free software and developed environment specially designed for mathematical problems solving. Every way of mathematical problems solving has its advantages and disadvantages. The facts are that commercial software is hardly available for many users and both commercial and free software may not be specialized for particular problems solving, or they are too complex to use. On the other hand, developing specialized mathematical software demands knowledge about development tools and the tools themselves. Considering the fact that students nowadays have opportunity to use some commercial software for free and that their programming languages are included in many study programs, some disadvantages may be overcome. This enables students to create their own software for special purposes.

This paper presents the preview of available development tools for creating Numerical Mathematics software. In this way, solving Numerical Mathematics problems becomes simpler, error probability decreases and students have better understanding about this area of mathematics. They also can practice, improve and test their programming knowledge.

The Numerical Mathematics software that is presented in this paper is created in Visual Studio 2010. This paper describes development environment, libraries and approach that are used, as well as special features of created software.

II. DEVELOPMENT TOOLS

Choosing the appropriate programming language and software tool depends on development platform and the platform for created application implementation as well. The fact that programming languages are independent from the platform, availability of development software tools has that constraint, should be reconsidered. For wider implementation application should be able to support many operating systems, such as: Windows, Unix and even Mac.

One of the most popular programming languages today is Java. Java programs are running into their own virtual machines whose are available at almost every platform, starting from Windows, Mac, Unix to operating systems for mobile phones, such as Symbian. Numerous tools for Java development maintain popularity of this programming language. Some of them are NetBeans and Eclipse. This programming language is loaded by libraries for all purposes. [1]

Another programming language that is widely used is C++. It is more complex then Java, but it offers higher flexibility. It dates since 1983 and has many successors such as Java and C#. Its age does not imply that it is outdated, because it is improved during the years and still is in use. [2, 3]

Also widely used is Qt tool which uses framework of the same name. This tool is available for many platforms and its applications may run under Linux, Mac, Windows, Symbian, Amiga and other operating systems. Visual Studio is a tool that provides its application development, but they can run under Windows operating system only. [2]

As a programming language Visual Basic has its place in programmers' world and is widely represented. The best development tool for this language is Visual Studio, and its application can be used only under Windows operating system. [4]

C# is a programming language that is usually associated with Microsoft and its development tool Visual Studio. This language has many Java features. Developing under .NET framework limits its applications on Windows operating system for the time being. Although, there is a significant effort invested into adjusting this framework to the Linux systems as well. At the moment there is Mono develop tool available for Linux and Windows systems. It tries to emulate .NET framework under open source paradigm.

The example Numerical Mathematics software that is created and described in this paper is written in C# in Visual Studio 2010 development environment. Previous knowledge and the fact that software is not designed for great number of users have influenced on this choice. Also, Visual Studio is advanced tool and its professional version is free for students.

III. ABOUT C# AND VISUAL STUDIO 2010

Programming language C# was developed by Microsoft Corporation. It was designed to be simple and modern object oriented language for general purposes. It originates from C programming language, as well as its other successors, Java and C++ the most.

It has many protection measures such as strong type checking, array bounds checking, checking for attempts to use uninitialized variables, automatic garbage collector and so on.

Visual Studio 2010 development environment is the latest version of this Microsoft's product. It is expandable by packs and supports many programming languages such as: Visual Basic, C++, C#, HTML/XML, J#...

It is an Integrated Development Environment (IDE) that indicates that, besides text editor which enables code markup and code auto completion during typing, it has integrated compiler. This makes testing and code debugging much easier.

Visual Studio 2010 supports console application development as well, but its primary role is to simplify graphical interface application development. Because of that it has integrated class, graphical and web designers.

Very important parts of application development in any programming language are libraries. Visual Studio 2010 includes .NET framework. Programming languages for this framework run in software environment known as Common Language Runtime (CLR). That is an applicative virtual machine which enables stabile work thanks to security, error capturing and dealing with the memory. Current version 4.0 has one of the most powerful libraries. It includes several programming languages and many features, such as: database connecting, cryptography, user interface, numerical algorithms, data access, network communication, etc. [5, 6, 7]

For example Numerical Mathematics software described in this paper, free library info.lundin.math is used. The purpose of this library is to receive mathematical formulae from the user in the form of specially formatted array of characters, as well as values of variables contained in formulae, to solve it and to return the result.

IV. NUMERICAL MATHEMATICS SOFTWARE

The aim of Numerical Mathematics software design is automation of problems solving in this particular mathematical area. The main characteristics of problem solving in this case are required accuracy and iterative methods. Both of them implies on time consuming and increased error probability in case of manual problem solving. This emphasizes the importance of automation of numerical mathematics problems solving. The other reason is that existing commercial software does not enable problem solving for every one of them in this area. Once created software can be used as many times as it is necessary. Also, it could be available on the Internet for any user that is interested in solving these kinds of problems.

The development criteria for Numerical Mathematic software are established and they include [8]:

- Functionality and intelligibility – the software has functionally staggered options

and meaningful content that is understandable for an ordinary user;

- Pre-set accuracy for results display – the accuracy of 10^{-9} is set for every numerical data;
- Minimizing error probability from user's point of view – for example, dividing by zero. In such a case user will be informed about the error;
- Clearly stated purpose of every particular task – necessary input data are explained in the front, as well as the needed data format for calculating the task;
- Theoretical explanation of every Numerical Mathematic topic – this theory covers every problem that can be solved by the software.

By following these criteria software is designed to be functional, user friendly, easy to use, accurate and reliable.

The main page of the Numerical Mathematic software contains basic data: program name, main page tab, contents tab, the institution name, the institution logo, the names of program author and his mentors and the study program name (Figure 1.).

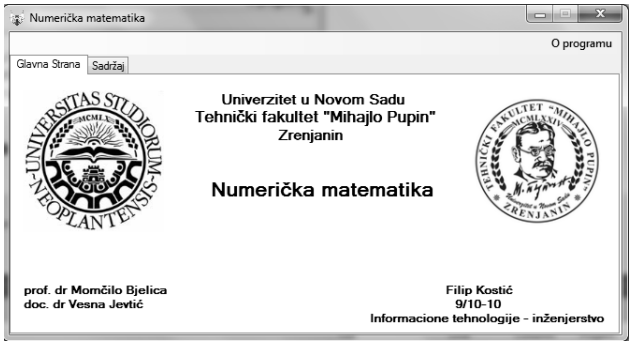

Figure 1. The main page of the Numerical Mathematics software

The contents page shows topics that are included in the software (Figure 2.):

- Error estimation and number presentation;
- The interpolation and the approximation of functions;
- Numerical differentiation;
- Approximate computation of integrals;
- Numerical solution of non-linear equations and their systems;
- Numerical solution of linear equations systems;
- Approximate solution of ordinary differential equations. [9]

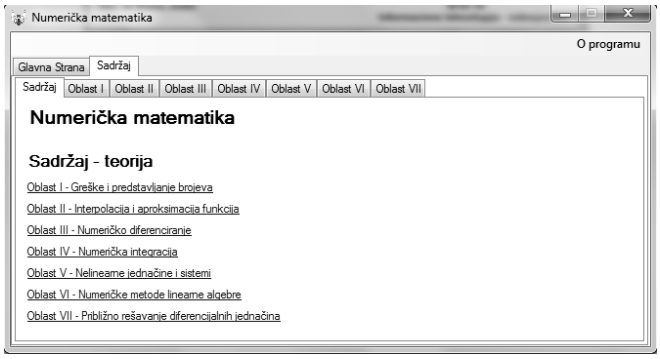

Figure 2. The contents page of the Numerical Mathematics software

For every topic, there is a theoretic background shown in a separate page (Figure 3.). It gives wider picture about the problem that should be solved. Furthermore, it explains the user the meaning of an input and an output data for every problem.

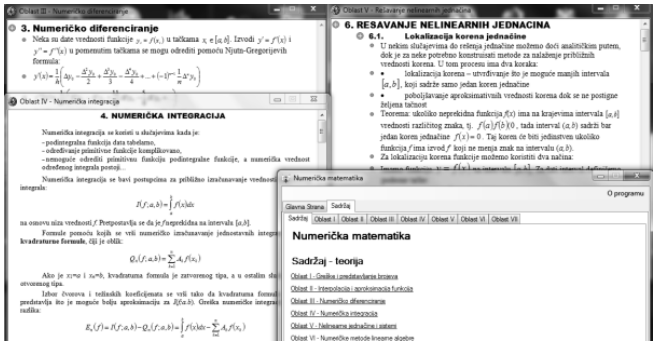

Figure 3. The theoretic background for selected problems

Problem solving page for every topic is specially designed to provide to the user intuitive use of the interface. This is important for both the data entering and the result display. The example topic interface is shown in the figure 4.

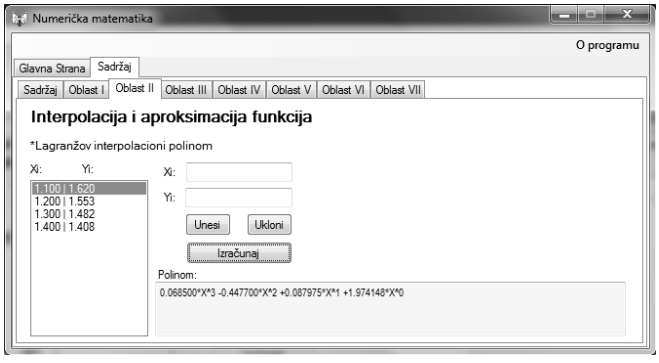

Figure 4. The user interface for selected topic

In this case the user can find the polynomial $P(x_i)$ whose values at points x_i (i=0, 1, 2, …, n) coincide with the values of the given function, $y_i=P(x_i)$ [10]. In order to find that polynomial the

user has to enter interpolation points (x_i, y_i). The result for entered points is shown in the figure 4.

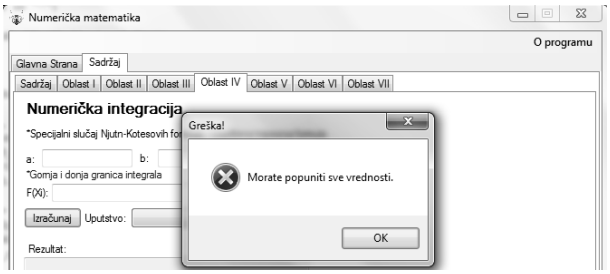

Figure 5. The warning about the input error

The user error while entering data is prevented too. In case that user did not enter every needed value he will be informed about it (Figure 5.).

Another type of error occurs in function defining. For that case special explanation is designed to display labels of operations, functions and constants that are allowed in the software (Figure 6.).

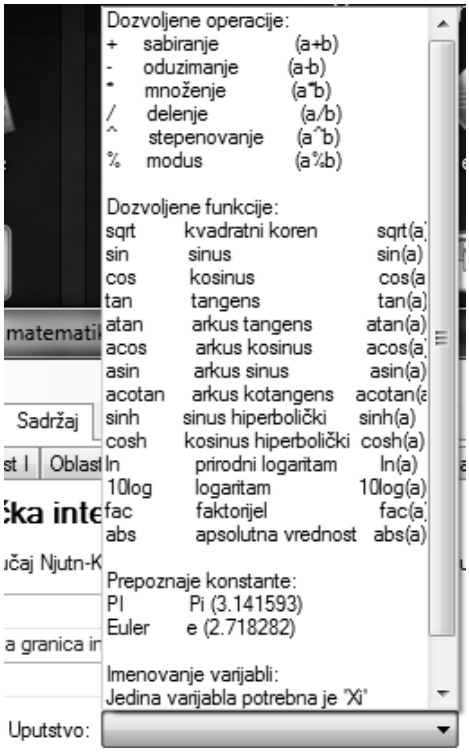

Figure 6. The directions for entering data

An ordinary user may not know how to enter these data, but an arbitrary form of input data should not be allowed. The software enables entering data in appropriate form only. The figure 7 displays an example of correct form of entered function.

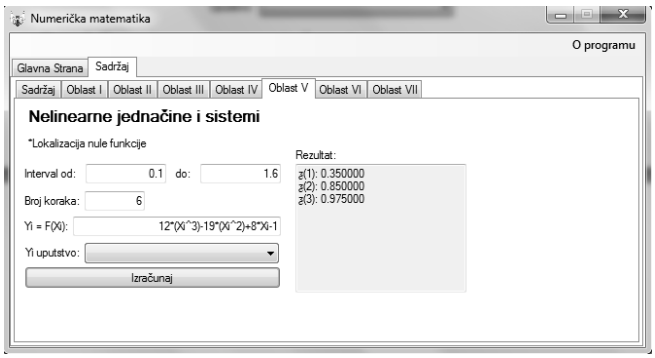

Figure 7. The example of correct form of entered function

According to abovementioned, created software enables numerical mathematics problems solving through the user friendly environment. It gives theoretical background that explains chosen topics, instructions about entering input data and warning about the entering error. Its use shortens the time needed for problems solving and increases accuracy.

The software is designed for an ordinary user who is dealing with these particular subjects, but designing the software is meant to programmers who have both the programming knowledge and numerical mathematics knowledge.

V. CONCLUSION

This paper showed main characteristics of available programming languages and software tools, depending on needed platforms for numerical mathematics software design. Developed software enables automation of problem solving and in that way decreases error probability, as well as time needed for calculation. Its development refers to undergraduate students from Information technology study program, who have both programming and numerical mathematics knowledge and available free software.

Developing the software student gets better understanding of numerical mathematics topics, and he can test and improve his programming skills. By making this software available for free use, others can benefit from it. This is especially important for the ones who are interested in this subject and do not have commercial software.

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COMPLEX COMPUTATION ALTERNATIVES IN FORM OF ARTIFICIAL INTELLIGENCE

J. Pavlović, V. Brtka, V. Ognjenović and I. Berković
Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
jasminpavlovic@yahoo.com; vbrtka@tfzr.uns.ac.rs

Abstract - With the current level of technological advancement there are often processing limitations emerging during real systems implementation. Following paper contains discussion about possible conventional complex computation alternatives in form of artificial intelligence. As an example of such implementation Fast Fourier transform algorithm is modeled using feedforward neural network. Obtained research results, presented below, implicate that neural networks can be used as fast and reliable conventional methods substitution.

I. INTRODUCTION

Fast Fourier transformation algorithms can be very demanding in term of processing power needed for their execution. The problem is magnified when such algorithms must be performed in real-time systems. Having that in mind, FFT implementation becomes almost impossible to achieve using embedded devices of low processing characteristics.

One such problem occurred during Cooley-Tukey algorithm implementation on lower middle class microcontroller, Fez Panda II. In fig. 1 we can see basic specifications of Fez Panda II microcontroller.

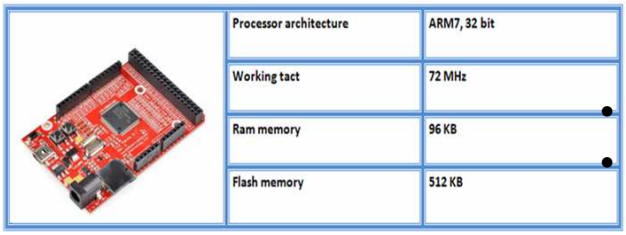

Figure 1. Fez Panda II specs

After extensive testing following results pointed out that current FFT implementation just is not fast enough. Execution time for 128 point FFT at 40000 samples per second is, at average, 1.2 seconds. The lower limit for one FFT iteration execution, defined by the nature of the problem, is 700 milliseconds. The only conclusion is that less computationally demanding substitution for Cooley-Tukey FFT algorithm must be found.

II. ALTERNATIVE IN FORM OF ARTIFICIAL INTELLIGENCE

After extensive research and quest for adequate substitution it has been concluded that domain of artificial intelligence could provide fast and reliable alternative [2, 3]. Feedforward neural network with one hidden layer was chosen as FFT substitution.

According to a rule of thumb, neural network implementation is reserved for solving problems which are not solvable using conventional methods [4, 5]. In our case problem can be solved using classical approach, but as mentioned before execution time represents the main obstacle. Bearing in mind that emphasis is on overall speed, not the precision, neural network can be more than suitable solution.

III. ARTIFICIAL NEURAL NETWORKS

An artificial network (Neural Network, NN for short) consists of a set of simple processing units which communicate by sending signals to each other over a large number of weighted connections [6]. This is the form of a parallel or distributed task execution. Every NN consists of:

A set of processing units, called neurons.

Connections between neurons. Generally each connection is defined by a weight w_{ij} which determines the effect that signal from neuron i (or group of neurons called layer) has on neuron j.

The transfer function f(n) which summarizes weighted inputs to a neuron. Usually an argument n of the transfer function f is calculated as standard weighted summation.

Figure 2 shows the connection between a layer of neurons i and neuron j.

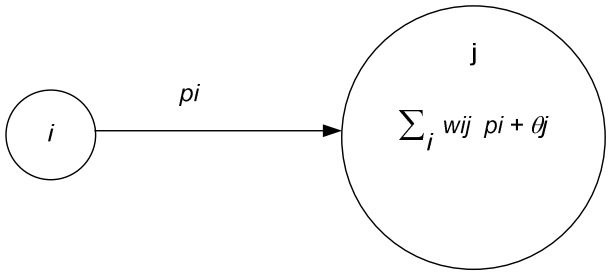

Figure 2. Standard weighted summation

Every input p_i to the neuron is weighted, all weighted inputs are summarized and finally a bias θ_j is added. The output of a neuron is calculated by a transfer function which is usually sigmoid.

The main feature of a NN is possibility of training. Supervised training is achieved when for every input value an target value is presented. The goal of a training process is to learn targets for given inputs. The learning process is conducted via weight transformation through learning algorithm.

Most common learning algorithm for feedforward NN is the Backpropagation algorithm or some of its variations. Feedforward NN means that inputs are propagated from input layer to the next layer until output layer is reached, while the error of output layer is propagated backwards (backpropagation of the error). Between input and output layers are so called hidden layers.

IV. SOLUTION ARCHITECTURE

Devised feedforward neural network has 64 inputs, 42 neurons in hidden layer and one output neuron (Figure 3).

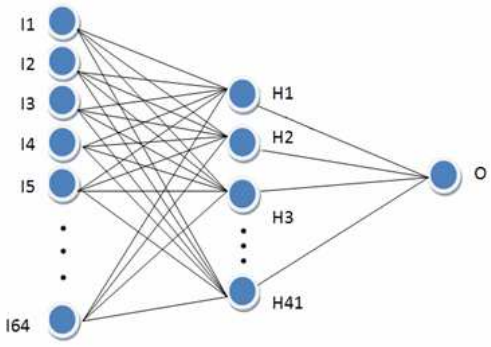

Figure 3. Neural Network architecture

This particular number of inputs is chosen because of the compatibility with Cooley-Tukey algorithm which demands samples number to be to the power of two [7]. Input data represent voltage readings sampled at 40000 times per second. Expected output is incoming signal's dominant frequency. NN

$$P(t) = \frac{1}{1+e^{-t}}$$

uses sigmoid activation function:

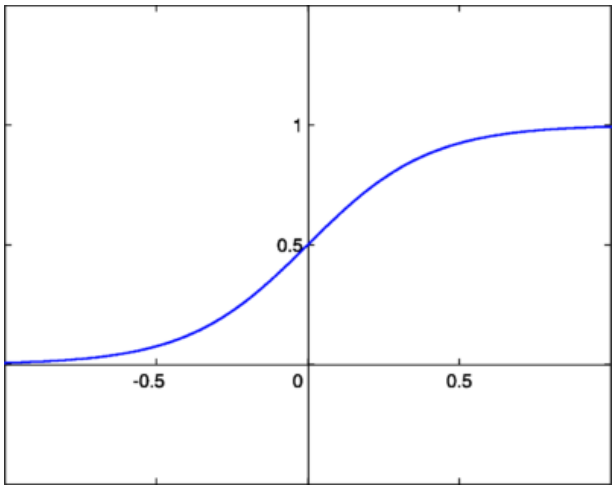

Figure 4. Sigmoid activation function

Activation function has been modified by adding slope parameter β in order to prevent phenomena known as catastrophic memory loss.

V. TRAINING

Neural network is trained using backpropagation algorithm. Starting weight values are generated randomly. During the process of training neural network is presented with training sets. The first 64 elements of training set are generated signal values and the 65th element is the targeted frequency (figure 5). With every processed training set neural network is updating its weight values. Computations are determining how much the error is changed by a small change in each weight. Then the weights are shifted by a small amount in the direction that reduces the error. This approach is called gradient descent on the error [9]. There are many algorithm variations. Standard on-line back-propagation with momentum algorithm is used in this implementation [1].

There are three adjustable training parameters. Alpha represents learning momentum. It effectively keeps a moving average of the gradient descent weight change contributions, and thus smoothes out the overall weight changes. Eta represents learning rate. Learning rate determines scale of weight changes during training. If learning rate is set too low, the training will be unnecessarily slow. Having it too large will cause the weight changes to oscillate wildly, and can slow down or even

prevent learning altogether. Precision is main training stopping condition. Based on precision value training algorithm will stop when certain error threshold is achieved. Higher precision value will require longer training process.

Voltage reading	Voltage reading	Voltage reading
50	50	22
62	97	0
26	22	22
83	18	69
8	96	99
97	54	85
0	0	40
99	73	3
3	85	8
.	.	.
.	.	.
.	.	.
40	30	59
47	11	14
64	91	0
3	64	30
91	0	77
16	64	99
73	91	77
38	11	30
Frequency	Frequency	Frequency
18626	11980	6437

Figure 5. Training data example

Choosing right parameter values is often determined by the nature of the problem and it's a matter of trial and error because there are only few training rules that are universally applicable [9].

VI. ANALYSIS RESULT

Test results have shown that the average execution time falls around 625 milliseconds. That is almost thirty percent faster than Cooley-Tukey FFT algorithm. Further improvements can be performed in order to optimize neural network and lessen execution time.

Xerxes program represents a proof of concept (Figure 6). Using techniques shown above Xerxes is able to mimic Cooley-Tukey algorithm with high precision.

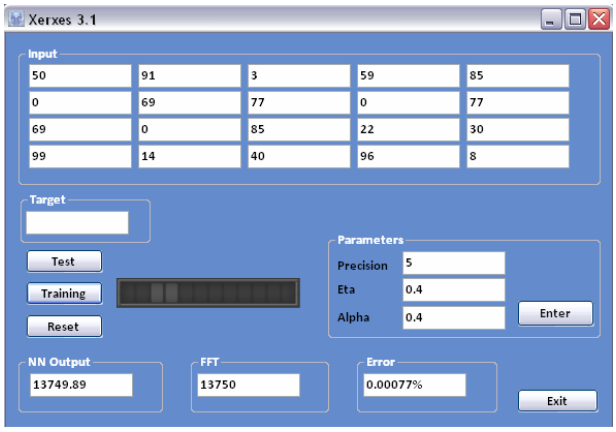

Figure 6. Xerxes testing program

VII. CONCLUSION

After analyzing obtained results we can conclude that artificial neural networks can find their place alongside conventional methods used for solving computationally demanding tasks. There are some downfalls considering precision but with enough training average deviation can be reduced to an acceptable level. The fact that the execution time is only architecturally dependent makes neural networks a very powerful tool. Complex algorithm behavior can be replicated using sufficient amount of their processing data. Single neural network architecture can be used for replicating many different behavior models with only slight changes in neuron number.

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TRANSPOSING INFORMATION TECHNOLOGY SECTOR IN LEARNING IN THE EDUCATIONAL PROCESS

J. – L. Obadović *, **

*JU SSŠ „Vukadin Vukadinović“, Berane, Montenegro

**Medicine, study program: Medical High School, Berane, Montenegro
jezdimiro@t-com.me, luka.obadovic@gmail.com

Abstract - This paper presents the study of the impact of modern information technology to the development of distance learning in secondary schools in Montenegro, its improvement, improving the efficiency and effectiveness, as well as the process of placing contemporary knowledge in the service of a quality educational process. Accordingly, the use of information technology in the field of transposition of knowledge in schools much easier for teachers and students provides a more appropriate form of learning. In such circumstances, the school can not survive in its traditional form, but must adapt to global challenges and modernize its role by providing distance learning students. Integration of information technology in the field of distance learning is a key factor for successful implementation of reforms of the educational process, and deserves a deeper and more extensive studies.

I. INTRODUCTION

Entering the XXI century brought new challenges for young people and opened new vistas unknown to earlier generations. New opportunities create a sense of thinking about the future or a new modern school, bringing with them the need to explore the unknown and to experiment when it comes to the educational process in the future.

Thinking about the future or a new modern school we can not avoid thinking about the importance and role of modern information technology (IT abbreviation) and information technology in improving the educational process, increase efficiency and speed of learning. According to this reasoning, we believe that IT will be today and in future the main factor and the foundation stone for the development of educational processes and methods and forms of realization of the teaching process. As part of that thinking is necessary to explore new roles of schools, teachers, students, parents, society, schools and ways of internationalization of education, new IT capabilities, new ideas about distance learning or e-learning or e-learning and create a vision for the school future. So, not without reason, that we live in the information age. Modes of exchange and transfer, and various amounts of information are now more than ever before in history. No matter what level of education is enforced, the doctrine must address the challenges and changes of our time, which leads to the need to further transform the education system.

The concept of lifelong education and/or learning (*Life Long Learning*) is based on the idea of learning that lasts a Lifetime, and both terms, and lifelong education and lifelong learning, including each other, because lifelong learning is a system of organizational, administrative, methodological and procedural measures as a prerequisite realization of lifelong learning.

The education system needs to constantly innovate, because the knowledge and constantly updated, and knowledge transfer is becoming more and more learning. Due to the challenges posed by modern, dynamic society, lifelong learning has a tendency to such a society is slowly turning into a learning society in which lifelong learning is seen as a "*learning society and knowledge*" and "*society*", the application of multimedia technology, digital technology, interactive learning technologies and other technologies in the educational system of Montenegro, which keeps pace with new developments.

IT has a fundamental impact on modern society and therefore, not without reason, that we live in the information age.

II. IT IN EDUCATION

It is difficult to give an exact definition of IT. The term IT includes all forms of technology used for creating, storing and sharing of information in various forms (business data, voice, sound,

images, multimedia, etc..). IT general term describing the technology that helps the production, handling, storage, communication and information distribution. First used the term "IT" was *Jim Domsik* from Michigan and November 1981st years, to modernize the previously used term "*data processing*". The term IT include various elements and skills for creating, storing and transmitting information. The term IT often involves a much wider field and the field of technology, such as networking and computer hardware engineering, software design and database, as well as management and administration of information systems. The most important component of an IT computers.

Integration of computers in secondary education reform processes in Montenegro, and the projected need for new computers, in order to reach European levels of equipment in schools of 10 pupils per computer, the time dimension of the school year 2010/2011. the school 2014/2015. years, figure 1 shows the.

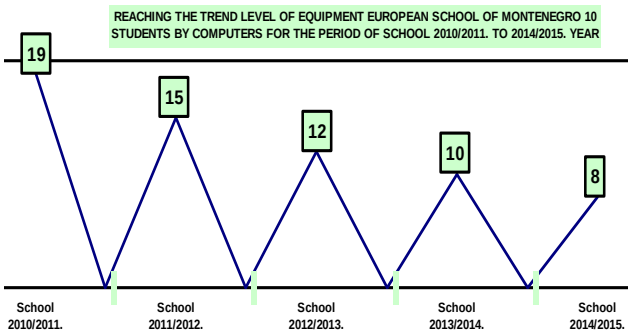

Figure 1. Status and projections of installed computers in secondary schools in Montenegro (the period of 2010. year 2015. the)

On the basis of the analysis explored the state of installed computers in secondary schools in Montenegro and the projection of continuing the installation of computers for the period from school year 2010/2011. to 2014/2015th, in order to reach European levels of equipment in schools, the projected ratio of 10 pupils per computer (Figure 1). The analysis indicates that the school year 2010/2011. The ratio was 19 pupils to one computer or 19:1 (1690 PC), the school 2011/2012. The ratio of 15:1 (2113 PC), that the school 2012/2013. The amount ratio of 12:1 (2641 PC), that the school 2013/2014. The amount ratio of 10:1 (2641 PC) and will then be designed to achieve a ratio of 10 students per computer, and that the school 2014/2015. The projected ratio drop below ten students per computer and will amount to 8:1 (4127 PC), as in figure 1.

Results of research on the development of information society in Montenegro in recent years indicate the number of positive trends that have led to an increase in the level of development of information society as a whole.

Analyzing the current situation in Montenegro, special attention should be paid to the segment of information literacy. Education system is in progress, the schools are mostly equipped with computers and Internet technologies. However, it seems that knowledge in their utilization and knowledge on how to transfer knowledge are not sufficiently developed. Partial or inadequate education, literacy activities of teaching staff, lack of knowledge of English and resistance of older generations to adopt new skills and information literacy is a barrier developing an information society that needs to be addressed in the future. Computers from year to year are increasingly present in education (Figure 1).

IT revolution changed the way of learning, teaching and sharing knowledge.

To make the education system to be successful, you should follow contemporary trends and to apply modern IT at all levels from elementary school through high school, to Uaniverziteta? IT mastered the lives of society as a whole, and thus become an indispensable part of everyday life of young people. IT were present, not future.

III. KNOWLEDGE TRANSFER MODEL

Previous studies indicate that type of perception significantly affects the level of acquired knowledge and skills, or to use different senses provide the most effective models for the transfer of knowledge.

An important task of the education process must be the identification and implementation of efficient techniques and methods of knowledge transfer. Application of IT in the process of teaching to achieve significant improvements in the process of teaching activities. New teaching techniques in knowledge transfer:

❶ *Traditionally, learning to use multimedia techniques*.

❷ *Smart classrooms*.

❸ *Mixed hybrid learning*.

❹ *Distance Learning* (*E-learning*).

Traditionally, learning to use multimedia techniques: This transfer of knowledge from teacher to student for years to change by adopting new technologies for efficient execution of these activities. So the school board passed the film with a film on PowerPoint presentations, and now offer

the complete recorded lectures on the Internet, or use new methods of learning, as is distance learning.

Smart classrooms: Defined as an intelligent environment equipped with different range of hardware and software equipment (projectors, cameras, sensors, modules for speech recognition, face, etc..). Therefore, smart classrooms, a new synthesis technologies, user interfaces and traditional teaching methods to create innovative, advanced and flexible education for learning. Possible division smart učinonica the functional components of:

A. ***Virtual assistant*** to absorb human speech and movement with computer operations using them as instructions, for example, changing the slide to the voice command, lighting projector detected the login user.

B. ***The automated recording of lectures*** is a category that allows the automatic recording of lectures, tracking teachers and in some cases, in more complex systems, identifying user actions.

C. ***Digitization of written material*** is classified as a group of software-hardware components for the transformation of manuscripts in electronic format or directly to the collection of data via the smart board and touch-sensitive screen.

D. ***Systems for video and/or audio conference*** systems consisting of interactive telecommunication technologies for the establishment of a simultaneous two-way communication through images and sound, as in figure 2.

Figure 2. Video conferencing

A key criterion for the realization of high-quality video conferencing (Figure 2) is the synchronization of the media, because ″voice″ and ″video″ separately transported through the network. *Cisco TelePresence System* is managed within the complex IP solutions to connect two or more distant facilities, which have characteristics similar to a television studio, in a virtual conference room.

E. ***Virtual classroom*** is an environment that simulates the view of the traditional classroom.

Oil and/or hybrid learning is a combination of several different learning methods. Hybrid learning is one of the less frequently used terms in education, which is based on the application of modern IT to the teaching of teachers in the classroom. This teaching involves teaching with the use of multimedia materials, and opportunities to continue learning outside the traditional classroom, which allows the creation of e-tests, by which the student can i check the level of knowledge. Accordingly, the teaching materials are published on the internet portal, freeing students write hard, and leaving more space for the concentration of students in class.

The advantages of hybrid classes compared to traditional learning are:

- The possibility of free choice learning time.
- ability to lead a discussion with a number of participants.
- The possibility of direct ″1 on 1″ consultation with a professor.
- The possibility of a wider choice of teaching content - texts for reading, multimedia material (clips, simulations, etc..), Web pages, discussion forums, etc..
- Unlimited repetition of material.
- The possibility of finding various articles and research facilities.

IV. DISTANCE LEARNING (E-LEARNING)

Distance learning has occurred much sooner than you would initially think. Of course, not in the form they are now known and used, but it had the same role - to overcome the physical distance for the sake of knowledge transfer. Pioneer *Distance Learning-a* was **Isaac Pitman**, shorthand teacher. He applied the distance learning in working with their students even 1840th in England. They caused my to copy a short message from the Bible and come back to him for review by mail. He kept communicating with students across the country and as successfully passed their knowledge. This way of training students, the forerunner of today's distance learning, immediately showed their qualitative, cost-effective, pragmatic side and a freer use than traditional methods.

When it comes to **distance learning** is often used in a number of terms: *Distance Learning, Distance Training, Distance Education, eLearning* (*e-Learning, "e" Learning*), *On-line Education, Virtual Instruction, Virtual Education, Virtual Classrooms, Electronic Classroom, Blended*

Learning etc.. An understanding of these terms as synonyms is no accident. They all have in common is to assume a learning process in which the knowledge source and recipient is physically located and where their relationship is mediated by the application of IT.

The beginning and development of *E-Learning*, the *e-learning* in the United States belong to universities. How this happened in the early days of Chris Curran has demonstrated in a study *"Strategies for e-Learning in Universities"*. Academics were among the first to use electronic mail and *World Wide Web* primarily to support their research, information access and communication with colleagues, and later as a supplement to the teaching of students. Many of the strategies used today in traditional universities come from the first, usually modest pilot projects and initiatives of individual teachers. Many of the first application included the creation of more scripts and other teaching materials available on-line. Some teachers went further, making use of *on-line* technology to communicate with their students, to access external resources and for developing and teaching courses based on the web. Many of these first programs made by teachers on the faculty of informatics, where the strong sinegrija between research and teaching, and is available for infrastructure development programs and their delivery to the Internet.

In the sphere of education, facilitated learning and increased use of IT, for a dozen years, often using the term *E-learning*, which is variously interpreted. The term E-learning is often translated (interpreted) as distance learning, electronic learning, whereby the said term implies carrying out educational process or other processes of knowledge transfer, implementation of modern IT which include computer, CD-ROM, DVD discs, digital television, portable and pocket computers and mobile phones. Communications technology enables the use of the Internet, electronic mail, discussion groups, and systems for collaborative learning.

E-Learning is used for distance learning through the Internet network, and can be considered a component of a flexible (mixed) learning. When learning takes place exclusively via the network, then called *on-line* learning. When learning is distributed to mobile devices like mobile phones, portable and pocket computers, then the learning is called *m-Learning*.

Mobile learning (*m-learning*) and learning through the network (*on-line learning*) are two subsets of electronic learning (*e-Learning*). All three belong to a set of distance learning.

Unlike distance learning, learning in the classroom (face-to-face) contact provides students and teachers, and the name and contact learning.

In practice, each of these types of learning is combined with learning in the classroom (face-to-face) to give a mixture, called a flexible (blended) learning.

E-learning models are:

- Learning with computers (eng. *Computer Aided Learning*, reduced CAL).
- Teaching with computers (eng. *Computer Aided Instruction*, reduced CAI).
- Intelligent tutoring systems (eng. *Intelligent Tutoring System*, reduced ITS).

These models feature a different impact of computers and software they use for educational purposes, ranging from simple system for the distribution of educational content and systems that interactively work with customers during the process of teaching. The designers of software for *E-Learning* tend to restrict the focus of their work on the course delivery and content, and educational institutions require a broad range of educational services.

E-learning systems such as **Moodle** [4], web address http://www.moodle.com offer learning solutions centered on students, built on the socio-constructivist pedagogy. Here students, students construct their knowledge through discussion, thereby strengthening their thinking skills.

Moodle (*Modular Object Oriented Dynamic Learning Environment*) is one of the most popular and most widely used open source systems (open source) for the management of on-line learning (*Learning Management System* - LMS). It is a network application that is installed on the server, and access to it from any networked computer via web browser. As of January 2010. year, Moodle has had a worldwide user base of 45 721 registered and verified sites, and is used by 32 million users in the 3 million objects, [5] as in **figure 3**.

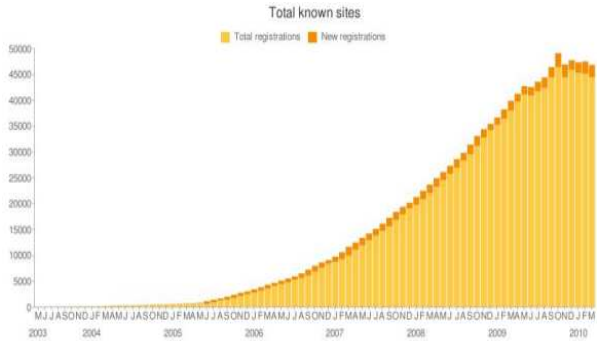

Figure 3. Statistics of the use of Moodle for the period since 2003. by 2010. [5]

As can be seen in **figure 3**, user communities Moodle platform is growing every month. The internationalization of websites based on this platform further contributes to its popularity, so that users of non-English speaking countries (in the software industry the most commonly used language) can be used in their native language. According to the analyzed data about the number of registered users [5] (http://moodle.org/stats/ on 17.10.2010. Year) Moodle is localized in over 73 languages in 193 countries, which means that during the 2012th , this statistic is improved.

Statistics of the use of Moodle [5], listed in **Table 1**.

Table 1. Display using Moodle

Display using Moodle	Statistic
Registered sites	49.330
Number of countries	210
Courses	3.424.817
Users	34.697.273
Teachers	1.206.462
Entries	19.276.241
Forum posts	52.440.739
Resources	28.151.556
Quiz questions	44.839.843

There is no limit to the number of servers that an institution can have and is not uncommon for organizations to have more than one Moodle server. Current trends are based on *table 1*, show that the number of registered sites larger than 49 thousand, and that there are over 37 million users of Moodle platform in the world [5].

Moodle System for Distance Learning offers a completely new capabilities, and integration with various external sources of content (Repository support), the Google Docs through Wikimedia, Flickr and YouTube.

Advances in technology made it possible to create better solutions for collaborative learning based on the Web. Asynchronous activities use technologies such as blogs, wikis and discussion groups, and allow participants to work together when the time suits them. Synchronous activities occur with all participants gathered at the same time, such as chat-session, virtual classrooms or conference.

Distance learning can be achieved indirectly through the *Distance Learning System* (DLS abbreviation), which is actually a specific software solution.

DLS system of a particular educational establishment means the use of lectures and exercises set to the Internet with multimedia materials, consultation with teachers via the Internet, the flow of *e-mail* among users of DLS platform can test on the Internet, etc., so that pupils, students can leave their homes attend classes via the Internet.

The system of distance learning, short DLS, an integrated combination of technologies used to support teaching by teachers and learning by pupils, students, meaning they were separated in space and/or time. Spatial and temporal separation between students and professors is overcome thanks to technology that enables the student, the student from anywhere, anytime access to educational content desired.

When you create a DLS must carefully analyze and implement all aspects of distance learning, with the development trend of IT on a daily basis receive a new form, primarily in the form of new multimedia and interactive elements and content. Accordingly, attention is drawn to be implemented all the elements necessary for a complete simulation of the teaching process in any environment, the end user chooses.

DLS platform elements are:

- system of course design,
- system for the preparation of the course - running through the course,
- Testing System,
- a system to monitor the progress of the user,
- a system to monitor the status of the user.

DLS system consists of subsystems: a record of users and time spent in the system, management and manipulation of exchange rates, the creation and listing of learning materials, setting up content on a platform, keeping the user through the course, track the status of users, scoring and evaluation, monitoring of use, organization elements, access authorization, a hierarchical approach, quality and subsystems for the search.

It is necessary, however, remind the functioning of the core DLS platform as a process which runs as follows: after an hour of traditional teaching (and training), teachers of subjects, directly and automatically (from a separate application administatorske) set of presentation (ie, multimedia *e-learning* resources) on the DLS system. In this way the student, the student would have the full content of the lectures which he could access without restrictions. That type of publishing educational materials to the student, student to follow the lectures missed over the internet. Besides lectures, the speakers on the Internet (within the DLS platform), put them to tests. Thus, creating such a system would have enabled the construction of a continuous and increasing the available knowledge base consisting of the presentation of lectures, lessons, training, tests and other materials, with access to pupils, students and professors. Responsibilities of subject teachers, would include the creation and design of multimedia learning resources, distribution of *e-learning* resources to students, students, creating and grading tests carried out tests. While, the student, the student chooses DLS variant dynamics and learning time.

V. FINAL REMARKS

Based on the analysis and description, the system of distance learning has its beginnings before recorded more than 100 years. With technological development, there were new opportunities for distance learning: educational programs on the radio (1920), Educational Television (1950), the use of satellites (1970) and cable (1980) for fast transfer of multimedia educational materials at a distance. A common feature of all these systems is that they are unidirectional and asynchronous. Students, studnt listened or watched educational courses, but no way were unable to question the teacher or students to share their opinion, studnt across the world who are at the same time followed the same lectures. This situation changed by the system of video conferencing (mid 1980), but at the time this system was very expensive and available to a small circle of people. With the advent of personal computers appear to learning materials that use the capabilities of computers - to create the text and the lessons that carry the sound, pictures or film clips, but the ability to create interactive learning materials and tests of knowledge and skills. These educational materials were originally distributed on floppy disks and later on CDs and the Internet. Learning with computers is named: *distance learning*, *electronic learning*, *e-learning*, *e-learning* etc.. Open the possibility of multimedia educational content make wide circles of professors, and the emergence of the Internet and the ability to share these facilities around the world.

The traditional way of transferring knowledge in education in relation to transposition of knowledge from teacher to student and/or students for years to change by adopting new technologies for efficient execution of these activities. Previous studies indicate that type of perception significantly affects the level of acquired knowledge and skills, or to use different senses provide the most effective models for the transfer of knowledge. Consequently, knowledge is transmitted: the traditional teachings of the application of multimedia technology, with smart classrooms, a combined hybrid learning based on the application of IT and distance learning.

For the modern IT is almost no obstacles in the ability to visually display any form or kind of reality that is adapted to the senses and learning abilities of students and/or students.

In addition to the educational system, reading, writing and numeracy, knowledge of IT is one of the elementary literacy. To make the education system to be successful and follow modern trends Ministry of Education of Gore gave full priority to the introduction of IT in the education system, creating MEIS (*Montenegrin Eductional Information System*) Project, 2003., in which are defined by specific methods, resources and technology for the implementation of information systems.

The current position of IT at all levels of the education system was generally satisfactory and globally we can say that for many indicators, Montenegro is in the middle compared to other states. One of the relevant data for the positioning of Montenegro is the ratio of the number of students and computers in high schools and on the school year 2010/2011. amounted to 19:1, it is now the school 2011/2012. The ratio is decreased and 15:1, and it is envisaged that in future the school 2013/2014. was designed to achieve a ratio of 10 pupils per computer (10:1), while the academic 2014/2015. The lower the ratio below ten students per PC-1 in the amount to 8:1, as in figure 1.

When it comes to distance learning is often used in a number of terms: *Distance Learning*, *Distance Education*, *eLearning*, etc.. An understanding of these terms as synonyms is no accident. They all have in common is to assume a

learning process in which the knowledge source and recipient is physically located and where their relationship is mediated by the application of IT, and reflect the nuances of individual options within the process of distance learning.

Distance learning gives education a new dimension. IT were present, not future.

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VISUALIZING GRAPH SEARCH ALGORITHMS - POSITION IN TEACHING ARTIFICIAL INTELLIGENCE

V. Ognjenović, N. Đurić, I. Berković and V. Brtka
University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
visnjao@tfzr.uns.ac.rs; berkovic@tfzr.uns.ac.rs

Abstract – This paper presents the visualization of graph search algorithms. A review of Dijkstra's algorithm is given, as a characteristic representative of this category. It is shown on the example of this algorithm how the algorithm visualization can be done on the basis of graph representation. A review of visualization of Dijkstra's algorithm: PathFinder and ANIM3D is given. Basic characteristics of these visualizations are summarized, as a basis for their use in teaching Artificial Intelligence.

I. INTRODUCTION

Algorithm visualization software graphically illustrates the mechanisam behind a certan algorithm, so it can help in great measure at understanding how an algorithm works. A good practice at learning about graph search algorithms is to follow a flow of a certain algorithm visually, step by step. In the field of artificial intelligence, where it is necessary for students to process a great number of search algorithms, the visual interface for displaying the mechanism of an algorithm must be well designed.

According to [1], the effectiveness of algorithm visualization technology is seen in its enabling the students to participate the course in a greater scope, which is very similar to participation of the instructor himself. The instructor usually creates visualization for classroom use and uses it as a visual aid in lectures.

This paper shows the visualization of one of graph search algorithms – Dijkstra's algorithm and its use in teaching Artificial intelligence. Section two shows Dijkstra's algorithm from the graph viewpoint, as a basis for visualization. Section three is an overview of Dijkstra's algorithm's visualization used for teaching Artificial intelligence. Section four describes the basic idea of visualization of this algorithm as a model for teaching purposes. Section five concludes this paper.

II. DIJKSTRA'S ALGORITHM

Dijkstra's algorithm, conceived by Dutch computer scientist Edsger Dijkstra is a graph search algorithm that solves the single-source shortest path problem for a graph with nonnegative edge path costs, producing a shortest path tree [2].

A. Defining problems using a graph

In practice, graph G = (V, E) (V – vertices; E - edges) has been added the function of distance

$$f: E \rightarrow R$$

which assigns length to each edge. This length, or distance between vertices is usually a positive integer, although it can be any real number.

An important problem in graph theory is determining the shortest path between selected vertices. According to [3], there are four variants of this problem:

- distance between one to all other vertices (single-source problem)
- distance between all vertices to one separated vertex (single-destination problem)
- distance between two distinguished vertices (single-source, single destination problem)
- distance between all vertices (all-pairs problem)

First three problems are considered separately (and not as a subset of the fourth) because there are more efficient algorithms for solving them. E.W. Dijsktra published a paper in 1959, in which he describes a graph search algorithm which efficiently solves the first problem, for graph with non-negative edge distances, outputting a shortest path tree between selected vertices as a result [2].

B. Dijkstra's algorithm overview

At the start of algorithm description Dijkstra considers n vertices, of which some or all are branch connected pairs; also length of each branch is given – non-negative. He limits the algorithm for a case where there is at least one path between any two vertices, and then proposes two problems [2]:

- The first problem is construction of minimum total length tree between n vertices, such a tree is a graph with one and only one path between any two vertices.
- The second problem is searching the minimum total length path between two given vertices P and Q.

In short, algorithm starts with the initial vertex, assigns initial values as lengths and tries to improve them with each iteration.

1. A temporary distance value is assigned to every vertex: zero for the initial one and infinity to all others.
2. All vertices are marked as unvisited. Starting vertex is marked as current. An array of unvisited vertices is made, which is filled with all vertices except for the starting one.
3. For current vertex, all unvisited neighbours are tested and their temporary distances are calculated. For example, if current node A is marked with temporary distance of 6, and branch that connects it with it's neighbour B has a length of 2 then distance to B (through A) is 6+2=8. If this value is lesser than previously recorded temporary distance to B, it's overwritten. Regardless of the fact that neighbours of a certain vertex are tested, they are not marked as visited in this step so they stay in the unvisited array.
4. When all neighbours of current vertex are tested, vertex is marked as visited and is removed from the unvisited array. The visited array will never be checked again; it's currently memorised length is final and minimal.
5. If destination vertex is marked as visited (when planning the path between two selected vertices) or if minimal temporary distance between two vertices in the unvisited array is infinite (when complete traversal is planned), then stop. Algorithm is finished.
6. Mark an unvisited vertex marked with minimal temporary distance as the next 'current vertex' and go back to step 3.

III. DIJKSTRA'S ALGORITHM VISUALIZATION OVERVIEW

This section shows, out of many possible, the Dijkstra's algorithm visualization used for teaching artificial intelligence.

A. Visualization as a teaching tool

Visualization of a certain algorithm is always a challenge for students. This paper is another confirmation of this claim.

C. D. Hundhausen in [1] describes his observation of classroom activities, including 83 student groups (1-4 students each), who constructed animations of 22 algorithm themes. Figure 1 shows the number of student groups having animated each algorithm theme. The particularly popular ones were the QuickSelect algorithm, Dijkstra's algorithm, Kruskal and Prim's minimum spanning tree algorithm, as well as breadth-first and depth-first search. These themes were representative of the major problem-solving techniques studied in the course: divide-and-conquer, greedy, dynamic programming, and graph algorithms.

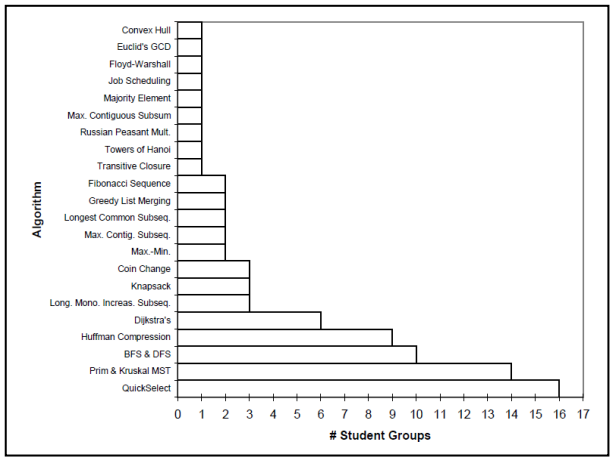

Figure 1. Number of student groups that animated each algorithm theme

When Artificial intelligence classes at Technical Faculty 'Mihajlo Pupin' in Zrenjanin are taken into account, a significant difference is seen between students' learning the graph search algorithms with and without any form of visual presentation. In this school year, students had to write seminar papers in which they described a segment of a certain search algorithm. According to papers submitted by now, a large number of

students presented algorithm operation by graphs. Several students were interested to convey visualization for the paper themselves, primarily visualization of Dijkstra's algorithm.

B. PathFinder

M. G. Sánchez-Torrubia and C. Torres-Blanc emphasizes the value of parallel algorithm operation monitoring by graph and certain algorithm code line. It was done successfully in PathFinder [4].

Figure 2 shows PathFinder, a new electronic Math Teacher for active learning Dijkstra's algorithm. Sánchez-Torrubia and Torres-Blanc in [4] defined the concept of this electronic teacher and described the minimum and some additional requirements. The tool in question represents an enhanced paradigm of this new concept on Computer Aided Instruction (CAI) resources, i.e. an application designed for active eLearning, following the eMathTeacher philosophy. One of the most striking features here is the animated algorithm visualization panel. It shows, on the code, which step the student is currently executing, as well as where he had made a mistake within the algorithm running. Another two features are the active framework area for the algorithm data and the capability of saving/retrieving the created graph.

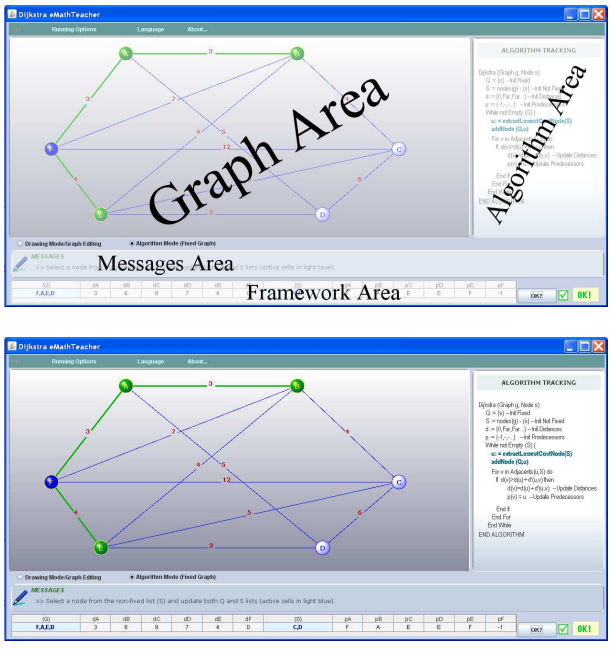

Figure 2. PathFinder: an eMathTeacher for Dijkstra's algorithm

In [5] describe the minimal conditions for a tool to be considered an eMathTeacher:

- Step by step inquiring: for every process step, the student should provide the solution while the application waits in a stand by mode, expecting the user's input.
- Step by step evaluation: just after the user's entry, the eMathTeacher evaluates it, providing a tip for finding the proper answer if it is wrong or executing it if ok.
- Visualization of every step change that happens.
- Easy to use.
- Flexible and reliable: allowing the user to introduce and modify the example and to repeat the process if desired.
- Clear presentation within a nice and friendly graphic environment, helping insight.
- Platform independency and continuous availability (anytime, anywhere).

This way of presenting the graph search algorithm enables direct associations for each algorithm line, giving the students higher self-confidence to use this algorithm.

C. ANIM3D

M. A. Najork and M. H. Brown describe a 3D animation library for visualization of combinatorial structures in one of their papers [6]. For the purposes of this paper, algorithm animation is taken. Although constructing a new view of an algorithm usually takes dozens of design iterations, consuming a lot of time, this library eases this situation. It provides high-level constructs for performing animations, eliminating the need for recompilations through offering an interpretive environment.

Also, ANIM3D develops a 3D animation of Dijkstra's shorthest-path algorithm in just 70 code lines, avoidin combining SI and CGS units. Since equations do not balance dimensionally, confusion often occurs. If mixed units have to be used, they have to be clearly stated for each quantity used in an equation.

An 3D animation of this algorithm is shown in Fig. 3. The vertices of the graph are displayed as white disks in the xy plane.

Above each vertex v is a green column representing D(v), the best distance from s to v known so far. Initially, the columns above each vertex other than s will be infinitely (or at least quite) high. An edge from u to v with weight W(u;v) is shown by a white arrow which starts at

the column over at height 0 and ends at the column over v at height.

Upon completion, the 3D view shows a set of red arrows which form the shortest-path tree, and a set of green columns which represent the best distance D(v) from s to v.

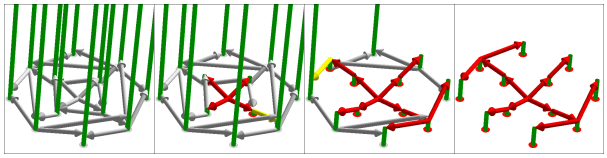

Figure 3. The left snapshot shows the data just before entering the main loop. The next snapshot shows the algorithm about one-third complete. In the third snapshot, the algorithm is about 2/3 complete, and the snapshot at the right shows the algorithm upon completion.

IV. GRAPH SEARCH ALGORITHM VISUALIZATION

Based on the previously analysed aspects, several basic concepts of graph search algorithm visualization can be drawn, like:

- Each change on graph occurs only in steps related to only one graph node;
- An algorithm review is necessary for each image (graph) change – that review can be shown through the code itself (like in PathFinder) or another, even picture mode, like in ANIM3D;
- It is desirable for the visualization to follow both steps forward and steps backward in algorithm operation;
- Optimal time frame for complete display of an example is desirable, which should mean the possibility for a certain part of algorithm operation display can be faster.

V. CONCLUSION

This paper showed the visualization of graph search algorithms as a way of learning about these algorithms within the Artificial intelligence teaching process. The software making successful visualizations was shown, and the important elements were summarized. This showed how graph search algorithms can be used with a higher success rate.

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POSSIBILITIES OF USE OF EDUCATIONAL COMPUTER SOFTWARE "INHERITANCE MECHANISMS" IN TEACHING BIOLOGY IN GRAMMAR SCHOOL

V. Odadžić * and B. Odadžić**
*Zrenjaninska gimnazija, Zrenjanin, Srbija
**Tehnički fakultet „Mihajlo Pupin", Zrenjanin, Srbija
vesna.odadzic@gmail.com,borislav.odadzic@gmail.com

Abstract - The basic feature of modern society is a continuous need for innovation and improvement in all areas of human activity. Education also requires constant innovating. The application of Informatics and Information Technologies within the lectures of all the school subjects is one of the most important steps in the aim of development and enhancement. Application of educational computer software in Biology lectures offers possibilities of teaching individualisation and represent important motivation factor for students. Educational computer software "Inheritance Mechanisms" in Biology lectures represents a new generation of educational technology, which is based on computing science. Teaching software "Inheritance mechanisms" is compiled as a substitution for the book during the elaboration of Biology materials. This software is made for teaching and learning procedure, tests, assessments and exercises. The software contains teaching material with exercises, tests, interests, and gallery.

I. INTRODUCTION

The application of Informatics and Information Technologies within the lectures of all the school subjects is one of the most important steps in the aim of development and enhancement. It is expected that contemporary educational system should form a student as an individual, flexible person, who will with easiness accept contemporary social changes and adapt to them. The application of contemporary information technologies as a support to traditional educational process can produce significant results.

Concerning ICT, two important roles are assigned to schools. The first is to fulfil the expectations of society for demanding ICT skills, and the second is to raise the quality of education in the schools with the support of ICT. Many scholars, teachers have recognized the potential of ICT to enhance teaching and learning, and as a side effect the number of published articles about the use of ICT in school work is enormous [16]. Usage of ICT in schools is so diverse that it is almost impossible to list all possible applications. Introduction of ICT in biology lessons can raise not only level of knowledge but students attitudes toward biology as well [13]. The applications adapted or developed to be used in science teaching like imaging systems in microscopy [12] [14], virtual dissections [15], simulations [26], and real laboratory exercises with data acquisition systems [1]. It is extremely important to mention that Biology programmes at all the levels of education are very suitable for presenting by the use of a computer. In developed countries the use of computers is widely present within university education, in teaching and learning. Brant, Hooper and Sugrue in 1991 [5] were examining the use of simulation in Genetics. French and Rodgerson in 1998 [7] made computer simulations for exercises and university lectures, but also for Biology lectures in primary and secondary schools. Apkan, 2001 [6], created simulation programmes that replace real dissecting of animals. Franklin and Peat at the University of Sydney have conducted online learning with the first year Biology students [23] and have conducted the researches of strategy efficiency for computer based learning and student progression [24]. The same authors in 2001 examined the possibilities of virtual environment for learning Biology contents. Potirala K. (2003) [8], [9], at Krakow University, conducted a research on the efficiency of interactive learning with the use of ECS in Genetics, Ecology and Taxonomy. All listed authors emphasize the advantage of the use of computers in relation to application of other forms and methods of work in Biology lectures. The efficiency of these kinds of lectures and enhanced motivation of students is especially emphasized.

II. EDUCATIONAL COMPUTER SOFTWARE ON THE FUNCTION OF IMPROVING THE QUALITY OF TEACHING

"Software in the field of education presents intellectual technology and is called educational computer software (ECS) that includes programming languages and tools, specific organisation of lectures, learning and studying, and it is based on logic and pedagogy" [4]. By the use of ESC in lectures we encourage: motivation of students, individuality and differentiation of learning process, self-evaluation, acquiring new knowledge and achieving exercise, use of information databases and the Internet access and more efficient time consumption in the learning process. The application of educational software in lecturing provides elevating of motivation with those students where all other methods showed no success, or were less successful. The specificity of ECS lies in the fact that it enables interactive learning - immediate error correction and affirmation of acquired knowledge. By the use of ECS in lecturing and learning there is a tendency towards authentic individualization of lectures. By use of specific techniques the controlling function of lectures is achieved, the process of learning is regulated and the inner motivation for learning is encouraged. ESC can provide individualization in relation to various types of thinking, different capabilities in task solving, various cognitive learning styles. Two basic principles with designing ECS that should be referred to in order to enhance the activity in learning are: widening the prospects and increasing interaction. In order for software to enable more successful and active learning it is obligatory to divide the material into smaller units and to enable the transition onto the next lesson only after the material from previous lesson is learned, with solving some practical tasks. If a student has a certain previous knowledge, it is sufficient to meet the criteria set in a form of a practical task, without the need to go through the material already known to him/her. In order to increase the interaction in ECS, it is necessary to create a module for interaction that could be conducted in a form of exercise, interactive quiz or in some other way, but always in accordance with the contents of the software. The content of Biology lectures is practically predisposed for ECS application. The largest part of theme units and lesson items from Biology curriculum at all levels of education can be presented with pictures, texts, adequate video sequences and simulation applications. For certain fields this is the way to achieve maximum effects.

III. EDUCATIONAL COMPUTER SOFTWARE "INHERITANCE MECHANISMS" IN BIOLOGY LECTURES

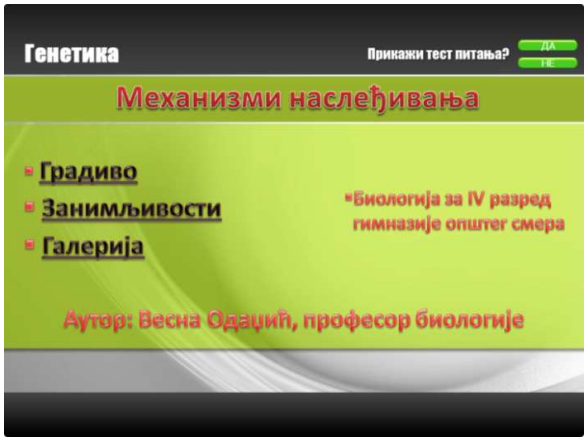
In the aim of enhancing biology lectures we created a software for learning the contents from lecture topic "Inheritance mechanisms" for the 4th grade of grammar schools. The software "Inheritance mechanisms" is made in Adobe Captivate 5.5 programme. Adobe Captivate 5.5 presents currently leading e-learning software in the world. When this programme first appeared is served mainly as a tool for creating software simulations. Today it is just one of the options that is offered by this programme.

The cover page provides basic information about the presentation and the author, and there are also the links for logical units such as:

- Teaching material
- Interests and
- Gallery.

By clicking some of these hyperlinks the wanted unit is opened.

On picture 1. The cover page of educational software "Inheritance mechanisms" is displayed.



Picture 1. The cover page of educational software "Inheritance mechanisms"

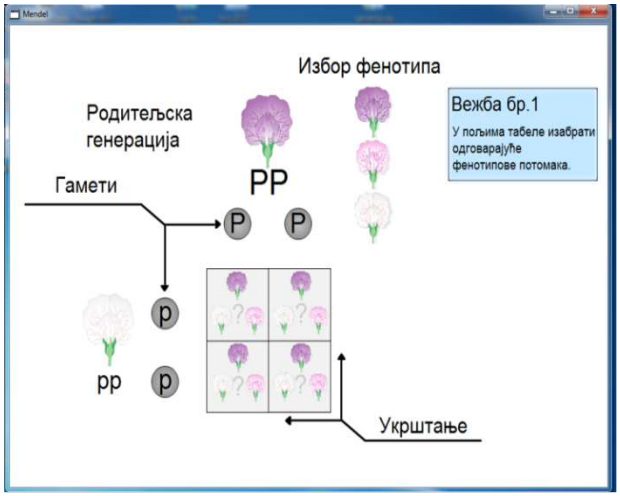
In the upper right corner a user is offered the choice of doing test questions. If he/she clicks the button "yes", after each unit test slides will follow, and in a case of choosing "no", test slides will become invisible for the user, offering him/her the possibility of focusing entirely onto the teaching material.

Teaching software "Inheritance mechanisms" is compiled for 4th grade students of grammar schools as a substitution for the book during the elaboration of Biology materials. Next to the basic part, the software contains exercises as well as the

final test from Genetics. The contents of teaching units are given in the programme:

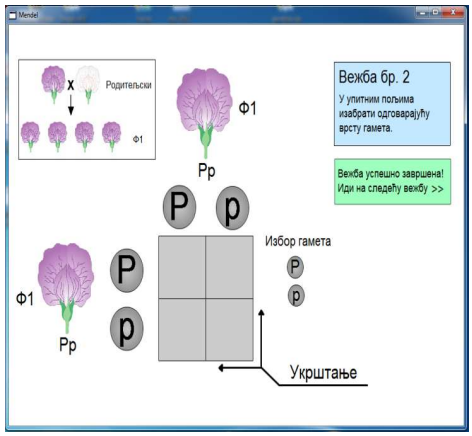
- Introduction to Genetics (the significance of genetic research);
- The basic rules of inheritance;
- Types of inheritance;
- Chromosome basic inheritance;
- Recombination;
- Mutations, chromosome aberrations;
- Population genetics;
- Artificial selection and animal and plant breeding;
- Genetic development control;
- Human Genetics;
- Genetic predisposition of human behaviour.

Teaching material - has its own cover slide and contents towards hyperlinks of each lecturing unit. By clicking a certain hyperlink the wanted lecturing unit is opened. Within the teaching material animations that show dihybrid inheritance and the exercises are shown. The exercises are designed as interactive animations with a tutorial and tasks that a student should solve. If a student makes an error he/she gets automatic information about the error and additional directions that will help in solving the problem correctly.



Picture 2. Exercise number 1. Monohybrid cross choosing phenotypes

After each lecturing unit the test follows.



Picture 3. Exercise number 2. Principle of Segregation

The test contains various types of questions and problem tasks: multiple choices questions, fill in the blanks, matching. After the student answers the question there comes a feedback about the correctness of the answers. If the answer is incorrect the student gets additional information that will help with coming to the right answer. A special convenience in the tests is possibility for automatic change of offered answers array, because the programme each time gives new variations of answers. In this way mechanical learning and copying are prevented (each student in his/her computer has various answer combinations). Each question, depending on the complexity, carries a certain number of points. There are 72 questions altogether.

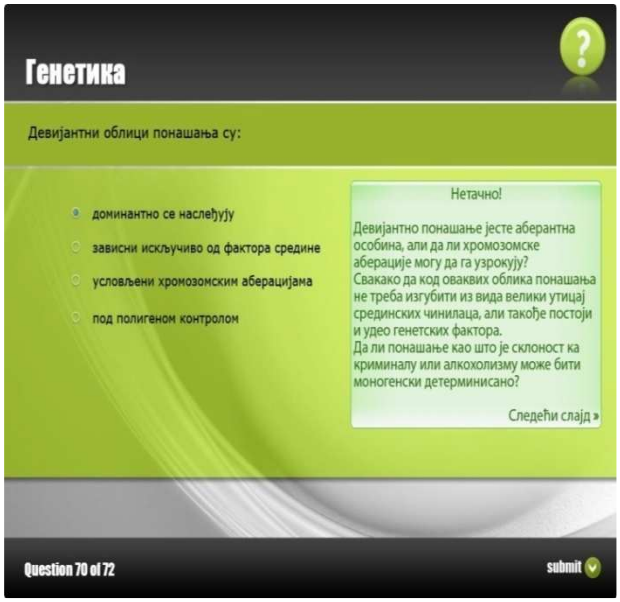
The most used type of question is true/false with multiple offered choices. fill in the blank (type the answer) as well as matching (connecting correct answers) are also used.

After the question is answered and the button submit clicked, a user gets a certain feedback that depends on the correctness of chosen choice. By clicking the button submit before choosing an answer, the programme will inform you that you have to answer the question in order to continue further on with the presentation. If the user provides a correct answer the application will confirm that as shown on picture 4.

In case the answer was incorrect, (as seen on picture 5.), the message can contain a short explanation so the error could be memorized and understood. This is a way more practical solution than to have all correct answers offered at the end of a test, because the user is at a given moment focused only on one question.

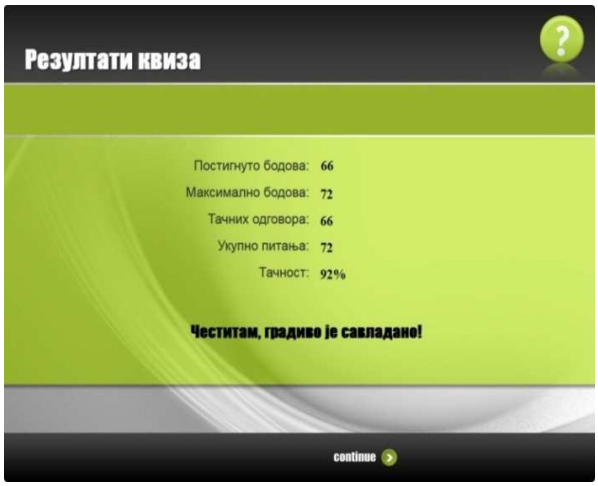
Picture 4. Application with the right answer confirmation

This testing system is extremely functional and widely used in western countries as one of the more efficient tools in learning, in education, and business environment.



Picture 5. Application with incorrect answer explanation

After answering the last question the slide with results follows (picture 6.) and it contains following information: number of achieved points, maximum number of points, number of correct answers, overall number of questions and success in percentages. The border for passing is determined by the presenter and in this case it is 60%.



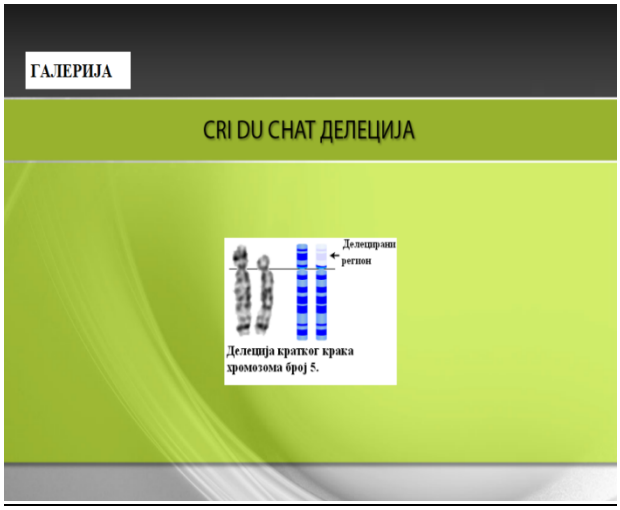
Picture 6. Testing results

Interests (as seen on picture 7.), contains 13 slides that can serve for widening basic knowledge from Genetics.

Picture 7. Interests from Genetics

Gallery (as seen on picture 8.), contains 129 pictures and schemes. Along with the pictures within the software there are other pictures, unknown to students, that relate to lecturing units.

Application of the educational computer software in teaching and learning offers possibilities of teaching individualisation and this represents a very important motivational factor for students. Teaching software "Inheritance mechanisms" is very suitable for individual learning because it enables the choise of the way in which the problem is solved. Creative application of the software in biology lectures develops individuality and creativity of students.



Picture 8. Picture from Gallery

IV. CONCLUSION

The author's interests are connected with the introduction of the new Infocommunication Technologies in biology educatione. Computer application in educational system should include thoroughly designed complex procedure which is eminently realised in all parts of educational system.Modern instruction in Biology in elementary and high schools requires innovations in organization and didactic - metodological modelling of the educational process. In the aim of enhancing lectures and overcoming drawbacks traditional Biology lecturing we created a software for learning the contents from lecture topic "Inheritance mechanisms" for the 4th grade of grammar schools. Teaching software "Inheritance mechanisms" is compiled as a substitution for the book during the elaboration of Biology materials. The software contains Teaching material with exercises, Tests, Interests, and Gallery. This programme has been under development as an original copyright work since 2008, and has been applied in Biology lectures in Zrenjanin Grammar School. Achieved results show students' interest for these types of lectures and learning, and output results show that the students' average grades are higher in comparison to traditional approach of learning with lecturing topic "Inheritance mechanisms". The course of further research is directed towards evaluation and software perfection.

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TEST SYSTEM FOR COMPUTER GRAPHICS SUBJECT

B. Sobota, Cs. Szabó and Š. Korečko
Technical University of Košice/Department of Computers and Informatics, Košice, Slovak Republic
branislav.sobota@tuke.sk, csaba.szabo@tuke.sk, stefan.korecko@tuke.sk

Abstract - This paper contains description of test system with tele-learning features developed as a component of complex virtual teaching room. It was developed and implemented on the open source free platforms Linux, Java, PostgreSQL. The system is partitioned into three subsystems: subsystem Administrator, subsystem Teacher and subsystem Student. This system supports many question types including tasks with short answer and tasks with wide answer. Special benefit of the described system is the ability of opening wide questions support including capability of drawing or sketching in question by built-in graphics editor.

I. INTRODUCTION

In the last years we are observers of expansion of computer technology in all fields of our life. Mainly Internet is today inseparable part of school, various education organizations, and companies and also is frequently used at home. On the Internet, many education courses and virtual schoolrooms were released for past few years [1][2][3][4]. These courses appeared prosperous from different reasons. The first one can be, that it is possible examine many students with minimal overheads on the teacher. It is also helpful tool by evaluation process of test. Identification of student is still open problem, when it is used distant form of exam [5]. Using of broadband computer networks can be solution of this problem. Important factor is design and consequential realization of experimental services. These services have a realization capability of this problem solving. Tele-learning character with QoS (Quality of Service) components of these services should be used in Test system for graphics which pilot part is described in this contribution. Then this system can be used as a component of complex virtual computers graphics laboratory. The large graphical data sets including multimedia content is special requirement for student testing in computer graphics.

This work is the result of the project implementation: Center of Information and Communication Technologies for Knowledge Systems (ITMS project code: 26220120030) supported by the Research & Development Operational Program founded by the ERDF.

II. SYSTEM DESIGN AND IMPLEMENTATION

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Do not use abbreviations in the title or heads unless they are unavoidable.

System design for creating of tests, next half-automatic processing and rating of results was a goal of our work. Analysis based on rules, which are described in previous [5][6][7], indicated requirements for designed system [5][8]:

- Creation and administration of these user's accounts:
  - Administrator account
  - Teacher account
  - Student account
- Inserting and administration of subjects in system.
- Assigning of subjects to teachers and students (for solution).
- Inserting and administration of questions for appropriate subjects.
- Teacher account alternating by other teachers with specification of rights.
- Creation and administration of different kinds of tests with appropriate questions and question-area with special accent to include graphics and multimedia.
- Print output of created tests.
- Test processing by students.
- Test results handling, test archiving and next results browsing.

Based on these requirements system was partitioned to three subsystems:

- subsystem Administrator
- subsystem Teacher
- subsystem Student

This dividing is used also by login to system. User can log in to system as administrator, teacher or student. Logging to system is solved through unified authentication model. When user is logged to system he can use only these functions, which are allowed based on his rights.

To system logged administrator can create next administrator, teachers and students accounts with definition of their rights. Administrator can edit or remove user accounts also. Next administrator's task is insertion of subjects to system. Subject is assigned to each teacher and he can realize functions described below in his subsystem later. Also administrator can assign the subject from subject-list to students. Administrator can change his system profile like login name and password..

Based on assigned subject teacher can create various kind of questions to these subjects. Subject questions are stored to logical unit – directory. This directory represents the question area, which is used by creation of generic test later. Teacher can create test after creation of enough question number. He can choose from two options:

1. User test – All questions, which were created in appropriate subject, are displayed to teacher from tree structure of directories. Teacher defines test questions from selected question area. After selection of necessary number of question he specify a time limit for test solution, maximal test points number, minimal test points number (for test passing), time interval (when test is active) and test name.
2. Generative test – is created based on entered parameters. In first step teacher select of questions area, from which questions will be taken. In second step are defined of test parameters mainly statistical probability or questions weight. In last step teacher insert the same parameters as by User test plus number of questions.

Teacher can print also prepared. Teacher can change his login name a password.

If student is logged in the he can choose from three options: browsing of passed tests, executing any test from active tests, change his login name a password.

Based on dividing into three subsystems three use cases were solved also: administrator using, teacher using and student using. Subsystem Teacher is most complex. This is the cause of its

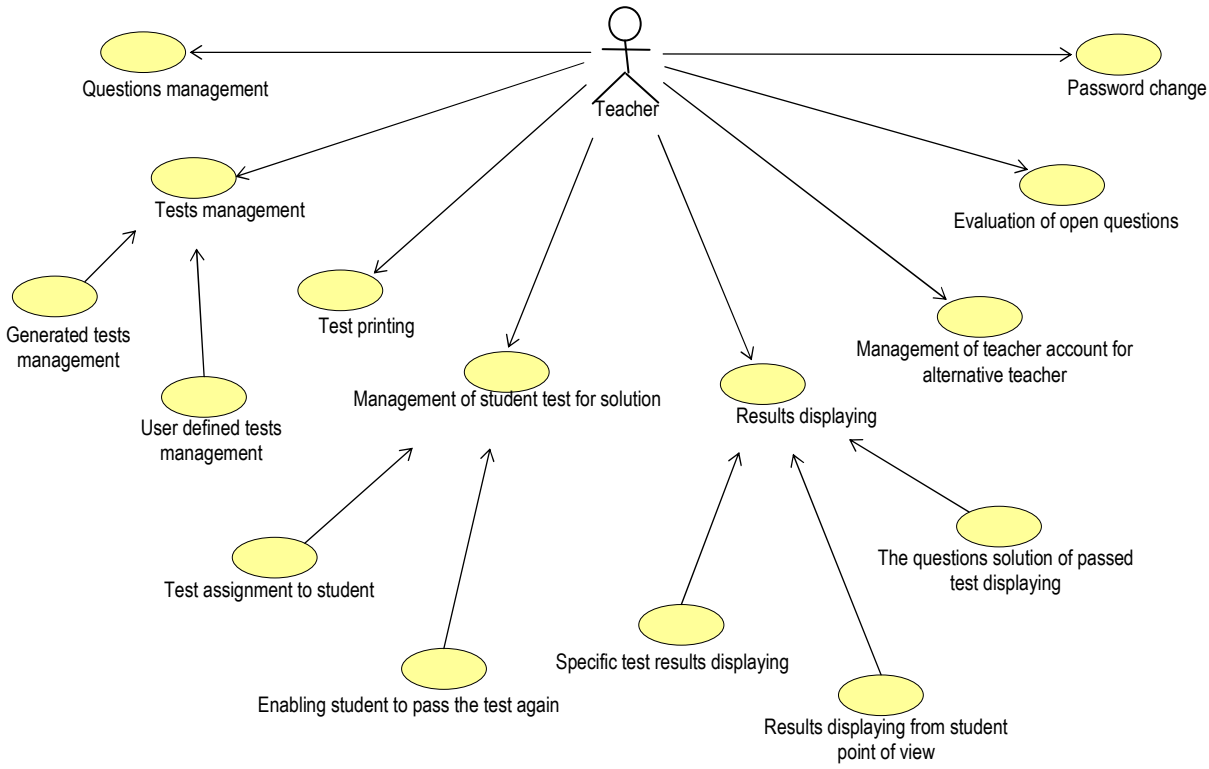

Figure 1. Use case model - teacher

describing bottom. Its model contains too many use cases. Most important are: question management, test management, open wide questions evaluation and test results displaying.

Data architecture design is modeling all serious data entities. Power Designer was used by design. Logical data model is designated as source of physical data model. This model was generated and edited by Power Designer.

Detail elements are the tables of database, which are used for data storing of information system. Among a main entities are belonged entities for storing of basic information about system users, including login name and password. Also are stored subjects, their relation to teachers and to students. The system kernel contains tables for storing of questions, user and generative tests and test results. Table of questions and their answers is serious component of system. Directories are used for logical ordering the tree nodes. Their persistence is fixated also by table storing.

III. SYSTEM ENVIRONMENT

System operating is very easy. In internal windows, which include tree structure, control is realized by the computer mouse. After right mouse click on appropriate tree node is displayed relevant context menu with adequate operations.

Subsystem Administrator is composed from next:

- Subjects list – is used for logical segmentation of subjects, which are taught in school. Their logical and clear segmentation enable directory structure.
- Teachers list – contain user account with Teacher role. In this list is possible subjects (from previous list) assign to teacher.
- Students list – is used for student's accounts managing and for subjects (from subjects list) assign to students.
- Other administrators list – contain a list of administrators, which was created logged in administrator (not a list of all system administrators).
- Details – display detail information about selected item
- Realized operations – display history of realized operations.

Subsystem Teacher is composed from next:

- Subject list, their tests and questions – This list contain all subjects, in root directory, taught by logged in teacher. These subjects were specified by administrator. In subjects scope is possible a creation of logical directors structure, different kinds of questions and tests. These tests will be mention to students.
- List of taught students – contain students, which were assigned to teacher subject by administrator. Student has assigned tests (for executing or passed tests). The appropriate icon inform about test state.
- Alternate teachers list – contain teachers, which can alternate actual teacher. This teacher can be used in case if actual teacher can't create, assign or evaluate test (for example he is busy or ill).
- Details - display detail information about selected item.

Subsystem Student can be divided to two parts:

- Test list, which are waiting for passing
- Passed test list

Tests waiting for passing are in some of these states:

- state "Execute " - test is ready for executing
- state "Disallowed" - test is accessible only in appropriate time interval, but not now.

Passed tests are in some of the following states:

- state "Successfully" – test is passed successfully with enough number of points
- state "Naughtily" – test isn't passed, not enough number of points
- state "Evaluate" - test contain open questions, which aren't evaluated by teacher
- state "Error!!!" – incorrect test end

Student use „Next" or „Back" buttons (if first or last question is not displayed) for moving through test questions. These operations one can use until clicking on „Finish" button or until appropriate time limit is expired. Special benefit of described system is ability for support of open wide questions including capability of draw or sketch in question by built-in graphics editor. This ability is not

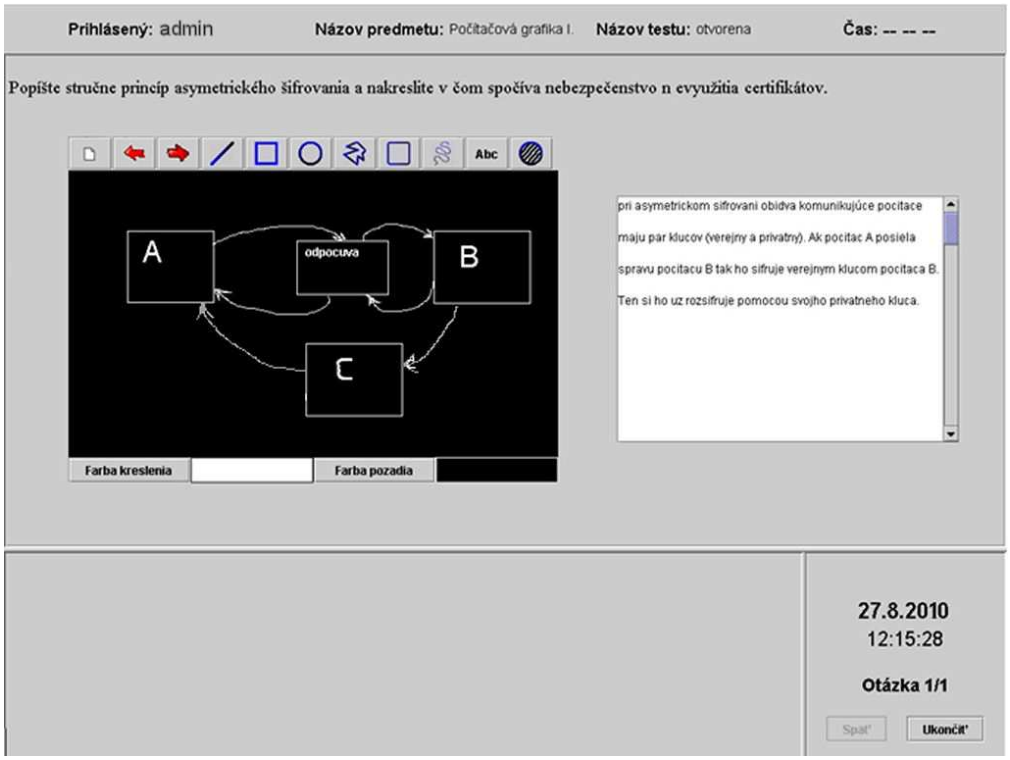

Figure 2. Example of open wide question with draw support

implemented in today-used systems like e.g. Moodle [1], but it is useful in computer graphics.

In figure Fig.2 is example of this kind of question. Student apart from eventuality text area using can answer to open wide question also by using a graphics. This question contain draw panel. In this panel student can use draw tools with basic geometric shapes (also text) for formulation of his answer. This question kind is very hard evaluated automatically. Presented system is waiting for teacher's subjective rating.

Objective questions scoring is able execute system automatically. However open questions can be in tests. These questions contain text area. Student formulates his answer to them. Open questions can contain also task in form of simple picture drawing or in form of sketch in partially drawn picture.

Evaluation of open question cannot be automatically opposite to other question kinds. Then it is implemented function for subjective teacher rating required.

Oftentimes results of appropriate test in specific class are important for teacher. Teacher can see summary table with appropriate information after click on appropriate function in context menu in list of subjects, tests and questions.

IV. CONCLUSION

The paper presents test system with ability for support of open wide questions including capability of draw or sketch in question by built-in graphics editor. System is implemented by Open source technologies. Programming language Java and database system PostgreSQL are freeware. It's possible use final software product legally and free in schools or other educational institutions. For server is recommended operating system LINUX. Also it's possible for using the MS Windows platform. On client you can use Linux or MS XP/Vista/Windows7 and then Java Runtime Environment with support of Java Web Start technology and web-browser Internet Explorer 6.x and higher, Mozilla Firefox 3.x (recommended) and higher, Opera 10.x and higher. Future work will be oriented to implementation of live video transfer to open questions during test.

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EMPHASIZING THE APPROACH TO PROMOTE INFORMATION TECHNOLOGY FOR ASSETS MAPPING AND DISASTERS RESPONSE PLANNING IN EDUCATION

M. Timovska
Protection and Rescue Directorate, Skopje, Republic of Macedonia
timovskam@yahoo.com

Abstract - Disaster risk management is most efficient when based on adequate ex-ante risk identification. Working with leading experts, the initial task will include a review of best practice in the field of using ICTs in disaster prevention and risk reduction, including information sharing platforms and emerging technologies. Therefore, the active participation of teachers and students in school disaster safety plans is desired for moving the world towards a safer living place and sustainable developed society. Our first approach to the data search was to identify key informants who could either provide us with data or link us to other sources, creating a snowball effect. Our search focused on one kind of data: data on disasters. In this case, the common denominator was attribution in geographic space of the data, the intended link between the datasets.

I. INTRODUCTION

If we look out carefully, we can see that the environment of the school is full of hazards, which might result in natural or man-made disasters. The incidents of the recent past provide evidence that school-children are much vulnerable for all these types of hazards. Hence, it is the right time for us to develop our own school disaster safety plans.

Our objective is to provide maximum protection to each of our students and the school community and to prevent possible damages that could happen during and after a disaster.

The establishment and training of a school disaster safety team, awareness creation, the analysis of the specific vulnerability and hazards of the school environment, the school and village mapping with evacuation routes and identified safe places, the cooperation with the community and finally practical exercises and evacuation drills will enable the school community to be prepared and to act adequately to save lives in case of an emergency.

Education is considered to be the best way for making a safe and disaster resilient society.

School is an important agency to reduce disasters risk through knowledge, innovation and education. Teachers and students play crucial roles in the development of a culture of prevention and preparedness, because they can transfer knowledge and skills to the family and community.

The safety of the school environment, a school emergency plan and preparedness of teachers and students are issues which require management capacities and leadership, therefore the school principle plays a crucial role. In this context, it is of high importance to find ways to infuse this new concept without burdening principals and teachers with heavy tasks and without creating fear in the students. *When everybody knows what to do and what not to do in a disaster event, lives can be saved and damages drastically reduced.*

A school disaster safety plan has a holistic approach to combat any disaster and encompassing all activities from prevention through crisis response. Not all emergencies can be prevented; therefore a plan needs to describe arrangements for responding to such emergencies that might occur in the school environment. A written description of hazards to which the school might be exposed are identified and this allows developing prevention and response activities to minimize them.

The head of the early warning team is responsible for informing the school about possible disasters and to give the evacuation warning. He or she has to prepare the warning signal (bell, public address system, megaphone, etc.) and operate it in an emergency. Other necessary material would be telephone or mobile phone, radio and contact information of the various local authorities like PRD, police, hospital, fire brigade etc.

II. THE SCHOOL DISASTER SAFETY PLAN

The school map is an essential part of the plan and requires a detailed situation analysis of the school. This article can be carried out by the teachers and later be shared with the students. The map shall show the following components:

- All physical structures as buildings, classrooms, staff room, laboratories
- Identified places to keep emergency equipments (Communication system, Fire extinguisher, First Aid boxes, etc.)
- Identified, undisturbed evacuation paths which are used in an emergency
- Identified safe place (assembly point) within or outside the school premises where students can be evacuated
- Classroom evacuation maps might be included to show the process of evacuation of students by columns, beginning at the tables next to the exit.

We can use the information technology broadcast to educate children where those areas are. We should also training them what they should prepare to pack. Also, when they learn about disasters and that they are partly caused by human, we will find preventive measures together so that they can protect themselves and others when there is a disaster.

As this threat has continued to grow, neither national nor international commitments have kept pace with the huge numbers of children affected. *The rights of all children, to both education and safety, must be safeguarded simultaneously.*

Goverments bear the moral imperative to ensure equal access for all children to education and to *safe* schools. These rights must also remain of foremost concern, even during emergencies.

The communication of information to the school is central to risk management.

Vulnerable child need to know about the hazards and risks they face, and the measures they can take to mitigate and prepare for potential disasters.

Therefore, the argument runs, they must be better educated about risk, and where existing messages are not understood these need to be repackaged so that they are easier to understand.

The School disaster safety plan should be simple and easily understandable. The document can be arranged to meet the needs of the school. It should include the following elements:

- Introduction about the school
- List of Members of the disaster safety team with their responsibilities and contact details
- Hazards and Resources identification in the school
- School and Community maps
- Programme for school disaster safety team training, mock drills and updating of the plan
- Do's and Don'ts during an emergency.

A second map should include the school environment or the community where the school belongs to. It should be produced in cooperation with parents and community representatives.

This map shall include the following components:

- Geographical characteristics (lakes, rivers, higher/lower grounds, hills, etc.)
- Transport (roads, bridges, boats, railway, etc.),
- evacuation routes and safe areas or shelters
- Buildings including the nearest available resources (Public Phone, Police station, Hospital/Health Center, Red Cross, Temple/Church, etc.)

The school map should be posted at various points in the school. This will help to show the nearest exit and evacuation route to anyone who looks at the map. The safe evacuation paths should be clearly marked with arrows. Alternative access routes to the school along with the nearest key infrastructures should also be included. Evacuation routes and emergency exits in the school can be indicated with signs.

A. Recognizing dangers threatening the school

The dangers (hazards) that are threatening to strike the school should be identified through discussion. The members of the School Disaster Management Committee will have the knowledge and experience of the dangers faced by the school. They can recall their past experiences and make a list of the dangers in the following Table. Specify the threat level of the danger as High (H), Medium (M), Low (L), or zero (0). The level of threat is a combined assessment of the frequency and

damage potential of a danger. Listing the past disasters will be useful to address the most recurring danger. Only the dangers that are relevant to the school should be listed. There may be problems (vulnerabilities) existing in the neighborhood that may make disaster management difficult. All such problems should be identified and the possibilities for solving them should be identified. A risk map can be prepared by showing the various problems existing outside the school and their relative location with respect to the school.

This risk map can be displayed in the school and it will be useful to understand the existing dangers in the neighborhood. The map should be oriented in a direction so that the teachers and students can easily understand the map. The North direction may be marked on the map.

B. Resources Mapping for Schools

All resources available within the school and outside the school for helping in disaster management should be compiled and listed. Some of the resources may be very close to the school and some may be far away from the school. These resources should be decided depending on the hazards affecting the school and vulnerabilities of the school. Facilities within the school may include evacuation area and shelter, equipment and materials useful for disaster response, trained manpower, awareness materials, etc.

A facility map can be prepared by showing the various facilities existing outside the school and their relative location with respect to the school. This map should show the location of nearest police station, fire station, hospital, ambulance, taxi stand, telephone booth, medical store, rehabilitation centre, assistive device production workshop etc. This facility map can be displayed in the school and it will be useful to understand the existing facilities in the neighborhood. The map should be oriented in a direction so that the teachers and students can easily understand.

III. IN THE PROTECTION AND RESCUE DIRECTORATE SERVER SOFTWARE

In the Protection and Rescue Directorate server software Lotus domino was installed in 2007. The server has the following applications:

- application for electronic post – enables electronic communication within the Protection and Rescue Directorate (PRD) at local level, with the local community (outreach) sections for protection and rescue but also with external subjects.
- application for e- archive – enables e-registering of the administration book of the protection and rescue directorate in accordance with the latest world trends and efforts of the government of the Republic of Macedonia for wider use of information technologies in the work of the state institutions.

A GIS is a framework that allows the user to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts. Such visual outputs allow an understanding of problems and answering questions in a way that is quickly understood and easily shared. It is useful to view GIS as a process rather than a thing. A GIS supports data collection, analysis, and decision-making and is far more than a software or hardware product. It can be used in many different disciplines and allows application of a geographic approach to the methods. Geo-Information System (GIS) in the Protection and Rescue Directorate is a support for creating data base for areas of interest of the Directorate but also gives a graphic support when managing the resources in the field. Geo Information System is in its beginning phase of development due to the lack of financing. In 2008 a license for MapInfo 9.0 application was procured and it contains few rasters and vectors components. This application is not a server one and it is not web based.

The final projects for geo information system to be established in the Protection and Rescue Directorate should have few components:

- Web based client application consisted of three modules
- Module for access, which enables the system administrator to manage the data base,
- Attribute module which enables registering and searching relevant data by using the GIS web search machine, and
- Spatial module, which enables identification and data transfer in attributive module by using various graphic leer (land slides infrastructure, topographic maps, real estate etc)
- Server for accommodating the GIS data base

- Cartographic foundation (topography maps with a scale of 1:25000, digital maps in vector format to have data about demography, relief(elevations of surface), hydrographic, communications and maps for the flora and fauna at the territory of Republic of Macedonia and other data if necessary.
- Commercially available software for managing spatial data(server and client part)

This system should also enable global positioning of the resources in the field i.e. GPS with the system E-112. In this way a full picture is received about the current situation and the situation with the resources in the field which enables easier decision making by the Main staff (HQ).

A. Argos system

ARGOS is a computer support system which enables to asses the consequences from nuclear, radiological, biological and chemical catastrophes as well as weather analysis and monitoring the conditions. Accordingly, the system could be used to obtain a review of the full situation and a full picture of the consequences from the emergency. Main goal of the assessments are the emergencies (accidents) but this software could be used in case of incidents caused by terrorists' attacks related to transport from the nuclear and chemical industries, transport of dangerous substances etc.

The system also enables intensive usage of the Geo- information (GIS) to display data on geographic maps which will make easier to operational function of the Protection and Rescue Directorate. ARGOS system is operational and has been established in 8 European countries by which as a donation it was also given through DEMA to Republic of Macedonia. In Republic of Macedonia one server and 5 clients' computers have been installed and they have installed ARGOS system and are also operational (in use). Installation of web based application is in its final phase. This application will be used for certain analysis, but also data exchange with the other countries that use the system. Technical abilities (characteristics) of the system: RIMPUFF model is a short and medium size model of the ARGOS system. This model could calculate the dosages of:

Gamma radiation, concentration in the air and depositing(sedimentation) in the soil

Spread / dispersion of chemical material in the air

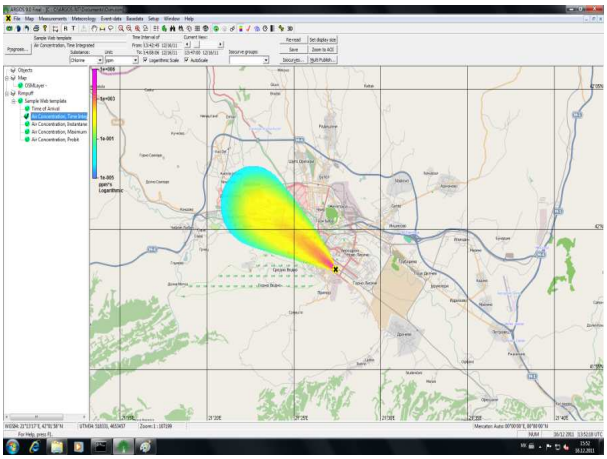

Figure 1. Assessment of movement of a contaminated cloud in case of major damage, Skopje.

Based on the model, simulations, analyses, prognosis and calculations of the speed of dispersion of the chemical substances in case of chemical major damage or gamma radiation in case of nuclear and biological catastrophe could be carried out. This data are obtained in the GIS system represented in a time unit. In this way high operational level is being achieved by the PRD such as: *Evacuation in threatened/ jeopardized areas.*

In order for the system to be able to make the assessments, it is necessary to receive data about the weather conditions about the location where the NBC major damaged occurred.

Long range models of atmospheric dispersion can also be assessed, to make analyses and prognosis, but a cooperation with the ARGOS company is necessary especially because of the different weather situations in various parts from a wider region or even a continent.

Such models have been developed by DEMA because of the gamma radiation from the nuclear catastrophe in Fukoshima.

- *Urbane dispersion or so called URD model* enables to make NBC scenarios for urbane environments, so one of the calculations' factors calculates the elevation factor, i.e. residential buildings.

The result about the dispersion of the contamination in the air will be different if there are higher/ bigger buildings then in a region without any buildings. The same goes for the various reliefs (terrain elevations). Accordingly,

this model is a 3D model and to make a simulation it is necessary to have elevation data about the terrain.

Application to assess the daily risk from fire appearances in an open area based on methodology for daily risk of fire occurrences in an open area

Accordingly its preventive role, Protection and Rescue Directorate makes risks assessments about fire threats in an open area. Computer application has been developed and it makes the assessments in a faster and more efficient manner. Application was created in 2010 and was made operational before the season of fire occurrences. It is a web based one and is being hosted by server in the PRD. It was actively used during the summer when the risk of fire occurrences is much bigger.

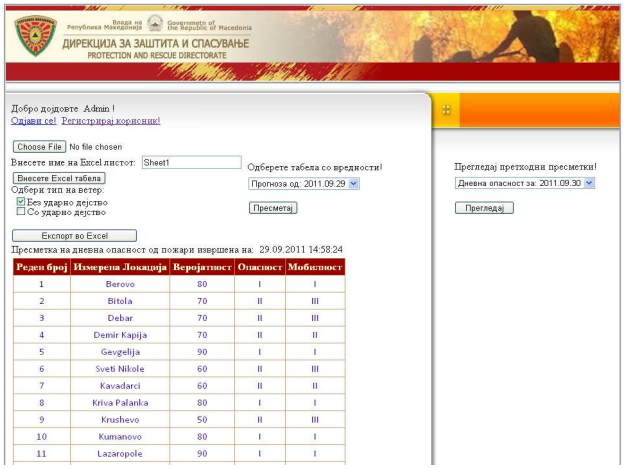

Figure 2. Application about risks assessments fire threats in an open area

IV. CONCLUSION

Preparedness is an important investment against natural and man-made disasters. It buys the humanitarian community valuable time to respond more effectively and gives vulnerable people a buffer against the repeated crises which strip away their resilience and push them deeper into poverty. The Schools can save lives, crops, property and achievements in education and healthcare by using preparedness thinking to be aware of risks, to reduce them and to plan ahead to combat them. It means we can use our limited resources as wisely and effectively as possible to stop a bad situation becoming worse. As our changing climate means more frequent extreme weather, it is ever more important that we can both raise a warning flag and be ready to respond to it. With good information, strategic thinking and careful planning we can work together to save lives and livelihoods. Prevention of disasters begins with awareness. Awareness is the first step towards action. Schools are the best venue for creating awareness about natural andman made disasters and how to prevent and mitigate them. School children and teachers can serve as messengers for building a culture of safety in the school and outreaching to the community.

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NOTES ON EXPERIENCES WITH THE LEARNING REGISTRY

M. Beňko and L. Samuelis
Technical University of Košice, Department of Computers and Informatics, Košice, Slovakia
ladislav.samuelis@tuke.sk

Abstract - Learning Registry (LR) is an open network for the discovery and distribution of learning resources between producers and consumers. It supports building applications to harvest and analyze the LR-associated data for the unique needs of users. The LR will store more than traditional descriptive data (metadata), it allows sharing of ratings, comments or downloads. This paper introduces the LR architecture, the basic technologies and describes some experiences with the LR node installation and usage.

I. INTRODUCTION

Learning Registry (LR) is an open source technical system designed to facilitate the exchange of data, and an open community of resource creators, publishers, curators, and consumers who are collaborating to share resources, as well as information about how those resources are used by educators in diverse learning environments across the Web [1]. In other words, the main goal of LR network is to capture, share, and analyze learning resource data to broaden the usefulness of digital content to help educators and learners. LR is not a website, repository, search engine or replacement for the existing sources of on-line learning content.

II. STRUCTURE OF THE RESOURCE DISTRIBUTION NETWORK

The LR network consists of connected master-master nodes that contain learning resource documents and are capable to distribute them. Every node implements some services that determine the node's function. Consumer agents connect to one or more of these nodes to download resources for their own processing. Likewise the producer agents connect to nodes to upload new resource documents or to update information about already existing resource documents.

The resource documents are held in JSON format [10], so additional agents' processing is relatively easy. Term *resource document* is a learning object description, with *metadata* and *paradata*. The actual learning object can be some website, video or anything else that is reachable through the web. LR is not another standard dictating packaging of learning objects or dictating the structure of them. LR only helps users to know about their existence.

A. Network nodes and their services

Node is the basic building block of the resource distribution network. Its main function is to process and store resource data. Nodes are usually held by different organizations and are focused on collecting resource data of learning objects under some criteria. Every node has its own description and can provide five different classes of services [4]:

- **Publish Services**: this service uses external agents for injecting new resource data into network. There can be differences how node is supporting publishing but all nodes have to use the same publication data model.
- **Access Services**: also used by external agents but for discovering, accessing and obtaining resource data from the distribution network.
- **Distribution Services**: as was written above node is storing resource data, so when another node finds out that it is interested in resource data held by another node are also, it should use these services. Distribution services are for transfer, replication and synchronization resource data from source node to destination node. Independent paired services are used for bi-directional synchronization.
- **Broker Services**: the state of resource data uploaded to node is not its final. Conversely updating descriptions of resource data is expecting. Broker services operate at node to augment, transform or process resource data to create new or updated resource data.

- **Administrative Services**: are used to obtain node status or trigger node administrative actions.

We distinguish two types of nodes. First is the **common node**, which provides any service from the list. There is only one restriction, i.e. if the node provides distribution service, it should be connected only to nodes in the same network. The second type is the **gateway node** and its main goal is providing distribution service to another gateway node in another network. Only one of this gateway-to-gateway connection may exist between *the networks*. Gateway node may also provide administration services, but publish, access and broker services are not permitted for this type of node.

B. Distribution networks and communities

Figure 1. shows an example how nodes can be configured into networks, and networks into communities.

Distribution network consist of connected common nodes and gateway nodes that are connecting to another networks. Group of network is then creating a *community*. Community can be **social** or **closed**.

- The **social community** provides connectivity to other social communities and network that belongs to social community may connect to other network that is in same or another social community.
- The **closed communities** ensure no connectivity outside the networks. Closed communities are useful for developing and testing purposes.

This layout determines common features that are described in network and community policies. Another benefit of dividing to networks and communities is in design of flow of data resources. Figure 2. shows an example: in one community is network with uncurated resources, network with curated resources and commercial networks with only one producer for each. If the uncurated network has a gateway to the curated network, and there are gateways to each commercial network, resource data can flow in only one direction, e.g. resource data for open networks into the commercial networks, but not reversely.

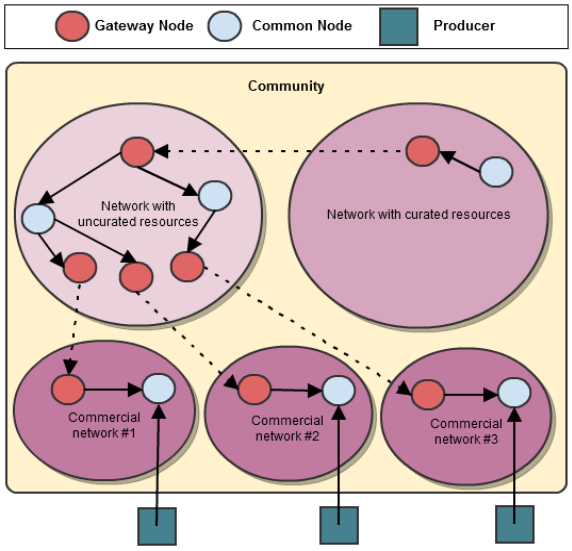
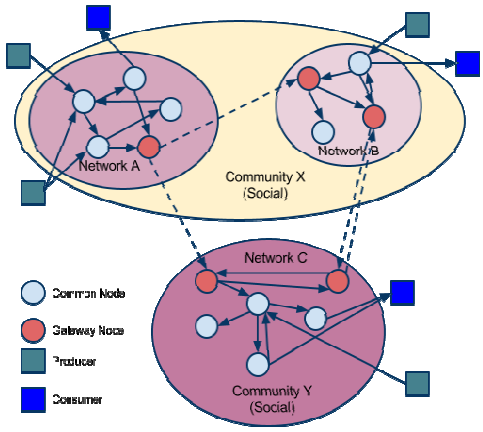


Figure 1. Example of network topology diagram

III. PARADATA AND METADATA IN RESOURCE DATA

Paradata is relatively new concept to metadata [2]. What is the difference between metadata and paradata? Paradata include activity streams and activity streams include metadata.

- Traditional **metadata** involve classification of *the actor* and of the *object.*
- **Activity Streams** are activities of users. In its simplest form, an *activity* is represented by an *actor*, *a verb*, *an object*, and *a target* [9].
- What **paradata** added to concept was the possibility of expressing *aggregations* – it is possible to express aggregated community interactions with *object* or individual user



interactions with aggregated group of *objects.*

Figure 2. Flow of data resources in LR networks

Next difference is the format that paradata and metadata use. Metadata are usually written in XML, it uses schemas for standardization, for example well known Dublin Core [8]. On the other side activity streams and paradata use JSON (Javascript Object Notation) [10] syntax what can be described as lightweight open standard designed for human-readable data interchange. It is derived from the JavaScript language for representing simple data structures and associative arrays, called objects.

Figure 3. shows an example how paradata notations could look like. Basically this says "Over the course of May 2011, high school English Teachers used the book 'A Tale of Two Cities' 15 times for teaching activities." In the example we can distinguish a metadata actor (high school English teacher), a metadata object (URL of the book), an activity stream action (taught on the specific date) and a paradata aggregation (measure, count).

For sharing basic facts about something it is best to use traditional *metadata*, for sharing specific actions that individual did is represented by *activity streams* and for sharing actions that multiple people did, or multiple things that one person did one should use *paradata* format.

To create a LR document that represents metadata we add resource locator (URL to resource), add some keys that will describe resource properly, sign them with resource producers' identities (curator, owner, submitter, and signer), and add metadata section and this entire envelope in JSON format. Complete document can be signed and uploaded to LR node.

```
   {
     "activity": {
       "actor": {
         "objectType": "teacher",
         "description": [
           "high school",
           "english"
         ]
       },
       "verb": {
         "action": "taught",
         "measure": {
           "measureType": "count",
           "value": 15
         },
         "date": "2011-05-01/2011-05-31"
       },
       "object": "http://URL/to/tale-of-
two-cities/"
     }
}
```

Figure 3. Paradata in JSON format

IV. TECHNOLOGY SUPPORTING LEARNING REGISTRY

There are basically two main thoughts that formulate LR. The first one is the JSON format, which was introduced in previous section. The second one is the general purpose high level programming language Python [11]. Both of them are designed to be human readable and therefore the understanding and manipulating with LR is kept simple.

Couch Database [7] is used for organizing JSON documents and the construction of server was simplified by using of Pylons [6] framework. Both of them have sufficient documentation and support. Server functions covers open source Web server Nginx [12].

LR developers' group created detailed installation instruction for Linux, Windows and Mac OS [13, 14, and 15]. Also there is available for download an image of Ubuntu OS with already installed node on it, which can be imported and started on virtualization software like VMWare [16] or VirtualBox [17]. Developer groups are opened for discussions [5] and extensive technical specification document with description of every detail is also available for reading [4].

The Amazon Elastic Compute Cloud [19, 18] may be utilized also (Amazon Machine Image) for supporting the establishing of a special type of virtual appliance.

V. EXPERIMENTS WITH THE LR NODE INSTALLATION AND USAGE

The experiment consists of creating a separate common LR node, which would be able to run administrative services, as well as publish and access services. We installed firstly a LR node on Windows as described in the installation guide [14].

We set simple a task, to retrieve node description. Description of the LR node should be available on URL *https://[node URL]/description*. In our case Nginx server returned error - site unavailable. Using IP address of our LR node server and port *5984* we were able to access utility *Futton*, which is part of CouchDB and is used as administrative tool. Using *Futton* we could retrieve node description document, but that was useless while administration of node is not public and should be set to operate only from localhost.

The basic way of operation of the LR node is as follows: server Nginx recognizes requirements

(e.g. http request), sends it to Paste server [24] that triggers execution of an LR Python script and returns the result back to Nginx server in the form of either HTML or JSON document. This solution was not stable and in the next step we decided to continue testing the LR in Linux platform.

We became familiar with the CouchDB settings. Since Linux virtual machine lacked a graphical interface, we decided to install Xfce desktop environment [22] along with a web browser, which we used for accessing *Futton* utility. We set our node to be common node of the LR network.

We left our LR node without any connections to other nodes since the next step was only to create, upload and download back again a JSON document of the learning resource. In our experiment we created a simple JSON document containing link to the learning resource and other required information (e.g. owner, submitter, keywords). Later these documents should be generated through external agent's systems (for example a plugin in LMS).

Upload is a bit more complex. It uses a python application *LRSignature*. This application uses generated pair of public and private key to sign JSON document and then uploads it via publish service to the LR node. Public key should be reachable through Internet and it should be saved in more instances to avoid a situation, when the LR node could not reach it while checking the producer's identity. Signing and publishing document was successfully tested on Linux and Windows. Figure 4. contains the shell for the publish command in Windows.

```
   type resource.json | python -m
LRSignature.cmd sign
   --key
"DC19BE6FA221AA9B0EC85A875DBE85978685AA67"
   --key-location
"http://www.example.com/public-key-win.txt"
   --passphrase "SecretPassphrase"
   --publish-url "http://[node URL]/publish"
--gnupghome
c:/Users/[currentUser]/AppData/Roaming/gnupg"
```

Figure 4. Signing and publishing learning resource document command in Windows

Obtaining learning resource documents is possible through more options: *obtaining* document by ID, *harvesting* documents by JSON or metadata (the 3rd command in Figure 5.) or *slicing* documents by keywords, datum range, identity (the 4th to the 6th command in Figure 5.). In order to test *harvesting* and *slicing* it is necessary to have large set of diverse documents stored on the node. We tested few documents for *obtaining* document through its ID; it is the first command shown in Figure 5. In the next step we implemented a method that publishes automatically learning resource documents along with its paradata.

Obtain:

```
1. curl -X GET "[nodeURL]/obtain?
by_doc_ID=true&
request_ID=[Document ID]"

2. curl -X GET "[nodeURL]/obtain?
request_id=[Document URL]"
```

Harvest:

```
3. curl -X GET
"[nodeURL]/harvest/metadataformats"
```

Slice:

```
4. curl -X GET "[nodeURL]/slice?
any_tags=science"

5. curl -X GET "[nodeURL]/slice?
```

Figure 5. Obtain learning resource document by ID command

Paradata can be attached to learning resource document with two options: *inline* or *linked*. *Inline* paradata object (or array of JSON keys and values) is the value of key *resource-data* in learning resource document. In options *linked* the key *resource-locator* is the value of an URL link to a separate JSON paradata document stored somewhere else.

We use our own simple LMS for experiments. In this case teachers have to create assignments for students and students have to deliver the results online. Teachers can view then and evaluate the results. System is built on HTML, PHP scripts and uses MySQL database. We implemented a method for creating, signing and publishing learning resource document (PHP script) for students and a method for creating paradata document for teachers to evaluate students' works. Paradata document is held in LMS and learning resource document has options *linked* and the *resource-locator* contains URL link to the paradata document. Further progress is aimed towards the implementation of more methods in order to gain more diverse paradata. With larger set of documents it is possible to test the remaining two options for obtaining documents from a node. The node should be connected then to *LR sandbox node* for testing purposes.

VI. CONCLUSION

LR enables enhanced opportunity for exchange knowledge through Internet. It is supported by organizations as Advanced Distributed Learning Initiatives [20] and Benetech [21] through sharing their huge repository of books. LR could empower inter-universities relations with exchange of their learning materials. LR has big potential in use for personalized learning environments, which could automatically select more specific resource for students. There may be more possibilities how LR can enrich the way we educate students.

VII. ACKNOWLEDGMENT

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CONTENT KNOWLEDGE AND MATURITY IN MATHEMATICAL AND COMPUTER SCIENCE EDUCATION

J. Stojanov, Ž. Stojanov
Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
jelena@tfzr.uns.ac.rs, zeljko.stojanov@tfzr.rs

Abstract - This paper specifies content knowledge and maturity as basic elements of the education in two closely related disciplines, mathematics and computer science.

I. INTRODUCTION

An evolutionary chain of languages, made by Robert Logan [1], contain six components: speech, writing, mathematics, science, computing and the Internet. Globally, writing and mathematics emerged at the same time, approximately 3100 years BC. Science appeared after 1000 years. Computing and Internet have appeared in the last century. Logan develops the hypothesis that the last two languages are of the same importance as any of the previous languages in the chain.

Writing is closely related with reading and is defined by a script and writing/reading rules. Some aims of the educational circles are fluency, comprehension and use of reading in learning different teaching facilities.

Mathematics is one of the most important components of school's curriculum. However, the content, teaching methods and resorts are under permanent criticism and changes. There is a general agreement that the results of mathematical teaching are not successful enough.

The world we live in is mathematically very complex. Many mathematical words and expressions are widely used in everyday communications. The use of money, time measuring, distance concept, and many others, are strongly based on mathematics.

Relation between mathematics and computer science is significant, and their interaction multiply affects on mathematical education.

II. MATHEMATICAL EDUCATION

There are many approaches in improving mathematical education, but with the same goal. A commitment of the teacher is decisive, especially his willingness in formal and informal education to becoming an expert in mathematical content, mathematical maturity, pedagogy, and computer science applications.

Mathematical content knowledge is roughly speaking problem-solving skill. The focus is on learning a lot of arithmetic, algebraic and geometric procedures and their usage in solving a wide range of mathematical problems.

Mathematical maturity involves understanding, solving encountered mathematical problems, posing problems, proving theorems, precise mathematical communication, reasoning and logic. Maturity is evident also in being able to use general mathematic knowledge and to make connections over a wide range of disciplines. Maturity is not specific to any particular content area and it is independent of amount known facts.

Progressions in content knowledge and maturity are mutually independent, however of the same importance. *A person may have a high level of math content knowledge and a low level of math maturity, or vice versa. Figure 1 provides an example of two hypothetical students: Student A (S-A) and Student B (S-B)* [2].

Mathematical teacher should be an expert in both, content knowledge and maturity, and more, in mathematical pedagogical knowledge. However, some researches [3][4] show rather low level of pedagogical knowledge and mathematical maturity.

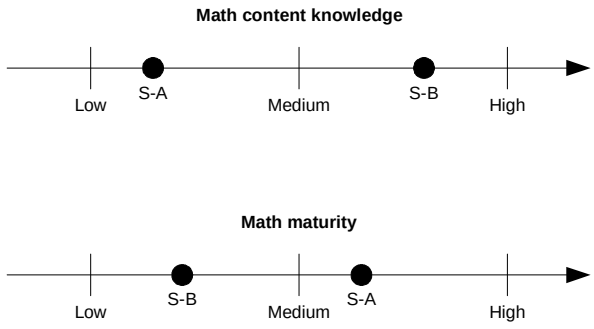

Figure 1. Separate expertise scale for math content and math maturity [Morsund]

Reading and writing mathematical contents are very useful, especially for understanding. First, the aim is to learn reading mathematical content that is rather different of reading in oral language. For the sake of mathematical maturity, there should be another mode – reading to learn mathematics. Burns stated: *Writing in math class supports learning because it requires students to organize, clarify and reflect on their ideas – all useful processes for making sense of mathematics. In addition, when students write, their papers provide a window into their understanding, their misconceptions, and their feelings about the content there're learning* [5].

Cognitive development is very important part of education. Although it is a continuous process, there are four stages in Jean Piaget's cognitive development model [6]: sensorimotor, preoperational, concrete operations and formal operations (abstract thinking). Piaget's approach is based on construction/constitution and analysis of mental models. Moving through these stages depends on nature and nurture as hereditary and environmental factors. Progress through the first two stages considers understanding of the environment and initial usage of symbols. It is more dependent on nature. Influence of the nurture is essential in stages of concrete and formal operations. The third stage implies logical thinking, systematic manipulation of symbols and reversible mental actions, i.e. operational thinking. In mathematics, it is a content knowledge level. Abstract and systematical thinking, problem solving and testing hypotheses are some of the characteristics in formal operations stage, which is open-ended, and in mathematics is related with maturity. Biological mature is only the basis for the last stage, but favorably environment and support are necessary. Moreover, cognitive development of one person may progress differently in separate disciplines. This leads to formation of different cognitive expectations in disciplines such is mathematics, especially in geometry and probability.

Generally, patterns can be stored in human's mind, so they can be thought as some models of information, knowledge, procedures and data representation. Moursund stated: *Learning is a process of revising models (perhaps even to the extent of discontinuing use of a model), and building new models* [2].

Through the number line concept, an example of assimilation and accommodation of mental model will be presented. A very young child does not know a notion of number, but it has a good sense of quantity. He knows very well witch pile contains more candies. At kindergarten, he learns a notion of number by comparing sets with same number of different elements. At this moment, a mental model consists only of small counting numbers (up to 10) represented by some "abstract" sets. (And this is a preoperational stage.) Next step is setting up the numbers on the line, with a remark on open right end. Significant accommodation of the model is introduction of zero and negative numbers. This model allows adding and subtracting, so here is the beginning of concrete operational stage. Further, there are accommodations for fractions and rational numbers, and the last one, the introduction of irrational numbers. The last stage, abstract thinking involves cognition of continuity on the number line, and facts that unit measure and direction are sufficient for its defining. Assimilation and accommodation toward math content is presented at figure 2.

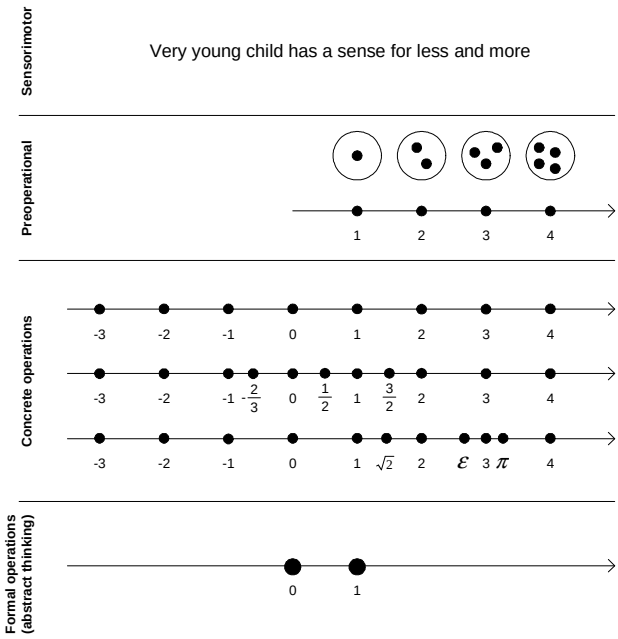

Figure 2. Assimilation and accommodation of mental model through the number line concept

Solving problem is a major issue in mathematical education. Unfortunately, it is often a major goal of both, the teacher and its students, to reach the solution of a posted problem. In that purpose, reading to learn mathematics tends to be a looking for an example that seems to be similar enough. However, it develops only solving skills and contributes sometimes to content knowledge. It should not be taught to solve problem of this or that kind, but to develop a general attitude for the solution of problems. For the sake of mathematical maturity, and in contrast with an algorithm, some concepts of heuristic strategies should be involved in solving problems: drawing a picture, breaking a

big problem into smaller, trials and errors, developing a similar but simpler problem, library research. This means a plan of action that may help, but is not guaranteed to help. The solving should have the main purpose of increasing general knowledge, and not the solution.

An influence of the computer and information science on mathematical education is evident, even in the teaching curriculums. Sometimes, it is justifiable, but sometimes it is not. For example, procedure of square root calculation is completely through. However, it is comprehensible. On the other hand, it provides significant help or even complete solutions for wide range of problems, so why not to use it? It is hard to harmonize that offer with basic principles of mathematical education such as mathematical thinking and solving problems.

Relation between mathematics and computer science is significant, and their interaction multiply affects on mathematical education.

III. COGNITIVE DEVELOPMENT IN COMPUTER SCIENCE EDUCATION

Computer science discipline was born in the early 1940 with the confluence of algorithm theory, mathematical logic and the invention of electronic computer [7]. The term *computer science* is later interchangeably used with terms such as computer science and engineering, computing, and informatics. The main effort in computer science discipline has been directed toward human-made processes, especially to information processing systems and machines. The main difference between computer science and computer engineering is that computer science is focused on analysis and abstraction, while computer engineering on abstraction and design [8]. The term computing is used to embrace all of computer science and engineering. The short definition of computing, taken from [8] is:

The discipline of computing is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application. The fundamental question underlying all of computing is, "What can be (efficiently) automated?"

The question stated in the previous quotation is one of the most inspiring questions in human history, and it suggests that *Computer Science* should have existed long before the advent of digital computers [9]. The roots of computing are influenced by mathematics and engineering (see Figure 3.). Analysis in computing is influenced by mathematics, while engineering influences design. Moreover, there are formed computer departments in academia that have mathematical or engineering emphasis. Computer science departments with a

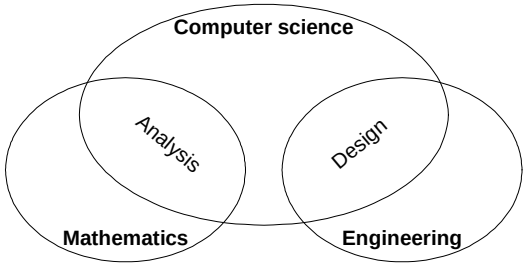

Figure 3. Influences on computer science education

mathematics emphasis and with a numerical orientation are usually named as computational departments.

However, it is considered that computer science has much closer relationship with mathematics than many scientific disciplines. This is consequence of the influence that mathematical issues such mathematical logic, Boolean algebra for circuit design, category theory, algebra, algorithms for solving equations and other classes of problems in mathematics have on early development of computer science field. Some academicians try to include computer science discipline in mathematics, while others propose that mathematics is a part of computer science, but neither of these inclusions is valid [9]. It is betted to describe the relationships between mathematics and computer science as mutual impact, and to consider different roles these disciplines have on person's education. Although both disciplines are necessary for the development of human society, the visibility and the case of use of computer science advancements tend to get the credit in society [2].

Computer science is fundamentally based on computational thinking that is skill for everyone, not just for computer scientists [10]. From the early childhood, humans gain analytical skills and computational thinking through reading, writing and basic arithmetic. Wing stated the characteristics fundamental to computational thinking [10]:

- *Computational thinking is related to conceptualizing, not programming*. Therefore, it requires thinking at multiple level of abstraction.
- *Computational thinking is fundamental, not rote skill*. Interesting challenge is to make computers think like humans, but without devolving humans to rote behavior because of computer assistance in daily activities.
- *Computational thinking is a way that human think, not computer*. It is related to how humans solve problems. We should

never forget that humans design and instruct computers to solve problems.

- *Computational thinking complements and combines mathematical and engineering thinking*. Mathematics provide formal basis for computing, while engineering aspect is related to building systems that solve problems and interact with the real world.
- *It is based on ideas, not artifacts*. The basis for computing is human ideas that are further realized through artifacts such as software and hardware.

Both computer science and math education begin in the early childhood. Through playing children gradually learn some concepts from math and computing. However, there is a significant difference between math and computer science education. Math education is driven by detailed scope and sequence, state and national standards, books and other materials tied to standards, and state and national assessment [Moursund]. In contrast, education in computer science comes from combination of formal and self-instructions. The samples for informal, or self-instructed education in computer science are activities such as playing computer games, or searching for content on Internet. Through these activities, children gain some sense and knowledge about using mouse and keyboard for particular purpose. Informal and self-instructing education also includes using digital devices such as cell phones, cameras, music storage and playback devices, and so on.

Based on the previous discussion, computer science education depends of many people that influence children growth. Formal education comes from regular classroom teachers or computer technology specialists, while informal education comes from parents, older siblings, colleagues in school and friends.

Computer science education can be viewed through cognitive development of students. Jean Piaget, biologist, philosopher, and behavioural scientist, developed one of the most significant theories in cognitive development [6]. This theory is based on the process of coming to know and the stages through which is knowing ability gradually acquired. Piaget proposed four sequential stages of development: sensorimotor stage, preoperational stage, concrete operational stage, and formal operational stage. Lutz and Huitt [11] discussed adoption and extensions of Piaget's theory of cognitive development in many scientific disciplines. Following the reasoning that led to math cognitive development scale Moursund [2] developed a computer science cognitive development scale with the following stages:

- *Stage 1: Piagetian Sensorimotor***.** Informal education usually provided by parents and other caregivers that contribute to general progress in sensory motor development and becoming acquainted with ICT environment.
- *Stage 2: ICT Preoperational*. It includes both informal and formal ICT education in preschool. This stage is characterized with considerable development of speed and accuracy in using mouse, touch pad and similar multimedia devices.
- *Stage 3: ICT Concrete Operations*.It included both informal and formal education, but with increasing importance of formal education. During this stage children star to think logically, which is demonstrated through systematic and logical manipulation with symbols related to concrete objects. In addition, at this stage children start to use variety of software tools, as well as to work in graphical manipulation environments like studios for working with digital photography.
- *Stage 4: CS Formal Operations*. Open-ended developmental stage with begins of systematic and abstract thought. Requires ICT knowledge, skills and speed in representing and solving problems at the level of high school graduate students. This stage continues into adulthood and requires a solid college-level CS course.
- *Stage 5: Abstract CS Operations*. Characterized with content proficiency and maturity at the level of contemporary CS texts at senior undergraduate level. At this stage are situated capabilities to solve high level CS problems posed by others.
- *Stage 6: Computer Scientist*. This is very high level of CS proficiency and maturity. At this stage is situated research work that advances the field, and work related to posing and solving problems at the level of contemporary frontiers.

IV. CONCLUSIONS

Math and computing education are closely connected, which is evident from long history of mathematics and computing. Many people and organizations are involved in development and change of these disciplines. Changes start in mathematical and computer science education and

influence all areas where these disciplines are used. The major role in changes in both disciplines plays ICT that provides powerful hardware and networking infrastructure, information retrieval systems and tools that can solve or help in solving a wide range of problems. Changes should increase proficiency and maturity of pupils and students in both mathematics and computing. This paper discusses development of content knowledge and maturity in mathematics and computer science and presents cognitive development scales for both disciplines.

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INCREASE OF MOTIVATION OF STUDENTS BY APPLYING MULTIMEDIA CONTENT IN TEACHING

S. Karanjac, Lj. Knežević, E. Eleven, J. Gavrilov, D. Ostojić
Technical faculty »Mihajlo Pupin«, Zrenjanin, Serbia
erikae@open.telekom.rs

Abstract - This paper will present the possibility of introducing multimedia content within the subject: "Svet oko nas" (World around us). Also it is shown the way how the resarch of motivation can be worthy tool for grading success of applying multimedia content.

I. INTRODUCTION

According to educational plan and program "Svet oko nas" is a subject that is taught in the first and second grade of primary school in Serbia. In this course students are introduced to elementary scientific concepts from the natural and social sciences, to master the techniques of early cognitive processes and the initial learning methods and techniques. It is necessary to promote children's interests, questions, answers and ideas about manifestations, processes and situations in the environment according to their cognitive developmental abilities, encouraging the research and development activities for children, encouraging them to observe cause-effect relationships, features and processes, the basic different parameters, free expression of their observations and predictions and self-solving of simple problem situations, develop various social skills and acceptance of basic human values as criteria for behavior towards others, developing responsible attitude towards the environment and interest in and readiness for its preservation. [1].

As part of this work it will be explored (the introduction of multimedia in teaching) the effectiveness of learning by electronic means, motivation for this type of work and is it easier to remember the material using images in teaching Svet oko nas in the second Grade in traffic areas.

Multimedia is the integration of multiple single media elements (audio, video, graphics, text, animation, etc.). [2]

Given the growth of multimedia and the inevitable role of the Internet, possibilities greatly expand the application of modern teaching aids in both the primary and secondary schools as well as high schools and colleges. Increasing the efficiency of teaching process to shorten the time, effort and resources is linked not only with the development of modern methods of learning, but also with the introduction of interactive multimedia applications in education.[3]

II. THE RESEARCH PROBLEM

The research problem relates how to stay trendy and motivate students to work, and how to ease memorizing of the contents. The core problem is the motivation of teachers to work on their subject and how to transfer the knowledge to students. The introduction of multimedia into the teaching of "Svet oko nas", we enable the whole new working environment, a different and more modern approach to the material, under the assumption that students will be more interested, because they see it as a kind of a game.

III. THE SUBJECT OF RESEARCH

In order to reach the subject of research which is the introduction of multimedia contents in the teaching of Svet oko nas we have to start from educational plan and program and what is required by them as well as the content of textbooks. Then we can adjust the multimedia teaching of the subject and the material to be processed within the same.

A. The teaching plan and program for the second class

The purpose of education is quality education, which enables the the acquisition of literacy necessary for life in a modern and complex society, and develop knowledge, skills, attitudes and values that enable students to successfully meet their own needs and interests, to develop their own personality and potentials, to respect other persons and their identities, needs and

interests, with the active and responsible participation in economic, social and cultural life and contribute to the democratic, economic and cultural development of society.

The main purpose of study in a integrated teaching subject Svet oko nas is that with gaining knowledge, know how or skills children develop their cognitive, physical, social and creative skills while also building the attitudes and values of the society in which they grow up as well as the wider social community.

The overall objective of the subject of an integrated teaching subject Svet oko nas is that children learn about themselves, their environment and develop the capacity for responsible life in it. [1].

B. Analysis of the content in traffic for 2nd grade

According to the educational plan and program in this topic it is necessary to restore the courses from the first grade of elementary school related to traffic. Then familiarize students with the types of transport, means of transport, order, safety and behavior in traffic as well as the basic traffic signs. [1].

1) Summary of lessons within thetraffic topic

According to the textbook for the second grade there will be processed the following teaching units that are displayed with a brief description of contents.

2) Traffic and traffic behavior

- In this part to the students we represent participants in traffic.
- We talk about the safe moving of traffic and which is a safe way to cross the street. [4]

3) Traffic signs

- The concept of traffic signs;
- The types of signs;
- Signs of orders or prohibitions;
- Warning signs;
- Signs of the notice. [4]

4) Work book

In the workbook there are questions relating to the proper motion as well as several signs that need to be identified. [5]

Figure 1. Workbook layout

C. Layout of multimedia content that will be used during the research

Multimedia content that will be used during the research was done by the book “Svet oko nas” and follows the plan and program for second grade. Multimedia presentation has the following structure:

Figure 2. Name of teaching unit

Figure 3. Participants in traffic

Figure 4. Safe movement in traffic

Figure 5. Traffic signs

Figure 6. Signs of command and prohibition

Figure 7. Signs of warning

Figure 8. Signs of notification

IV. THE AIM OF THE RESEARCH

The goal of this research is to prove that the introduction of multimedia in teaching of "Svet oko nas" we can increase students' motivation for the subject itself. Also, we can say that one of the goals is to facilitate the memory contents using images as the main outcome wich gives better test results.

V. HYPOTHESES IN RESEARCH

The main hypothesis is:

Motivation of students is increased with using of multimedia content within the subject Svet oko nas.

The other hypotheses are:

- Students remember more easily already taught content using multimedia material.
- Better results of evaluation by presenting contents through multimedia.

Will the main hypothesis of this research will be proved or disproved it will be concluded from the results of the survey. The other hypothesis will be proved on the bases of knowledge assesment by test.

VI. ORGANIZATION OF RESEARCH

Research will be realised in elementary school „ Đura Jakšić" in Zrenjanin. This school has three classes for each year of schooling, research will participate in of two second grade classes II_1 and II_3, because of same number of students in the control and experimental group. It will be used a standardized surveys and test knowledge assessment designed by the researchers.

"The survey in educational research is a procedure in which participants raise questions about the facts of scientific interest for a pedagogy that are known to participants, or issues related to the opinion of the participants. Subjects respond to by writing "[6].

„Instrument for surveys in which questions are asked and responded to in writing called the survey list. It usually consists of a header in which the writing and general data of two columns: a column of pre-printed questions (s sub columns which in is marked number of the questions) and the columns for responses, where participants enter answers. " [6].

The survey will be conducted after Presentation of the Teaching traffic in the second grade.

Survey consists of four questions with multiple choice. For the survey students must go through

content of all the questions in order to fully understand them.

During the research there will be two groups:

- control,
- experimental.

„Sometimes the experiments with two parallel groups compare the effectiveness of a "recent", "modern" teaching process with some older, already established procedure. Then the experimental group is called the group in which the new procedure is introduced, and the one in which the procedure belongs to older one it is called "control group.“ [6].

Assuming that on the day of the research all students will be present in a control group, the material is presented in the traditional way, while the experimental group is presented with multimedia content. Upon completion of processing of materials in both groups, they are given a five-minute assessment test. After testing the experimental group they do a survey from the first attachment.

VII. DATA ANALYSIS AND CONCLUSION

“The collected data may be of importance for the study only if we conduct quantitative and qualitative analysis. Quantitative analysis is performed using statistical methods. Results are statistical numbers for the studied pedagogical phenomenon. Next is their quality analysis and reaching certain conclusions. Qualitative analysis involves comparing the results with the results of previous research. It is associated with the theoretical principles that form the basis for the study of selected problems. This analysis gives an answer to what extent the hypotheses is confirmed or rejected.” [7].

“Data analysis can be done through several procedures:

- evaluate the data,
- matching the content of the collected data,
- compare the content of survey data with the contents of previous studies with the same or a similar research
- assessment of the group of experts for that area,
- determining data interaction within the same research.“ [8].

The results of testing conducted in the two groups (experimental and control) should be compared and then conclude the result. In the experimental group on the basis of the survey authors have had processed the results. Data analysis is done by tables and graphs.

The test showed the following results:

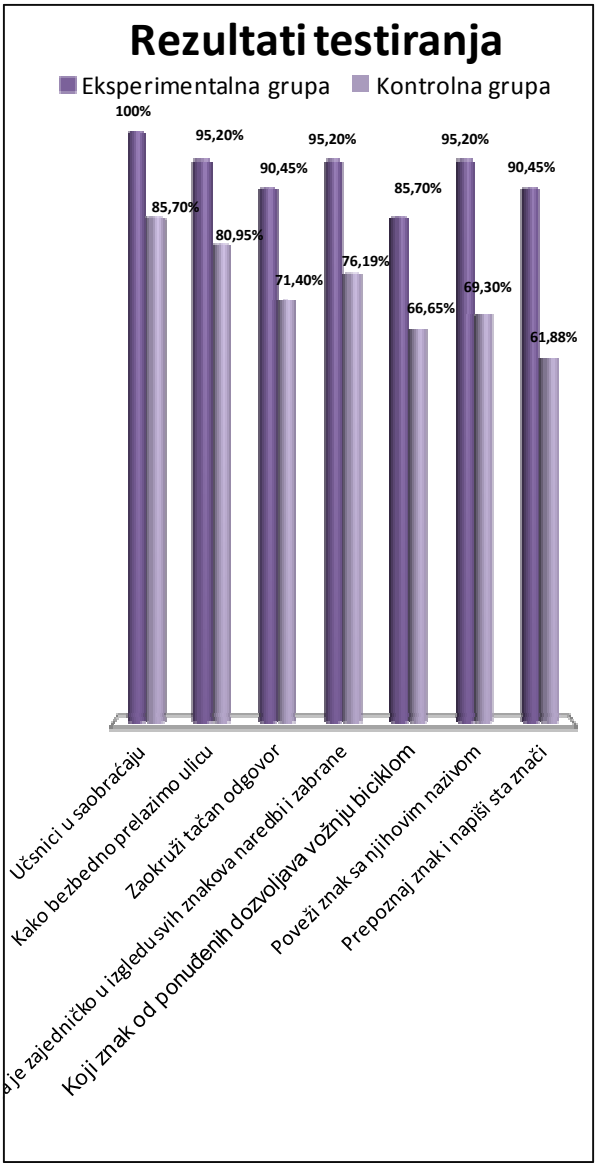


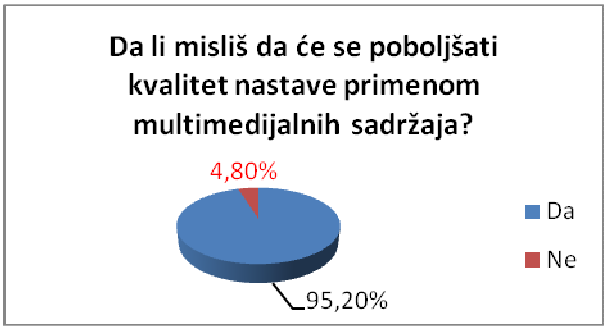
Figure 9. Graphical display of test results

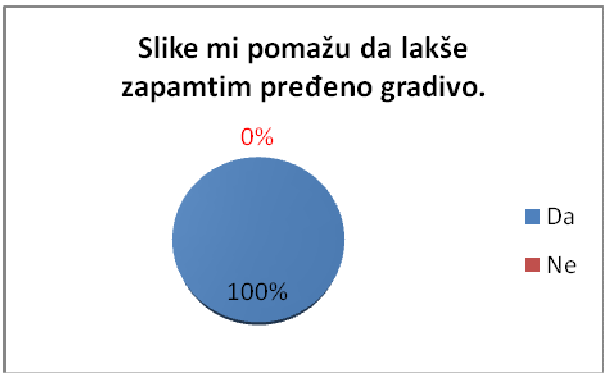
As you can see by the attached presentation multimedia content makes the material more memorable. The experimental group has 20% better evaluation results than the control, thus we conclude that the other hypotheses are proven.

Survey conducted in the experimental group showed that for the students work is more interesting this way, and it improves the quality of teaching. They also believe that pictures help them

for more active participation in class and to remember more material.

Percentage of answers:





Based on the survey results we can conclude that the main hypothesis is proven.

VIII. CONCLUSION

From the showed one can conclude that the primary and secondary hypotheses proven. If we take into account the percentage increase in motivation in facilitating memory material of students, we need to realize a survey on the level of entire country. This kind the research would demonstrate a need for the introduction of multimedia contents in primary schools as a basic teaching materials that should have more frequent usage, ending with the fact that these activities improve the quality of teaching.

The practical importance of research in finding ways of processing materials that will increase students motivation for the subject and enable them to actively participate in teaching, and therefore it is easier for them to remember material.

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COMPUTER SCHOOL – DATAWAREHOUSE PROJECT

B. Radulović*, Z. Čović ** and M. Ivković*

*Technical Faculty "Mihalo Pupin"/Department of Informatics, Zrenjanin, Serbia

**Subotica Tech – College of Applied Sciences/Department of Informatics, Subotica, Serbia

bradulov@tfzr.uns.ac.rs, chole@vts.su.ac.rs, misa.ivkovic@gmail.com

Abstract – This paper presents data warehouse system design for computer school. Basics of data warehouses system are described.

I. INTRODUCTION

Data warehouse is a concept of data integration into a specific storage that is used for conducting analysis and generating various reports. Data from relational databases is extracted, filtered, organized and stored in the storage form which enables complex and multidimensional access to data in aim to compute answers to questions of company management decisions support.

In this paper we ilustrate usage of data warehouse, database system and reporting tools integration to present the organization of data obtained from computer school which deals by attending courses in computer science. The aim of project was to provide storage, preservation, search, process and analyze of data on students training, specific training, locations of courses as well as lecturers which lecture this training so that the management of the company has an insight into the effects of the previous period at any time. The school is divided into the test centers (where it is collecting data). Test centers are facilities where the training and testing are performed by the participants. Each test center is located in a particular city (a city can have multiple test centers).

II. DATA WAREHOUSE

The term "data warehouse" includes a collection of data isolated from the operational databases and stored in separate databases or data warehouses. This term was first introduced by W.H. Inmon in 1992. who defines "data warehouse is subject-oriented, integrated, non-volatile, time-variant collection of data in support of management's decisions"(Elmasri et al, 2007). The main goal of data warehousing is data collecting and distribution of information throughout the organisation and use of any information, anywhere, at any time due to the realization of the principle of "always be at the service for information users".

Decision makers in organizations are often under pressure, because they must make their decisions on the basis of analysis of current facts obtained from various business situations, processes and data sources. These facts are stored mostly in on-line transaction (OLTP) systems as well as some the data sources. Integrated obtaining data for analysis is not very easy to perform.

Purpose of data warehouse system is to transform the data obtained from existing OLTP system into a form suitable for processing which enables performing analysis with tools for business decision making support.

A. OLAP

Interactive analytical processing (OLAP) is intended for online analysis of reporting as opposed to a production system aimed at updating and processing OLTP transactions. Name of online processing analytical coined the British mathematician Dr. Edgar F. Codd. He published a paper "A relation model of data for large share data banks" in 1970 as he was working for IBM. This paper presents a theory of relational databases as we know them today.

Initially queries were relatively simple. But over time the user queries become so complex that relational tools (OLTP tools) were not able to give respond within a reasonable period of time. Then come to the scene OLAP systems. They allow easy synthesis, analysis and data consolidation. This systems are used for intuitive and flexible manipulation of transaction data. OLAP systems support complex analysis carried out by analysts and allow analysis of data from different perspectives.

OLAP systems as data warehouses use multidimensionality and denormalization and it can be said that they represent the upgrade of data

warehouses. Basic elements of OLAP systems are: Database - provides data for analysis, OLAP server – process and manipulate data, Interface system – for interaction with a user and other applications and administrative tools.

III. DESIGNING A DATABASE

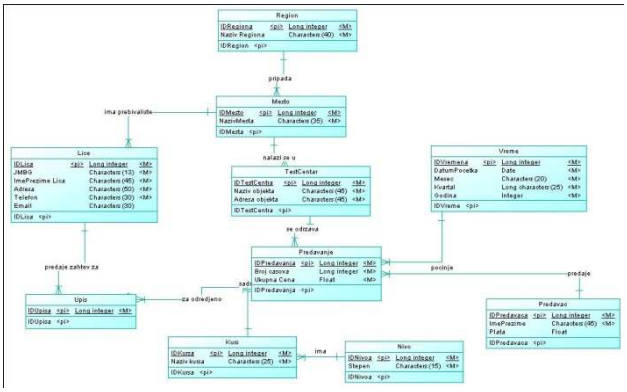

Figure 1. EER model

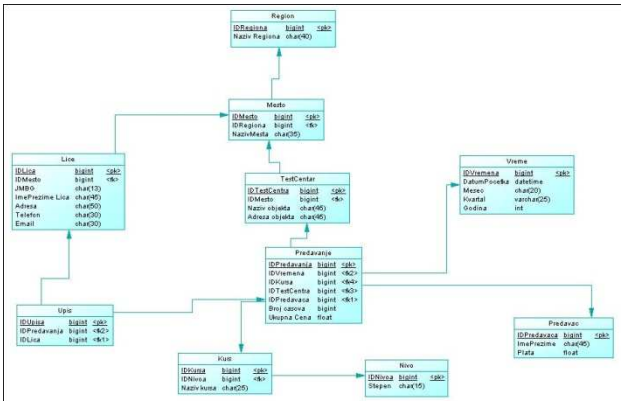

Figure 2. Relation data model

The database contains a general data of participants in courses and of courses for which they are chosen. It also keeps information of time and place of course, the price and duration of it and information of lecturer. For every course, we have to know course name, level of course (which can be a beginner, intermediate and advanced), and a lecturer who teaches in the center where the test takes place.

The database stores data about each test center: address, town/city, and region. This ensures that the
regional level is displayed of the most common training. It also keeps the time and data of training.

A. EER model – Conceptual Data Model

Conceptual model of data obtained in the Power Designer can be easily translated into physical data model and then generate the actual database. Fig. 1 shows EER model.

B. Relation Data Model – Physical Data Model

The relational model is presented through the scheme, generated by the Power Designer using the previous CDM model. Fig. 2 shows relation data model.

C. Implementation of the Model in Database Management System

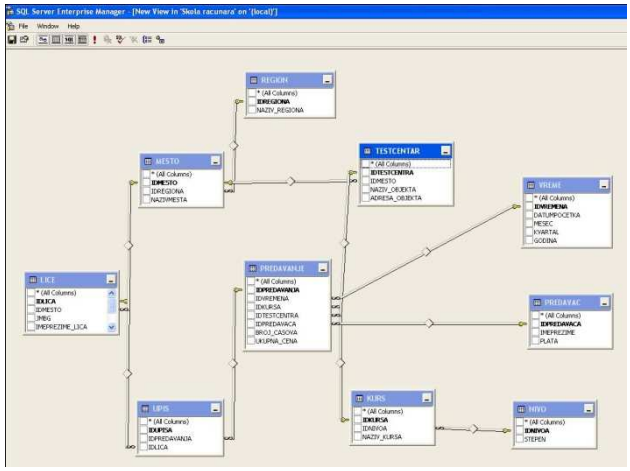

Figure 3. Model in Database Management System

Logically independent EER data model is created in Power Designer CASE tool. Then it has been translated in the relational model, and finally implemented in Microsoft SQL Server 2000 system for database management. Fig. 3 shows implementation of database.

IV. CREATION OF DATA WAREHOUSE

Data warehouse were created in Microsoft AnalysesManagerver 2000. Analytical requirements for creating data warehouse of computer school are defined according to answering following questions:

- How many hours of course are held by every teacher?
- What is the salary range on an annual basis?
- What is the salary range by region?
- What is the profit of training in a certain period?
- Show students by training they attend

OLAP cubes are organized by dimensions and measures. Dimensions are taken from the

dimensional tables and measures from the fact table. Table dimensions contain hierarchically arranged data which are the subject of various calculations. Dimension is a category for analyzing data. It can be, for example: standard, time, temporal, geographical and others. Fact table is used for application of mathematical functions such as summarizing, counting, average, maximum and minimum values of some columns, which are then appointed in accordance with the convention and are specified as derivative, i.e. aggregated data.

Standard cube dimensions, which are specified according to analyses requirements:

Course –Degree->Name of Course;

Lecturer – FirstnameLastname;

Region – Name of Region -> Name of City -> Name of Facility:

Time – Year – Quarter – Month;

Person – FirstnameLastname of Person;

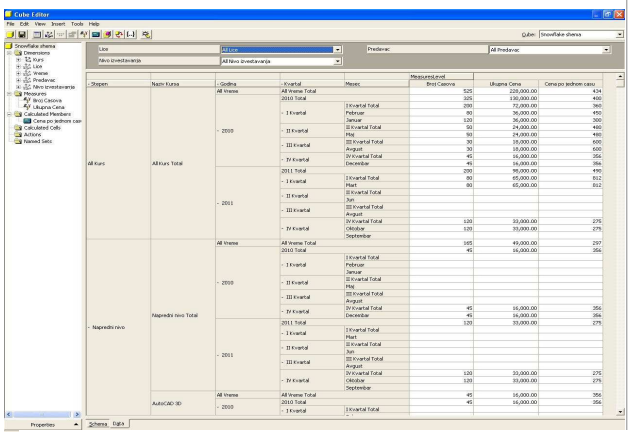

Figure 4. Data warehouse OLAP cube editor

V. ANALYTICAL DATA

Vreme	All Vreme											
Predavac	All Predavac											
Lice	All Lice											
Kursevi	Broj Casova	Cena po jednom casu	Ukupna Cena									
Napredni nivo	165	297	49000									
AutoCAD 3D	45	356	16000									
Vojvodjanski region	45	356	16000									
Novi Sad	45	356	16000									
Sajmiste	45	356	16000									
MSCA	120	275	33000									
Juzna Srbija	120	275	33000									
Nis	120	275	33000									
Aero Club	120	275	33000									
Pocetni nivo	250	500	125000									
AutoCAD 2D	50	480	24000									
Vojvodjanski region	50	480	24000									
Zrenjanin	50	480	24000									
TF Mihajlo Pupin	50	480	24000									
ECDL Start	120	300	36000									
Vojvodjanski region	120	300	36000									
Bela Crkva	120	300	36000									
TS Sava Muncan	120	300	36000									
Photoshop/Corel Draw	80	812	65000									
Beogradski region	80	812	65000									
Beograd	80	812	65000									
Srednji nivo	110	491	54000									
AutoCAD 2D	30	600	18000									
Vojvodjanski region	30	600	18000									
Novi Sad	30	600	18000									
Spens	30	600	18000									
ECDL Core	80	450	36000									
Vojvodjanski region	80	450	36000									
Vrsac	80	450	36000									
Kula Milenijum	80	450	36000									
UKUPNO	525	434	228000									

Figure 5. Pivot table created from OLAP cube data

Figures 6., 7., 8. and 9. shows various diagrams created upon filtered values from the previously created pivot table (see Fig. 5).

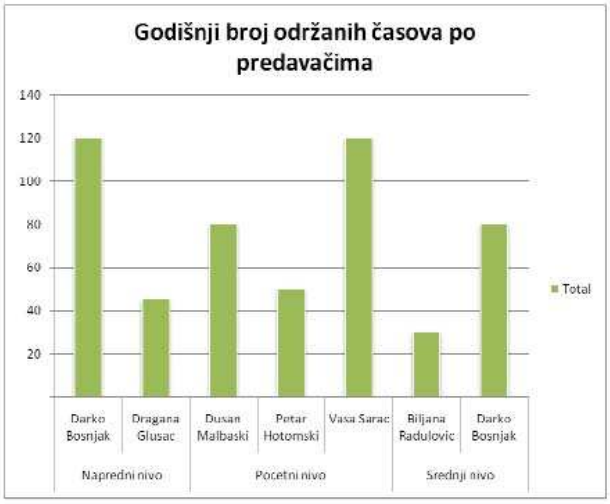

Figure 6. Number of classes held by lecturer

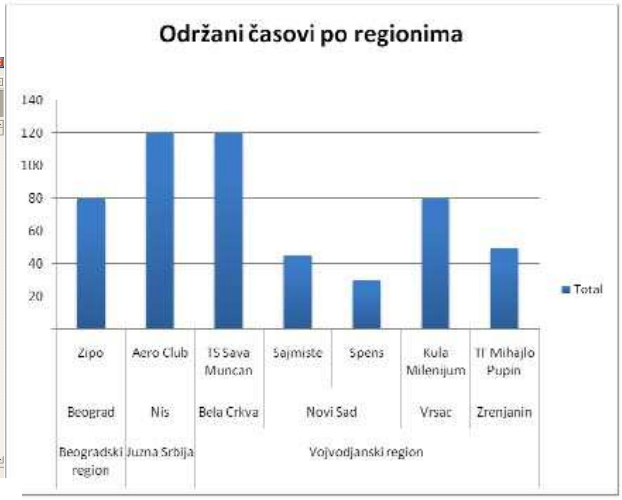

Figure 7. Number of classes by region

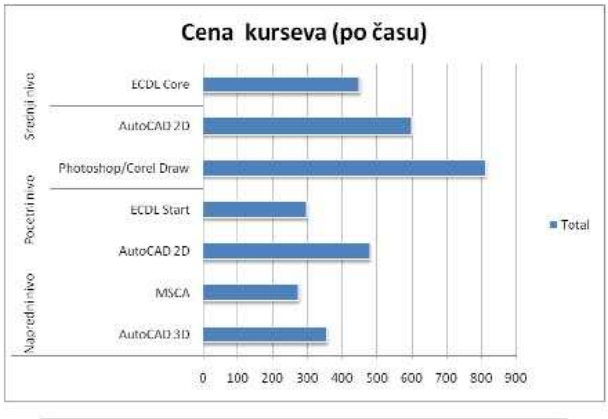

Figure 8. Price of courses by class

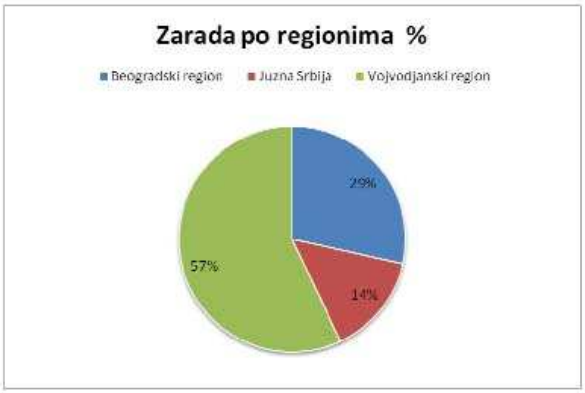

Figure 9. Profit of training by region

VI. USING MDX QUERIES

MDX (multidimensional expression) is a query language for OLAP (On Line Analytical Processing) databases such as SQL query language for relational databases. it's also the language of budgets, with syntax similar to spreadsheet. It is used to manage multidimensional information in Microsoft SQL Server 2000 Analysis Services. MDX is defined in the OLE DB OLAP extensions.

TABLE I. MDX TERMS AND RELATIONAL ANALOGY

Multidimensional term	Relational analogy
Cube	Table
Level	Column - string or discrete number)
Dimension	Several related columns)
Measure	Column - discrete or continuous numeric
Dimension measure	The value in the specific row and column of dimension table)

Examples of MDX queries:

- Number of classes held by lecturer

```
SELECT
   {[Number of Classes]} ON COLUMNS,
   {Lecturer.Members} ON ROWS
FROM
   [Snowflake shema]
```

- Earnings annually (2010 and 2011)

```
SELECT
{[Total Price] } ON COLUMNS,
   {[Time].[All TIme].[2010],[Time].[All
Time].[2011]} ON ROWS
FROM
   [Snowflake shema]
```

- Showing people who attended a training (and the number of hours)

```
SELECT
   {[Course].[Name of Course].Members} ON
COLUMNS,
   {[Person].[FirstnameLastname Person].Members}
ON ROWS
FROM
   [Snowflake shema]
```

- Wages and hours of the courses held in 2010.

```
SELECT
   {[Total Price],[Number of classes]} ON
COLUMNS,
   {Course.Members} ON ROWS
FROM
   [Snowflake shema]
WHERE
   [Time].[All Time].[2010]
```

- Earnings of Vojvodina region (by the towns) in 2010

```
SELECT
   {[Total Price]} ON COLUMNS,
   {[Level of Reporting].[All Level of
Reporting].[Vojvodina Region].[Bela
Crkva],[Level of Reporting].[All Level of
Reporting].[Vojvodjanski region].[Novi
Sad],[Level of Reporting].[All Level of
Reporting].[Vojvodina region].[Vrsac],[Level
of Reporting].[All Level of
Reporting].[Vojvodina Region].[Zrenjanin]} on
rows
FROM
   [Snowflake shema]
WHERE
   [TIme].[All Time].[2010]
```

VII. CONLUSION

Right knowledge and right information are the things that are valuable in present time. In modern business it has been virtually impossible to be successful unless we have the right information, but it is equally important to know how to use this information.

Creating a Data Warehouse gives us the opportunity to from its own operations determine the specific laws of the market at this example and data we have used in a way that we could do now. The aim of the warehouse data is not only to store data, but the goal is that managers may themselves carry out analyzes.

Bearing in mind that schools of informatics training are generally large systems, decision-making is much easier when it is possible to get information in every situation of each segment at any time. This kind of databases do not contain updated information, but store data from a certain moment of time.

Such data are of great importance for comparison and analysis of trends. This kind of comparation is impossible to perform in OLTP systems, because in that kind of system data are constantly changing and there is a need to create OLAP system and Data Warehouses.

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ENCOURAGING CREATIVITY THROUGH METHOD OF DISCOURSE IN HIGH SCHOOL TEACHING

S. Babić-Kekez
Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
snezanabk@gmail.com

Abstract - In this study, it's being considered the possibility of a modern approach in high school teaching by introducing the discourse as a method of teaching in order to develop creativity of students. The method of speaking or verbal method in faculty teaching, as one of the traditional form of work, in the reformed changes of principles of the Bologna declaration, gets characteristics of modern just by stepping towards the method of discourse in working with students and represents the foundation for essential, not formally reformed teaching in university. Starting point in work is one of the characteristics of this method which is refered to discourse of discourse, that is, to debates and different opinions when science doesn't have the answers. By introducing the discourse as innovative method of teaching in high school education, the principle of democraticy and individualization is being respected in order to develop tolerance and creativity as well as student's gradual taking the responsibility for his own learning and development. Achieving that goal leads to didactics oriented towards students, and in the same time it contributes to encouraging creativity of students, raising the quality of teaching in high schools, and development and strengthening if competence of teachers themselves.

I. INTRODUCTION

The process of globalization is affecting all aspects of development and functioning of modern society and on individuals in it. The world is so fast in becoming a whole with unique goals. Globalization, according to M. Pečujlić (2002), opens new horizons of freedom, democracy and progress.

Fact that wealth of one country depends more on expertise and educational level of people, and not only on natural resources which possesses, is the starting point for the most important international educational documents, such as The World Declaration of Educational Needs (1900) and The Report of International Commission about Education in 21st century: "education hidden treasury" (1996) in which it's particularly emphasized the right to educate the gifted and to develop personality and human ability based on knowledge, thought and self-conscious. That is places in front of social demands. Task of education, according to Ž. Delor (1996) consists of that everybody, without exception, has the possibility to express their talent and all of their creative potential. That means the possibility to achieve their personal goals. Main fields of education, such as education for learning to have knowledge, learning for working, learning for cohabitation, contain learning for existence, education intended to develop personality, individual capability and all potentials of personality, from cognitive, physical, aesthetic and others, to complete building up of self-conscious of an individual. This approach emphasize the importance of appreciation of personal characteristics and individual needs in the process of individual education and stands out the importance of creative development.

In accordance with these principles, modern education is characterized by features that can be categorized into two types: education for development and liberal conception of education.

Education for development or developed education according to S. Ivanović (2007) starts from developing priorities of society that adjust only education bearing in mind economical, political, technical, technological and other goals. Modernization of education is a part of modernization of society. In accordance with that education should prepare and train an individual. School is obligated to prepare better the young for a modern living, especially for working in high-tech computer world that is changing rapidly in which individuals and companies are obligated to act in terms of global market. In this approach stands danger to isolate education as a channel of difference between people. Overcoming is possible by democratization of education and adjustment of school to an individual.

Liberal conception of education, according to S.Ivanović (2000), starts from opening social system and the need of education to create an open society and maintain system that rests on free market, competition and individual values, free-

doms and rights of citizens. Education is a mean of preparing an individual for such conditions, a way of training for competition and the game of life by promoting those skills that contribute to it. This approach develops two models of education that coexist, especially education for elite and mass education for all. Opponents of this theory are the representatives of the conflicting theory that consider this approach cannot be democratic, that is to dominate relations that are not suitable for achievement of integrative functions of education and individual development. However, this concept as a framework for changes in education of countries in transition.

These approaches, and development education and understanding of liberal education, in its immediate, practical development cycle in which each subsequent meets the aducational need creates new, will inevitably modify the point towards the development of skills of an individual and creating conditions to encourage the development of individual capabilities, diversity and creativity of each individual.

II. CONSTRUCTIVIST THEORY OF LEARNING WITH THE FUNCTION OF IMPROVEMENT OF HIGH SCHOOL LEARNING

Introducing modern approaches to the organization of teaching in which students are active in creating conditions for overcoming the traditional method sand forms of work in higher education. Thus, they not only contribute to the adotion of permanent knowledge and developing skills for lifelong learning and professional development, but the students develop creativity and a sense of success. We are facing a major transformation, which includes not only technological, but also institutional and cultural changes. The transformation includes new patterns of behavior, values, social relations and institutional forms. The education systems are facing the challenge of building knowledge-based society. It is required a new combination of competence: 1. Theory, such as history, science, social studies and math; 2. practical, such as foreign languages and information technology; 3. Social, such as teamwork, leadership, connectivity, and 4. Cognitive, referring to the capacity for learning, problem solving and anticipation of risk (S. Mirkov;2011;65). The gap between traditional adoption and acquisition knowledge and knowledge of modern construction of knowledge, according to some authors can be resolved by compromise. Based on analysis of the characteristics of the traditional teaching, that paradigm of adoption or acquisition of knowledge on the one hand and the modern school, or paradigm construction of knowledge, on the other hand, points to the need of combining different paradigms and the possibilities of practical solutions (Šefer, by Mirkov; 2011;66). It discusses the possibilities of compromise between the solution based on traditional and contemporary interpretation of knowledge. Teachers can choose to encourage development or skills and creativity approaches to learning (which does not lead to recognition of the whole of a subject) or superficial adoption of the facts (whole content) through the transfer of knowledge from teachers to students (for faster learning and lower quality of knowledge). Šefer says that education should be the development of skills and creative approach to problem solving, and knowledge of whole subject in order to understand system's concepts in a particular discipline. In order to achieve this, it is necessary to include opinions ans skills used in learning about the science system, and the content and system terms, that its structure affect the understanding of new concept through research practice. Pooling resources and goals of both paradigms lead to desired outcomes. This learning process becomes close to the creative process in science and art, which Piaget corresponds to the idea of learning as a reinvention of existing knowledge and ideas of Vygotsky about the meaning and logic of the whole subject as a tool in the process of cognition (ibid.,65).

Educators recognize that constructivitis concept at best, the idea of exposing the "mature" or natural development, or "equilibration", noting that the subject of the statement, however, one must understand what it approves,and therefore he must be considered interesting. Post-Piaget's school itself, realizing this discrepancy made a step forward in this regard snd now provides for"co-action" or "cognitive conflict". It is believed that these projects are still in poor determining the situation when faced with the complexity of reality. The world does not teach the individual directly what he needs to learn. One most point out the purpose when in the middle of the inevitable parameters (G.Gojkov, 2011, 65). Starting from the fact that the phenomen that is learned is inseparable from knowledge of the subject, constructivist metatheory develops new perspectives in the nature of knowledge that is, in fact, hypothetical construction of reality. According to M.Andevski (2002) many constructivist directions: developmental constructionism, personal construct psychology, theories of assimilation, the radical constructivism, social constructivism, narrative psychology, in each individual different aspects, have one thing in common- everyone thinks that reality is not what it

seems. The constructivist paradigm according to which the student or student actively constructs knowledge, overcomes duality of traditional and contemporary in essence, attention directs the activities of students and in interactive model of teaching. According to L.Bognar (2006; 7) when it comes to teaching at university level, there are a number misconceptions. It is commonly thought that it must be lectured or possibly followed by questions and discussion so students can talk about it and lectures as the most important and most valuable form of instruction. Another widespread misconception is that teaching at the university should differ from teaching in schools, which in the case went forward, and that any attempt to modernize the teaching at the university means to continue lowering the lower level. New ways of working, such as activities in pairs, group work or collaborative learning, research projects and PhD students require a new organization of labor, material support, and training, teacher training and motivation for such work.

III. METHOD OF DISCOURSE IN HIGH SCHOOL EDUCATION

Performance of modern approaches in higher education are numerous and varied, and one of these is the discourse as a method of teaching that allows the development of creativity students. Verbal methods of teaching in colleges, as one of traditional forms of work, in school reform on the principles of the Bologna Declaration, given the characteristics of modern methods to precisely reach discourse in working with students and the basis for substantive, not formal reformed teaching at the university. Basically methods of discourse is dialogue, and is classified into a dialogic method, in a broader sense, the verbal method.

The term discourse (lat. Discursus) involves discussion, debate, verbal communication, speech, as and presentation of a topic, a term DISPUT (lat. disputare, nem. Disput) means creates conflicts, discussion, debate. As the main characteris tics of this method are:

- Discourse involves conversation that takes into account the discussion on a particular topic, subject;
- A question that is being discussed, under discussion should be expressed in a polemical form,

So that leaves the possibility of different angles and different positions argumentation, interpretation, conflict of opinion, and this suggests the possibility that the questions are chosen so that she and in science have not yet been clearly and unequivocally clarified, and suggest research;

Discourse and debate means that the spread of the discourse, relate to more conflicts in opinion situations where science has no clear answers, then there is a need for further research and argument positions, and this goes for the serious science of water, and methodological issues etc. therefore, it could be argued that includes elements disputa in its original meaning.

From the above it can be concluded that the terms as a discourse, DISPUT, the dialogue of similar meaning, or that have similar elements in its main provisions, but that their meaning may vary depending on the theoretical, didactic concepts which are installed or where applicable also, 166). In common is that they have the experience to Consultation participants have achieved as a result of understanding of participation and this is the difference from an ordinary conversation.

Basic characteristics of the methods of discourse aimed at the advancement of knowledge (Bereiter, C.by S.Mirkov,2011;67)are:

- The focus is not on activity, rather to understand.
- The focus is not on the controversy, rather than cooperation. Students can not take the position that encourages and discuss them, but to seek and develop a basis for understanding in common.
- Unlike most typical school "projects", the aim of cooperation is not a tangible product. Gains in knowledge and understanding are the only product.
- Although what the students did has all the features of a science study, it began as sharing personal interests (or, for the exchange of related interest personally), and gradually grew extensive science research. The aim is that the practice of discourse aimed at constructing knowledge becomes something that they can be transferred to in other situations.

For the development of creativity very important feature of this method is related to discourse of discourse regarding debates and different views when science does not have clear answers. Thus the alosteric method of discourse leads to a model of learning that takes place as extending previous knowledge and in contradiction with it. According to G.Gojkov (2011,67) thinks is that learning occurs only when students are away of their original concepts, when adopting a new concept, and then

the whole of their previous mental structure deeply transforms. Therefore, new concepts replace the old, slightly modifying previous network, system of facts creates a meaningful answer.

IV. CONCLUSION

The constructivist paradigm as the basis of modern and postmodern didactic model of adoption knowledge, exceeds the previous traditions of learning, but does not reject them, some of their elements considers useful, and in a sense the forerunners of modern concepts.that is, among others, methods of discourse that enables the development of creative skills and creativity of students with its features.

By introducing the discourse as innovative method of teaching in high school education, the principle of democraticy and individualization is being respected in order to develop tolerance and creativity as well as student's gradual taking the responsibility for his own learning and development. Achieving that goal leads to didactics oriented towards students, and in the same time it contributes to encouraging creativity of students, raising the quality of teaching in high schools, and development and strengthening if competence of teachers themselves.

V. ACNOWLEDGEMENTS

*The paper is part of project No.179036 Ministry of education and science RS (2011-2014).*but in the same time generates new forms of domination, hierarchy, autoratism, even barbarity. Some authors (M. Nedeljković) think that instead of two sides of globalization, we should make difference between globalization and globalism, as globalizetion is objective process of integration and technological global connecting and globalism of ideology and politics of global domination. It's necessary to create optimal requirements for active forming of the new world. The society needs to accelerate its development in all segments of organization and working, before all, in the domain of human resources.

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VIRTUAL NETWORK LABORATORIES BASED ON VIRTUALIZATION TECHNOLOGY

D. Dobrilovic, V. Jevtic and B. Odadzic
University of Novi Sad/Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
ddobrilo@tfzr.rs, vesna@tfzr.uns.ac.rs, borislav.odadzic@tfzr.rs

Abstract – This paper deals with university education for Computer networks course, as well as other subjects lizatthat demand network infrastructure for their teaching environment, virtuaprogram. Beside laboratories with real network equipment, which enable students to work in real network ion software can be used for teaching computer network too. Virtualization software enables creation of experimental environment for new technologies and developing and testing network software. It can be used for engineering education also.

This paper describes the most characteristic environments of virtual network laboratories as well as their main features. The new virtual laboratory, named VNLab, is proposed and described in this paper.

I. INTRODUCTION

This paper deals with university education for Computer networks course, as well as other subjects that demand network infrastructure for their teaching program. There are numerous ways for adopting practical and functional knowledge about computer networks and systems. One of them is using laboratories with real network equipment, which enable students to work in real network environment. The problems that can occur in this case are laboratories' cost and availability. Laboratories with real network equipment also have limited access, considering the simultaneous work for certain group of students. To overcome these problems there are other ways of teaching computer network courses.

For example, virtualization software for network modeling and teaching can be used. [1, 2] Virtualization software proved itself as efficient enough for virtual laboratories creation [3, 4, 5, 6]. Its primary role is to create experimental environment for new technologies, as well as developing and testing network software. The other, but not less important purpose of virtual laboratories is in education of information technology experts, i.e. for engineering education. Many examples confirm this statement. Virtual laboratories can be used in the fields of: operating systems [7], system administration and networks security [8, 9, 10, 11], server and client software development, data bases [12], distributed network platforms and other [13]. The most popular use of virtual laboratories is in the field of computer network education. There are many different platforms developed for those purposes, as well as the ones primarily designed for experimenting and after that for networking concepts studying.

Virtualization technology and appropriate software enable creation of virtual network environment that completely corresponds to the real system. Virtualization enables creation of several virtual computers with different operating systems on one physical machine. Virtual computers can be servers, workstations and network nodes, such as routers. Router's work can be totally emulated by virtual machine (VM) and specified software. Every virtual computer, i.e. virtual machine uses hardware of its physical computer. As every hardware component of the host computer is emulated, network interface card (NIC) is emulated too. Based on one physical card virtual machine can emulate many virtual network cards. There can be virtual connection between virtual machines and by that virtual network cards are connected in virtual network or its segment.

This paper describes the most characteristic environments of virtual network laboratories as well as their main features. The example of proposed virtual laboratory, named VNLab is showed too.

II. VIRTUAL NETWORK ENVIRONMENTS

A. VNUML (Virtual Network User Mode Linux)

VNUML is a general purpose, open-source tool based on network scenarios. Its primary aim was to simulate computer networks and to be a tool for creating virtual network polygon test. It was based

on User-mode Linux (UML) technology. VNUML was developed in 2004 at Telematics Engineering Department of Technical University of Madrid, as part of Euro6IX research project for experimenting in the area of IPv6 network systems.

It contains two components: XML based language and VNUML parser. The first one enables network scenario description. It is a VNUML specification language. The second one is language interpreter that creates and runs scenarios. It enables defining and running network scenario with GNU/Linux virtual machines. All virtual machines are connected through virtual network segments on one physical machine – virtual network server. The figure 1 shows an example of VNUML scenario.

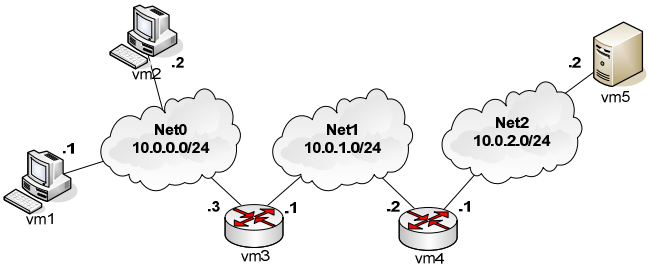

Figure 1. An example of VNUML scenari**O**

The figure 2 represents a file that is created by scenario from the figure 1. It was written in VNUML XML based language.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE vnuml SYSTEM "/usr/share/xml/vnuml/vnuml.dtd"?>
<vnuml>
     <global>
              <version>1.8</version>
              <vm_defaults>
              <filesystem>/usr/share/vnuml/fs/root_fs</filesystem>
              <kernel>/usr/share/vnuml/kernels/linux</kernel>
              </vm_defaults>
     </global>
<net name="Net0" />
<net name="Net1" />
<net name="Net2" />
<vm name="vm1">
     <if id="1" net="Net0">
              <ipv4>10.0.0.1/24</ipv4>
     </if>
     <route type="ipv4" gw="10.0.0.3">default</route>
</vm>
<vm name="vm2">
     <if id="1" net="Net0">
              <ipv4>10.0.0.2/24</ipv4>
     </if>
     <route type="ipv4" gw="10.0.0.3">default</route>
</vm>
<vm name="vm3">
     <if id="1" net="Net0">
              <ipv4>10.0.0.3/24</ipv4>
     </if>
     <if id="2" net="Net1">
              <ipv4>10.0.1.1/24</ipv4>
     </if>
<route type="ipv4" gw="10.0.1.2">10.0.2.0</route>
<forwarding type="ip">
</vm>
```

```
<vm name="vm4">
      <if id="1" net="Net1">
              <ipv4>10.0.1.2/24</ipv4>
      </if>
      <if id="2" net="Net2">
              <ipv4>10.0.2.1/24</ipv4>
      </if>
<route type="ipv4" gw="10.0.1.1">default</route>
<forwarding type="ip">
</vm>
<vm name="vm5">
      <if id="1" net="Net2">
              <ipv4>10.0.2.2/24</ipv4>
      </if>
<route type="ipv4" gw="10.0.2.1">default</route>
<filetree seq=webup@ root="/var/www">/opt/vnuml/>vm5</filetree>
<exec seq="webup" type="verbatim">/etc/init.d/apache start</exec>
<exec seq="webdown" type="verbatim">/etc/init.d/apache stop</exec>
<exec seq="webdown" type="verbatim">rm /var/www/index.html</exec>
</vm>
</vnuml>
```

Figure 2. The resulting file of scenario from the figure 1

VNUML was developed from the laboratory with local access (available like Live CD too) to the environment with remote access. Figure 3 presents general architecture of the remote access network laboratory. The laboratory's core contains several LAN communicators, i.e. switches with VLAN support. Everything else: routers, virtualization servers and student's workstations are connected on basic LAN switches (labeled as Core LAN Switches in the figure 3) and represents infrastructure laboratories' core.

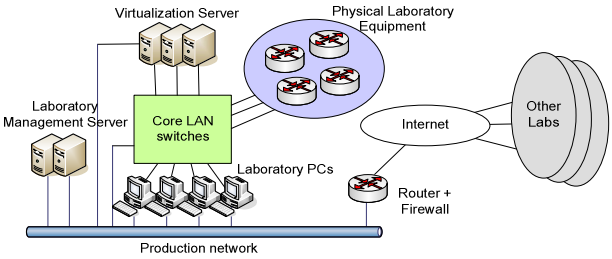

Figure 3. Architecutre of VNUML laboratory

Figure 4 represents one scenario for simultaneous work of 28 students divided in 14 groups. Scenario theme is firewall system configuration that requires 66 virtual machines. There are 8 sub scenarios on 2 Dell PE840 servers (Dual core Xeon 3060 with 2 GB RAM).

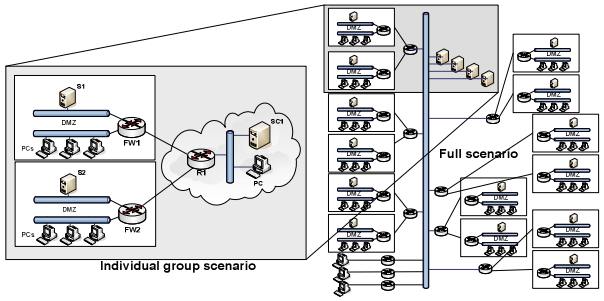

Figure 4. The scenario in VNUML with remote access

The main constraint of this system is UML virtualization software inability to run some other operating systems besides GNU/Linux OS. This environment does not have support for Windows and BSD operating systems.

B. Netkit

Netkit [14] is the second important network emulation system based on the same virtualization technology. It is fully developed at open-source software. It has four components: kernel, system file image, software for virtual hub and the set of defined user commands. The Netkit environment was developed for experimental purpose in computer networks domain. This project started in 2005 in the Computer Networks Research Group at University of Roma Tre, and it was the part of Linux User Group LUG Roma 3 project for creating non-cost educational environment. The

project was extended by XML based language named NetML. The purpose of NetML was to describe network topology that is used in network scenario of particular environment [15, 16].

Network nodes in the Netkit system are emulated by User-mode Linux which is used, as well as Debian GNU/Linux operating system. Any virtual machine can be transformed into specific network device, such as router, by running particular software.

This laboratory has several groups of exercises. The first group of exercises contains basic topics, such as: configuring one or two hosts, static routing, ARP and RIP protocols. The second group of exercises is named Application level and contains working with DNS and e-mail protocols (SMTP, POP, IMAP). Advanced level of exercises includes: bridging, STP protocol and MPLS. Finally, there are topics related to interdomain routing. There are ten exercises: simple peering, simple announcement, prefix filtering. Stub AS, Stub AS (static routes), Multi homed stub AS, Large multi homed stub AS, Multi homed AS, Small Internet, Transit AS. The whole group refers to working with autonomous systems and BGP protocol in basic and advanced configurations [17].

Netkit is used by many universities as teaching tool. The system is designed for working with local access. Beside installation package there is a Live CD version too. The main disadvantage of this system is inability of UML to support other operating system than Linux.

C. *V-NetLab*

V-NetLab environment represents complex structure with one NFS server. This server is used as storage for virtual machines and its disk image files. The V-NetLab has nine workstations with Linux operating system and VMware virtualization software. The system has a gateway that enables users to access to the virtual network and command interface. [18]

The figure 5 represents its architecture.

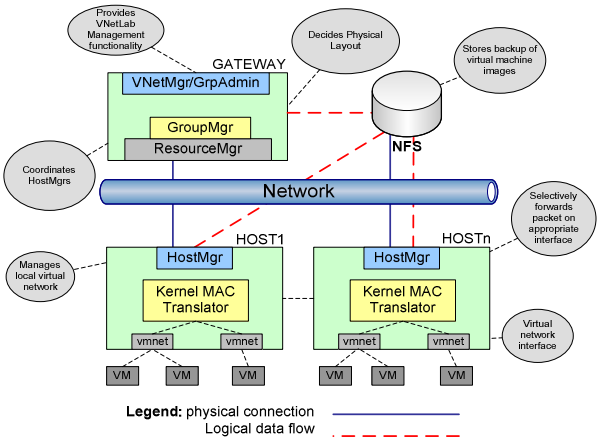

Figure 5. The V-NetLab architecture

Six workstations from the system are used in "course mode" while three of them are used in "development mode". Gateway host is used for user logging from external network. That host has control system on it that enables students and other users V-NetLab access and teaching course. This platform uses 130-300 virtual machines in real time enabling simultaneous access for 30-60 students. Each of them has its own particular virtual network to work on. The whole hardware-software system cost among $29,000.

Some of the exercises for this environment include: firewall system configuration with iptables software, network analysis (with tools such as: ping, traceroute and nmap) and network intrusion detection with snort tool.

D. *Einar*

Unlike other projects, this case represents student's project aiming to create virtual network laboratory for dynamic routing and learning of that particular topic. The project is not active any more, and it was distributed in Live CD version. It was developed at Royal institute of technology – Sweden.

E. *VELNET (Virtual Environment for Learning Networking)*

VELNET uses VMWare Workstation virtualization software with different guest operating systems (Windows XP, Windows NT Workstation, OpenBSD). In this case Windows platform prevails, unlike other solutions with Linux environment as dominant one. It was developed in 2003 in the School for computing and information technology at the University of Western Sidney – Australia.

F. VLabNet

This project is based on Debian operating system, Xen virtualization software and Quagga Routing Suite routing software. This solution represents one of the first attempts of combining virtual machines and physical network equipment. This laboratory integrates physical Cisco 2610 router as well. VLabNet is good example of virtual and classical routers application in laboratory creation. [19]. The VLabNet architecture is shown in the figure 6.

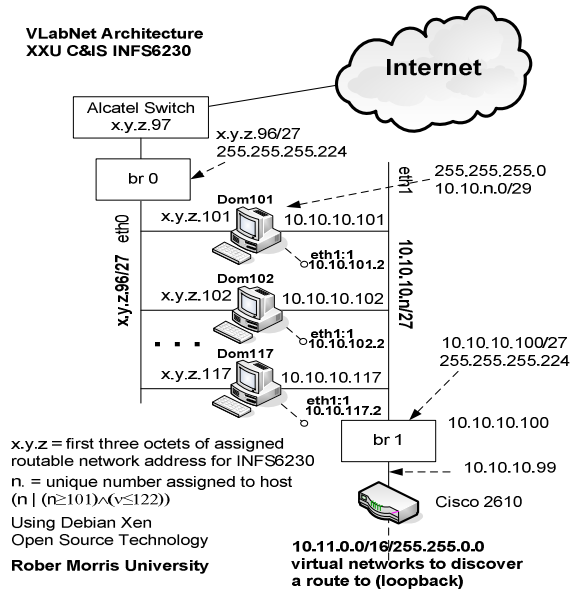

Figure 6. The VLabNet architecture

G. Manage Large Networks (MLN)

MLN is an open-source package that represents tool for defining computer networks. System uses User-Mode Linux (UML) or Xen as virtualization software and different virtual machines based on different Linux distributions. MLN language was developed also and it simplifies network scenarios creation and configuration. Students may use this system by script files written in this language.

MLN enables: detailed description of network interface configuration, inheritance support, other documents inclusion etc. In that way it supports large networks scenarios (topologies) maintenance much easier. As VNUML, MLN parser includes creating and running scenarios. There is no MLN graphical interface so far. MLN parser's architecture is plug-in oriented and this provides parser development as well as the tool itself.

H. Marionnet

Marionnet [20] – is virtual network laboratory that enables defining, configuring and running complex networks and their devices such as switches, hubs, routers and cables. Marionnet is free application created for Linux platform and based on UML and VDE [21] virtualization tools.

I. vBET

vBET system [22] – is based on UML. Users describe scenario by textually oriented specification language. Parser processes specification and generates a script. By running the script virtual node and virtual topology are created. Scenario may be canceled after the experiment. vBET language is similar to the NetML and MLN ones, because automation of running commands on virtual machines is not allowed.

J. Dynagen

Dynagen [23] – differ from abovementioned system. This system is oriented to the creation of scenarios made of emulated Cisco routers, based on Dynamips technology. The advantage of this system is high level of scenario reality while its drawback is inability to emulate any other platform or node type (such as server or working station) beside Cisco router.

III. VNLAB – VIRTUAL NETWORK LABORATORY

VNLab is an online educational system that distributes learning material, as well as learning environment, using the network infrastructure. The laboratory is based on virtualization technology. VNLab was developed during 2007 at Technical Faculty “Mihajlo Pupin”, University of Novi Sad, Serbia. It is used as teaching environment for Computer Network course for bachelor students at Information technology study program. VNLab represents hardware-software model of virtual network laboratory [24]. Hardware components of the model are: VNLab server, student, teacher and administrator workstations and network infrastructure enabling remote access to the VNLab server. VNLab is based on Microsoft Virtual Server 2005 R2 [25] virtualization software. At first VNLab was hosted on Microsoft Windows 2003 platform and web server Microsoft IIS 6.0 (Internet Information Server) [26]. Later, at the beginning of summer semester in this year, the laboratory is ported to the new platform with the Microsoft Windows 2008 and IIS7. Its architecture is presented in the figure 7. Two listed software components create the basis for implementation, administration and utilization of the virtual laboratory. The virtual server 2005 allows creation

of virtual machines configurations, as well as its virtual network connections.

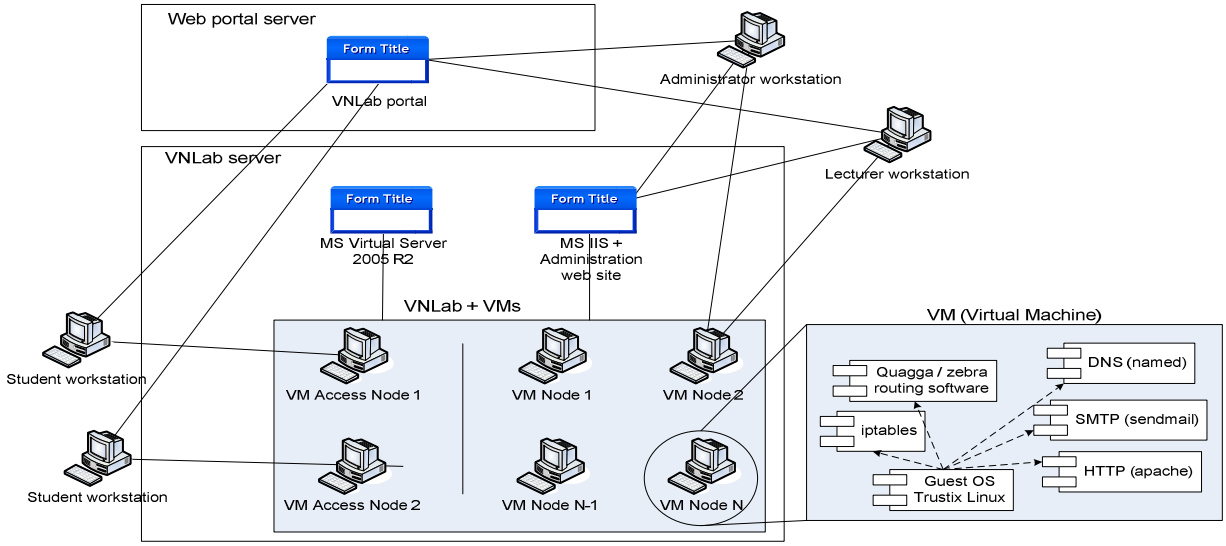

Figure 7. The VNLab architecture (formatiranje teksta)

The emulated network contains large number of virtual machines. The number of 40 virtual machines is sufficient for creation of the virtual network scenarios used for learning networking concepts. Virtual machines emulate hardware and software of physical machines together with the network interface cards (NIC). The maximum number of emulated NICs per virtual machine is four.

Emulated network has two major types of virtual machines. The first type has a role of computers and routers (nodes) that create the core of the network. Those nodes are preconfigured in order to enable the functional network environment completely similar to the real systems. In the figure 7 nodes are labeled as VM Node 1, VM Node 2, etc. Emulated nodes are designed to enable creation of virtual network suitable for building the environment for students to learn network concepts and to upgrade their skills with practical work in the real systems. The reality of the emulated network and learning scenarios depends on the configuration of these nodes.

The second type of the nodes (figure 7) refers to access nodes (VM AccessNode1, VM AccessNode2 etc.). Those nodes have only basic configuration. During the exercise students remotely log on those nodes and configure them in order to make them functional parts of existing network. That is the part of practical application of adopted knowledge and gaining new skills.

TABLE I. COMPARISON OF VIRTRUAL NETWORK LABORATORIES CHARACTERISTICS

System	Host Platform	Guest Platform	Virtualization	Routing software
VNUML	GNU/Linux	GNU/Linux	UML	Zebra/Quagga
Netkit	GNU/Linux	GNU/Linux	UML	Zebra/Quagga
V-NetLab	GNU/Linux	GNU/Linux	VMWare	/
Einar	GNU/Linux	GNU/Linux	UML	/
VELNET		Win XP/NT/Workstation, OpenBSD	VMWare	/
VlabNet	GNU/Linux	GNU/Linux	UML, Xen	Zebra/Quagga
Marionnet	GNU/Linux	GNU/Linux	UML, VDE	/
VBet	GNU/Linux	GNU/Linux	UML	/
MLN	GNU/Linux	GNU/Linux	Xen, VMware Server, User-Mode Linux.	Zebra/Quagga
VNLab	Windows 2003	GNU/Linux	MS Virtual Server 2005	Zebra/Quagga

IV. CONCLUSION

This paper showed the main characteristics of virtual network laboratories that are used nowadays for computer networks courses. The architecture of proposed virtual network laboratory, VNLab is presented too. Comparison of their characteristics is given in the table 1.

This table summarizes the main characteristics of virtual network laboratories. It shows that majority of them use different distribution of GNU/Linux operating systems for both host and guest OS platforms. The dominant virtualization tool is UML, but the other virtualization tools are used as well. The most popular routing software that virtualization laboratories use is Zebra/Quagga.

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NEW WAYS OF PROVIDING IT SERVICES IN EDUCATION

M. Miladinovic*, D. Radosav**

*Mining and geological faculty, Belgrade, Republic of Serbia,

**Technical Faculty, Zrenjanin, Republic of Serbia
milena.gojkovic@rgf.bg.ac.rsradosav@tfzr.uns.ac.rs

Abstract - Education is increasingly becoming a base development of a country. Knowledge, information every day more and more become the basic production resources society. Schools must be organized that it can monitor changes and innovated knowledge of their students, future experts in the world of work. Request that schools have a very developed information system, included in the appropriate bank data is a necessary factor successful business. Education capacities and working opportunities students, teachers, and other workers in the educational process are not approximately used. It is a great are empty paces and causes failure students. Success schools as well as a whole would be is incomparably more when its entire activity was regulated as well as comprehensive organizational system, and when the information links and communication were permanent companion course working process.

I. INTRODUCTION

Borders Between products and IT services has already begun to is waning, and in the next period is likely to completely to extinction.

Cloud computing [15], **Software-as-a-service - Saa** [16], **On demand computing** [17] and **Solution accelerators** [18], are just some of the future IT services that are already largely enters the scene. Faster introduction of new technology, their tackle easier application and use, greater efficiency and the availability affect the it to the customers more and more leaning to the exerted „packages“ IT Services, rather than to demand solutions adapted their specific requirements. Their application in the field of education has already started and should only be expected in masovnijoj implementation. [8] [9]

How to prepare for it the future?

- **To Find new ways to obtain and application software that is needed.** New producers and new ways of using their software can strength and new experience, which will in time when economic crisis remain behind us will be an advantage over the competition.
- **Intensifying co-operation with partners**. Executives at any price Requirements to reduce the costs of business may be long-lead in serious difficulties. To avoid, co-operation with partners, find joint way to reduce costs and increase efficiency and research what they expect in return.
- **Learn how to co-operate with the new generation partners and customers.** Old definition partners and customers more and does not apply. New applications, products and IT services educate the whole generation IT professionals who think, faster decision-making and do not utter contempt for the previous standard solutions. [9]

Can these conclusions and recommendations on which think it professionals in the "white world" be applied in Serbia, regardless of the development its market, number of computers in use, and strengths of the Internet users? Of course, because information technology are not familiar with border and only courageous and determined implementation of new solutions can contribute to it industry and in Serbia become what is a long time ago in developed countries - guider and motor development and progress.

II. CLOUD COMPUTING

More and more often we hear, to speak on the new information technologies, for cloud computing. [1] And the Best relevant knowledge on this technology be cannot imagine when it is due to these histories this term. Although it is possible be translated as well as computer cloud, but it is advisable to explain that we know what it is about.

IT development in the market is constantly reported need for innovation and improving the current state of information of composition. Just the inspiration for innovation has led to creation of

cloud computinga. Cloud computing is created as well as the desire IT experts for increase in capacity and by adding new opportunities in their own write without investing in new infrastructure and the need for training new staff and/or purchase new licensed program. Despite really large capacities which offers users, its resources but are not without borders. *Cloud computing* [2] it includes any service which is based on a contract or fee if necessary. IT services that must be performed in real time. Cloud phenomenon computinga increases the opportunity IT. His appearance so far able to increase IT, or use of computers and opportunities program. Progress computer and telecommunications technology improved the possibilities of transmission, storage, protection, processing, and data security.

There are different forms computinga cloud and the different applications that can be build on them. Cloud computing increases speed of developing applications, thus helping so in increasing number of innovations that appear on the market. As it is rather a new thing in IT cloud computing market, he is still not perfect. There are many benefits that customers should use to attract computinga cloud, but will also use them and the problems that can bring. Before the individual user or the organization they decide to use this technological platform should be well informed about possible shortcomings that this technology can bring. Users would first look at who should be all the ISPS IT services can be found in the market and which are their differences. Then they should determine which data they want stocking for such, how these files more sensitive, which cloud computing IT services or platform they best respond, how much space is needed, and the like. The introduction of this technology is certainly not easy thing for organizations. [3]

Some of the advantages of using cloud computinga are:

- Lower price support program in the sense that the user does not buy a new organizational support, but the need for rent over the Internet,
- User is always available to the last, the latest version program support,
- Program support, and the data are available with each computer with which user has access to the Internet,
- Lower maintenance costs and upgrade program support,
- Service is included in professional protection from the virus,
- Flexibility to change and adjustment applications and
- Permanent monitoring and maintaining the infrastructure.

Some shortcomings cloud computinga are:

- Problem of accessibility of,
- Security Problem,
- Problem depending on one server program support,
- Adoption of the new ways development applications,
- The inability simple relocation existing applications and
- A lack of standards for networking applications from different producers, exchange of data, move data as well as program support from „Clouds one producer“ in the „Cloud second“.

Experts who are dealing with certainty and cloud computingom are working to reduce deficiencies that have appeared thus far and analysts say they will most of the problems will be resolved in the near future. It will certainly contribute to a greater use cloud computinga.

Cloud is a very often used a metaphor for access. She comes of the ways in which the Internet means in various types of graph, but the internet infrastructure itself. When it is being used together with new phrase computing the term there is no more same meaning. Access to the data in the cloud" is conducted via web browser or specialized applications.

Cloud computing is still in continuous development. In its development for many different providers of IT services that its offer based on the "computer science in the cloud" (various applications, storage services and filtering undesirable content). [4]

Cloud computing explains the use of more servers, applications, information and infrastructure, which consists of scores computer, network, information resources as well as resources for data storage and program in order to reduce financial costs of users and enable faster and cheaper problem solving. These components can be quickly folded, misinterpreted and of

applied providing model distribution and use of that function at the request of users.

Figure 1. Cloud computing (Source: Nitesh Ambuy)

A. Educational computer cloud

Hewlett-Packard Company and coming - Computer Engineering with the support of Ministry of Education would criminalise computer classroom in the elementary school "Ratko Mitrovic" in New Belgrade. Unlike similar donations some of the other schools, this time the most modern technology used based on "cloud Computingu," which has been generated a unique solution in Serbia, and likely in the region. This solution allows all students, and professors in the school to have their own data and applications in a way that is much more economic, safer, and back office in relation to access to classic in the use computer resources. For each user is provided with this through its own Virtual PC is, and up to 10 times cheaper than standard PC-i, and the functionality and comfort virtual and physical computer is identical to. The students will be able to join their virtual computers and from school and from home, and even through mobile devices. *(http://www.digitalonline.rs/tekstovi/izvestaji/obrazovni-raunarski-oblak-u-os-qratko-mitroviq, 23.* September *2010.)*

Also, using this system it is possible to make a virtual classroom with the students who sit in their schools or at home, and to have highest quality lecturers. It receives and out co-operation between the different schools throughout the country in educational activities in order to exchange knowledge and information. Implemented system to the students to allow work on different projects, which their teachers will be able simply to control and everyone placed tasks with a single source. How is this solution an innovative fact that after knowledge what is developing in this school, HP plans to this project add to their world successful case studies.

III. SOFTVERE AS A SERVICE - SAAS

By comparing a relatively new concept of software as well as services on the web (http://www.poslovnisoftver.net/vesti/u-fokusu/77-softver-kao-usluga) with classic desktop commercial business software, as well as with dedicated developed solutions, one gets the answer to the question when the "Software services as well as best choice?".

A relatively new concept and in the world and in us, but more and more often in use because of its numerous advantages. Company does not tolerate much loading during implementation of such a solution. Of course it has adjustment, but the fact that such a software for its real so the massive scope to cover 90% standard business process is one of its greatest benefits. What is a somewhat shortcoming is if company has some very specific requirements. Then we should think about that or companies try to adapt themselves to software or to seek another solution, though, and it is not a problem because the user may develop a special services, reports, and similar, which only he sees. Such a solution a minimum technical requirements, practically software is working on all platforms because it executes in the web do is open Microsoft Internet Explorer. Windows, Linux, work on MacOS, and almost everything else that can be found on the market supports this form software. It is important to mention the web browsers are now a lot of progress, and that almost all children's diseases last so that the web is becoming a serious business platform. As the costs with regard to software as well as services a lot favorable solution, given that the business processes that are covered by a lot standardized, and is possible is a very easy and simply try software before purchase (mainly through registration on the web site companies which provides this kind of service).

A. *Why but software as well as services on the web?*

We are already accustomed to daily basis we use web applications. Gmail or Yahoo!Mail for e-mail, Youtube video for a review video clips, and other to the as well as domestic web applications (whether you sometimes food items in your shopping cart via web applications donesi.com or

requested translation some England words through sites metak.com?). Experiences are positive!

B. *Why web applications?*

First of all, affordable. Everywhere where it is possible to access Internet and there is a possibility of using web applications! Mobile service providers offer quick access to the internet (Telenor Internet, mts Access, VIP - for now only GPRS,) which will tell you that the possible virtually permanently online.

Second, does not require installation! Virtually everywhere where you have access to the Internet you have "you notice anything" application.

Third, still you have latest version. For firmware applications no longer combined as well as end user, but producer software or company which provides service to use web applications.

C. *What in fact SaaS is the way it is implemented this model?*

The concept software as well as services is actually simple: rather than the producers software license sale the end users, and then implement and maintain software in their companies, producer software is appointed by the software on his server in a given center and provides access to the system via the internet based on subscription.

The Philosophy Behind SaaS model is based on the concept sale software as well as complete sets services in contrast sale licenses software additions without cost of implementation, integration and maintenance. Software ceremonies, mostly, by producer software who possesses physical, technical and human resources for the work, maintenance, and support for software. This should enable the availability software on 24 hours a day 7 days in the week.

D. *SaaS support education in Serbia*

After a year and the first initiatives from Intel in order to raise the levels of education in Serbia youngest students launched a pilot project, titled "One student, one computer". Then, the Serbia visited Craig Barret, then the first man Intela. Elected the school and the two Belgrade municipality and move the computer to the division among elementary schools. In other news Comtrade has provided much-needed initial software for interactive learning.

The remodelling and Microsoft in action teaching methods and learning youngest in the field of modern technology. Stressing the importance development of economy based on knowledge in the Balkan region, the company Intel is today, in co-operation with the company Microsoft and city authorities in Belgrade, organised a conference "Intel-Microsoft Classmate PC's". The goal of the conference was to highlight the importance education and electronic learning system one student - one computer has in shaping the future Balkan region, and in particular of Republic of Serbia, by encouraging development of the economy based on the knowledge and education.

At the event were published, and results of research on representation of Classmate PC from Intel in education systems throughout the world, as well as on their impact on students and teachers. The students and the teachers who were able to use Intelove Classmate PC computers. (http://bozzabench.com/Tests/TestView/tabid/95/id/185/language/en-US/Default.aspx)

Figure 2. "TeachMe" - electronic teaching sanguine about sustaining company Comtrade

An interest in education improvement of the system recognizes the importance in information and communication technologies in education. One of the first efforts to improve quality of education in Serbia, and successful pilot program in 2009, when the Intel Classmate PC computers were introduced to the classroom of urban municipalities Vracar, Rakovica.

"Technology should be closer to children, and to make them more accessible innovative tools for learning. Intel Classmate PC netbuk PC, designed for educational purposes, it is completely changed the way that 2 million students in 50 countries and we want to learn Serbian elementary schools give you the same opportunity," said Andrew Jaukovic, director of the Department for the outsourcing/nearshore Intel business in Serbia.

Figure 3. Classmate PC netbuk PC

Results research "One student - one computer" show that the use of sighted a positive impact on students and their Classmate PC profesore. Positive changes that are related to the students motivation, team work, improvement in knowledge foreign languages (particularly English) and reduction of social differences among the students. Promotion of which is related to teacher the possibility co-operation with colleagues, increase children skills, increase creativity, and adoption of the new pedagogical methods.

Intel Classmate PC computers are for, accessible, easy handling and functional, and intended the elementary schools to the fourth grade. Students provide dynamic, interactive opportunities for collection of information and creating content. As well as a small, portable and affordable computers for general use of and access to applications via the Internet, they provide and teachers tools to facilitate adjustment guidelines and learning settling problems. This computers launches the Intel® AtomTM processor from Intel and Microsoft operating system.

IT companies in the Balkans are developing e-learning system for one student - one computer, developing economic development of the region. Company Intel also supports educational processes in the Balkans through ensuring appropriate program from the Intel® Learning Series collection hardware, software and services specially designed to render for the educational needs.

E. *Microsoft Dynamics for Education*

Success in education administration is in direct relation to the success of business schools. Faced with the budget and limited resources, administrators in education can use Microsoft Dynamics software for learning (http://www.microsoft.com/sr-latn/rs/default.aspx) and experience for optimising students, enable teachers to give all of themselves to meet the needs students, and at the same time, meet high expectations parents, local education authorities and the Ministry of Education.

Microsoft Dinamics offers integrated, fast customizing management software for the management of that allows administrators to manage school in terms of finance, students and teachers. This solution is performed by automation process, so that it is easily controlled by a direct access to all the key information. Microsoft Dinamics applications work and all Microsoft programs.

IV. ON DEMAND COMPUTING - ODC

On-demand computing is a model that allows user to provide access to computer resources as necessary, and not a lot working time It can be to preserve money companies for hardware and software.

Computer at the request is a very popular model in the companies where the computer resources available. Resources can be held in the enterprise user or in the places that are supplied by him to the delivery service.

Model has been developed to overcome common challenges for an enterprise that is not able to meet the requirements active in such industries as efficiently. Future to demand enterprises for computer resource management can dramatically vary from one to another time, maintaining the infrastructure is spent a lot of resources to satisfy demands of users. Likewise, if an enterprise reduces costs for its own maintenance with minimal computer resources, will not be enough resources to meet requirements management.

Computer at the request becomes a is predominantly. Computer Associates, HP, IBM, Microsoft and Sun Microsistems bicommunal vendors are among the IT services. These companies provide this service IT under different names. IBM is called their "On Demand Computing". Concepts such as network computers, the program computer science, autonomous computer and prilagodivo management looks like a very similar concept computer lessons on request. Cooperation with Bloomberg, ZapThink senior analyst, says that the computer on the request a broad category, which includes all other requirements, each of which means something a little different. Guard computer program, for example, the access to the request

which combines external computer resources and infrastructure management to use, based on payment structures.

V. SOLUTION ACCELERATORS

Akccelerators solutions represent a standardized parts of program code which serve as the basis for the development user applications.

Networking storage provides platform for IT departments to achieve a smaller total cost of ownership, improved resistance and greater business. Examples accelerators solutions:

- plan project,
- training program,
- various methods,
- presentations,
- plan testing,
- procedures for the clients,
- technical procedures,
- manuals for ease of use.

Accelerators solutions provide a comprehensive guidelines for the planning, construction and application software solution. They are helping IT professionals to achieve quick refund investments, and at the same time appoint new standards of reliability, performance, security and simplicity of use.

Contain instructions, samples templates for designing and technological files (such as the skripte and files for user-configurable). Instructions for the implementation team will be given in the form guide for the functions which explain in detail each implementation process.

Accelerators solutions are being introduced in order to users as less time spent in search for information that they are interested in.

VI. CONCLUSION

Legal/Justice education [5] is a complex and specific process that must be planned and dataljno search realized on various segments in the structure and processes of education.

Transition time in which we live, imposes the need for better organization and rationalization affairs in the field of education. With modernization all aspects of work and collecting large quantities of various information as possible is to enable quality organization obtained information, processing and their transfer. [10] since that system of education and education should follow contemporary mainstream development society and current generation of students preparing for work and life in the "information age", created the concept information system in education.

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BURDEN OF STUDENTS WITH SCHOOL OBLIGATIONS

M. Josic, E. Tobolka
Tehnical Faculty „Mihajlo Pupin“, Zrenjanin, Republic of Serbia
milorad.josic@gmail.com, tobolka@eunet.rs

Abstract - Whether and to what extent, the school and school obligations burden on students? Some experts believe that students are overloaded with school obligations, and others point out that children are less burdened than before, which is achieved by creating a perfect curriculum, as well as the modernization of teaching. However, this is a very important problem, whose significance stems from the high degree of complexity of the problem. This paper addresses this issue through a presentation of the terms burden and overburdened of students, their aspects and consequences that may ensue.

I. INTRODUCTION

In some studies showed that the average student burden with school obligations, daily and weekly basis, is sometimes more than the working hours of employed people. In addition, as in such situations leads to fatigue, and reduce the effects of learning, there is also endangering the health of students.

Students, parents, and a large number of teachers say that the material that students need to adopt is complex and extensive. It is undisputed, as the progress of science and culture reflected in school curricula and textbooks. Teachers teach comprehensive curriculum in a small number of hours, so they can not reach it works with the students, as the task remains to be done at home. This is one source of student burdening. The dominance of the frontal forms of work and the use of traditional methods of teaching leads to students are not active but passive participants in teaching executives demands.

With school and community factors, very often the parents, because of its ambition, and students, due to unplanned and unsystematic execution obligations, causing the load.

If we take into account the consequences of a large burdening of students, we can say that this is a very serious and complex pedagogical and psychological problems that require fundamental research.

I. THE TERM BURDEN AND OVERBURDENED OF STUDENTS

When we talk about the definition of burden of students, the Pedagogical dictionary says that it occurs when the student is placed on the requirements within a specified time can not fulfill with too much effort, jeopardizing its proper development and his health, or that he was not able to fulfill at all [1].

In the Pedagogical Encyclopedia, burden is considered from various aspects, such as the duration of classes, extracurricular activities, burden teaching material out of school during the day, week, year, how much burden on the scope and depth of the curriculum, homework and extra burden of teachers individual subject then the method, systems and forms of work [2].

Workload and demands that students setting in the school must match their capabilities. Working hours of children, their school and other commitments, should be lower than in adults. A student during the year spend in school, about two hundred working days.

It is important that the notion of fatigue does not interfere with the concept of overburden. Overburden leads to fatigue of students, but fatigue can have many other underlying causes of chronic diseases, mental and physical disorders, social conditions in the family and others. It is not easy to determine the exact border, pedagogical norm from which we could confidently say that the resulting burden of students.

Engagement of students can be examined from several directions. According Banovic, burden refers to the excessive demands in terms of quantity of material, and its redundancy, while neglecting the burden student tuition that does not correspond to their age, or burden due to inadequate methodical solutions [3]. Teaching styles, too, can have an impact on larger or smaller burden of students.

Engagement of students can be linked with the organization and layout of school work. Sometimes students burden a homework they get, and also their obligations outside of school.

Often the parents are not able to realistically assess of their children asking them the best results and taking away the right to play and fun. And that excessive burden is one of the main reasons why students do not do better in school. The cause may be a burden on the students themselves. In the as much as they do not know how to learn, to organize, plan their time, irregularly carry out their obligations, will contribute their own burden.

So, there are many factors influencing the excessive burden of students. It is vital that they detect, analyze, monitor and eliminate the negative phenomena that schools would not be a burden to students, but also a joy and pleasure.

II. ASPECTS OF BURDEN

For the successful operation of schools must seek optimal burden of students. This means that school work should not be for students too light, but not too heavy. However, in almost all the works that examine the problem of burdening students - the authors emphasize the engagement of students responsibilities beyond their mental and physical capabilities.

According to Furlan, the emergence of the burden we have to know, monitor and measure, and not to look at it as an irreversibly emergence, before which we are helpless.

Ivan Ivic talking about the problem of burding with the following three aspects:

1. quantitatively (time) burden of students,
2. intellectual burden (burden volume and weight of the teaching material, how the burden of presenting the content and teaching method),
3. physical and physiological burden of the body - burden of different types of activities and the inability to be in the educational process of replacing a variety of student activities [4].

A. Time burden of students

In the tests (which are performed Biondic, Rozmaric, Furlan, Ivic, Pesikan, Lazic, Krulj, Brkic), there is a figure that time is a big burden on students and that it gradually increases from V to VIII grade.

In the literature there is no complete agreement among authors regarding the method of measurement and evaluation of school obligations. However, according to Ana Pesikan, when we want to determine the time burden of students we can do this by calculating the empirical, real burdens, while we register all real, daily, weekly and annual school obligations of students. The length of time will depend on the grade in which is the student, the days and months, the students abilities, interests, ambition, and the conditions in which they live and work. It will no longer be burdened with a child who is hard, ambitious, but the mediocrity of highly intelligent child who was more carefully in class.

On the engagement of students also affects annual work program of the school through organizing additional, supplemental, selection, preparation of teaching. When added to the above obligations and learning at home, optional classes, and various private commitments (music school, sports training, foreign languages), it is clear that children, even on weekends or holidays can not relax and take a break if they want to achieve all .

Time burden of students with school obligations reduces their time for rest, recreation, leisure interests, which may reflect negatively on the mental and physical development.

B. Burden volume and weight of teaching material

Often we hear from students and their parents that the teaching material is too extensive and that some teaching facilities are not adapted to the age of the child.

When talking about the burden volume of student records do not mean just the time that the student needs to have mastered the material to be thought of the amount of information that a child should be adopted and how it is taught, or to what extent, age appropriate child. The scope and level of difficulty material adapts to the child is based on psychological knowledge of his intellectual development.

There are teachers who believe that if they communicate to the student as much information that more and adopt, as well as those who want to impress their students with the level of their education.

This approach leads to students constantly accumulating information that he is unable to

process all the adopted and hence leads to rapid forgetting what he had learned.

C. Didactic - methodical organization of classes and burden of students

Didactic - methodically organized teaching is teaching that encourages students development and is organized in a way that does not lead to the burden of students and does not lead to its failure.

In traditional teaching the teacher cares more about teaching content, because it commits to the program, rather than taking care of a student to learn the material. In order for a school program on students caused the interest to be as much as possible adapted to the interests of the students have. The curriculum must also be adapted to individual capacities and abilities of students. It is accompanied by material interests of students to learn easier, better and more memorable. Students need more those forms of teaching that allow individualization, independence and activity of all students.

D. Physical and psychological burden on students

In the process of teaching and learning, teacher and student have to invest some energy, understood as biochemical and bioelectric process in the nervous and muscular system. It is a physical quantity since it represents the ability to perform work which is predominantly intellectual in learning, mentally. Energy is also and didactic phenomenon. She provided mental stress and physical strength to achieve the planned tasks. If you do not exceed the allowed limits and not exceed the pathological forms of burden, the increased stress in teaching is one of the most positive factors [5].

Burden with school obligations causes the student has less time for leisure activities, games and more. Prolonged sitting posture leads to stress and spinal deformities, disorders in the bloodstream. Also, many school-related activities, fear of failure of their execution can be a cause of tension, insomnia, which adversely affects their health.

Psychological burden of students depends on the pedagogical measures applied during the teaching mode of teaching, methods of assessment, as a punishment and relationships, both among the students themselves and between teachers and students.

III. THE TEACHER AS A SUBJECT BURDEN OF STUDENTS

Modern curricula, well decorated textbooks, furnished offices, will not help much if the work of teachers is not consistent with the educational requirements if their job is not done well and with pleasure. The teacher's role in the organization, implementation and achieving successful effects in the classroom is of great importance. From the teacher depends a lot: from work, to evaluation of the achieved objectives.

To determine the extent of burdening students by teachers observe the following characteristics: indirect and direct the preparation of teachers, professional conscientiousness and responsibility of teachers, skill in applying established methods and forms of work, cooperation and coordination of the teachers of the same or related subjects, implementation of educational technology and so on.

Specifically, for homework students often have to devote much more time than anticipated. This is because there is insufficient collaboration between teachers in terms of assigning homework.

If a teacher starts with the processing of the material, and that it does not arrive in fully processed during that hour, it will cause considerable damage to previously learned material (during that hour). If the teacher within one hour stay for another ten minutes to end the session, it is better to devote time to establishing the old material but to move to a new treatment, you will not get that treatment in the course of the hour, and will adversely affect the memory of old material [6].

IV. STUDENT PERSONALITY AND HIS BURDEN WITH TEACHING

A significant number of students due to unsystematic work, for unbuilt work habits lead themselves in an unfavorable situation. When you get closer to the time control, written assignments or oral response to evaluation, they strive for a short time to reach missed. On that occasion, invest much more effort and time in service, press the short time period, leading to congestion, and thus fatigue. In that way the knowledge is worse, less superficial and profound. For these students there are also emotional reactions: tension, anxiety, insecurity, insomnia and lack of nutrition. Sometimes, if they fail to overcome anticipated, give up, resort to a variety of justifications, mislead teachers and others. Missed lessons

interfere with follow-up instruction, so the problem becomes even more later [7].

In order to learn successfully and effort invested in optimal limits, it is necessary to draw up a plan of learning within the stipulated time and follow it. No less important is the schedule of daily activities in the planned time for studying.

However, the good the completed schedule of daily activities have no use if it is not respected by the students, so should make a habit of students from the very beginning of schooling.

The student contributes significantly to overload their own if they perform the following activities: does not understand what they learn and do not seek help, poor learning, not motivated enough to work, not attentive in class, overestimate their mental and physical capabilities. For most causes of these reactions and the students and we can influence, but not at all completely.

V. THE CONSEQUENCES OF EXCESSIVE STUDENT BURDEN

All consequences of excessive burden of students can be classified into several groups: educational, intellectual, upbringing and social, physical, emotional.

Educational implications: knowledge is superficial, less permanent, the students are trained in self-education, low level of general and professional knowledge and others.

Intellectual effects: the burden of memory function, dominated by verbal activity, ignored the practical knowledge and skills, students do not have the initiative in their work, not learn to successfully carry out the thought process of the facts and concepts, to recognize the connections and relationships among facts and concepts, as the crowd jammed important and unimportant information, unrelated facts.

Upbringing and social consequences are bad traits as: uncooperativeness, passivity, loss of will, interest, motivation for learning and work, selective, superficial performance of obligations by the students, resort to a variety of justifications, alienation of learning as an activity of students, reducing cooperation , interaction between students and others.

Evident are the consequences of large-scale programs: dominated by "lecturing" classes, the student is a passive listener, saving knowledge arises as a basic form of learning.

Any burden that exceeds the limit of the optimal, adversely affects a child's development and his health and is one of the main reasons why students in school do not achieve better results.

VI. THE IMPLICATIONS OF THE RATIONALIZATION OF TEACHING AND EDUCATION

It is necessary to fundamentally change the position of students and teachers in the teaching process. It should go beyond teaching in which the student is mostly just a listener and observer without sufficient intellectual involvement and active participation in solving the tasks of teaching. It should start from the curricula, textbooks, teachers, methodological lesson organization and the ability to search within this rational burden of students.

Modernization of teaching and learning, involves the improvement of education, based on fitting the technology environment, information society. Normal to seek solutions for change in education that are the result of scientific and technological processes.

Programmed instruction is one of the most advanced and very specific forms of instruction. It is, in fact, this type of teaching in which students independently handle programs that are identified and detailed contents and method of learning, including procedures for notification of the results. This tells us all about the essential characteristics of programmed instruction, on what made it different from other forms of learning [8].

Information technology has enabled the introduction of more efficient management processes and transfer of knowledge. Electronic communication has given the IT era landmark, and is normally considered a change in teaching and learning under the influence of this new culture of communication. Computer symbolizes age of information and culture of electronic communication. Today we can talk about the versatile application of computers in education in all its parts.

VII. CONCLUSION

Experts in their work justified the need to overcome the traditional teaching. This is achieved by streamlining and rationalization of education. As a result of extensive teaching material engagement of students have a lot of information,

leading the implementation of the frontal forms of verbal and teaching methods. Such teaching students tiring, monotonous because they have to listen to and memorize as much. So instead of developing students activity, a solid organization makes students boredom, passivity and hostility towards teaching.

In elementary school, students should gain knowledge and skills that will form the basis for further education and professional education.

For high-quality content of general education students have to develop skills required by modern civilization: communication skills, critical thinking, ethical abilities.

It is important to accept the view that learning have to learn and to acquire knowledge. So from first day in school child have to learn how to successfully learn, to master the techniques of rational and effective learning. Also, make as much as possible of situations that allow students to be active in a position to speak freely, notes, expose and defend their ideas, apply their knowledge to manifest their creativity.

Former education reform dealt with the unloading school obligations, however, the problem of burdening students is still current.

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EIGHT GRADE STUDENT`S MOTIVATION TO PARTICIPATE IN COMPETITION TEACHING OF TECHNICAL AND IT EDUCATION

S. Vojnović, M. Marinković, M. Vidović, V. Jevtić, D. Karuović
Tehnical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
aruena@tfzr.uns.ac.rs

Abstract - The objective of this paper is increase student motivation eigth grade to participate the competition continues TIE. In the wix will be made site in the field of Information tehnology, that students can be helped to participate in the competition continues TIE. Students will be tested by two questionnaire. The authors will first examine the overall motivation of students to participate in the competition continues TIE, and then they will be present site which was created in wix. Then we will conduct another questionnaire and examine the students whether they liked the site presented and whether to increase their motivation to participate in the competition continues TIE.

I. INTRODUCTION

„Competition itself is neither harmful nor beneficial. It became that depending on the organization as a whole, and respectively the method and quality of planning, preparation, implementation and monitoring of the competition". [1] The competitions are designed for students with special interests and achievements in certain fields. The aim is to reveal the students with high ability and motivation through the competition. [1]

II. CONCEPT OF MOTIVATION

The motive is the driving force, the pursuit of some goal; psychological process that supports us to do things. [2]

Children, like adults, find motivation to learn in the various factors that can be divided into external and internal. Some of the external content may be interesting content, obedience, identification with a person who teaches it, rewarding learning outcomes, the desire for acceptance and other. Internal reasons are much more constructive drivers of the learning process. These are innate curiosity and love of exploration and discovery, the need to define the world around them and other motives, different depending on personality, situation, age, etc...

When we talk about the motivation of children for the competition, preference should be given to the internal motivation, because it is self-initiated. This motivation should be encouraged and fostered. [2]

III. STUDENT'S MOTIVATION FOR COMPETITION

The motivation of talented students is a given. They are curious, know more and want more. At school competition can be verified knowledge, make selections, thus eliminating a large percentage of students with the achivement of less than 50% on the test. Reducing the number of participants, reducing costs and, consequently, greater ability to adequately reward the best significantly contribute to greater efficiency of the competition. At the school competition students improve their test solving skills, objectively assess their knowldge, and reduce discomfort due to poor results at the next level of competition. [1]

Competitions are a step forward from the traditional classroom, children are encouraged to demonstrate averment and the self-attestation. The teacher's role in the motivation of children for the competition si undoubtedly great. Apart from the intrinsic motivation that a child feels, it also needs external motivation by not only teachers, but the overall environment in which the child is. A teacher who knows the sources of motivation, how to encourage and awaken it in students, can expect positive results with their competition team. [2]

IV. RULES OF COMPETITION FROM TECHNICAL AND IT EDUCATION

Regulations and rules for competition in the technical education of primary school complies with the ''Expert guidance on organizing competitions and festivals of elementary school'' issued by the Ministry of Education (Number:

610-00-01775//2008-06 in Belgrade 25.12. 2008.). This ordinance arranges the goal, objectives, types and levels, organization, method of evaluation, the requirements for implementation, monitoring and reporting on previous competitions and festivals. [3]

The aim of the competition is to involve as many students to have the opportunity to, depending on the content and type of activities;

- present knowledge, abilities, aptitudes, creativity, positive social values etc. which they have mastered during their development, education, upbringing and socializing;
- compare the results obrained with other participants, in order to motivate them for further advancement;
- assess and determine their realistic results compared to results of other participants, noting the failures, but also the quality in the process of its preparation. [3]

The tasks of the competition are:

Train participants to compare their knowledge, skills, attitudes, creativity, behaviour etc. with the values of other students, and for the students to:

- seek to achieve better results, both individually and as team;
- better and more objectively know themselves and other participants in the competition;
- develop capabilities in emotional acceptance score of the results. 3

The competition is organized at schools, municipalities, counties, cities and the State. This paper will examine how students are motivated to participate in competitions within the TIE subjects at school level. School competitions are organized by schools to separate the most succesful students, who will represent the school at the following copetitions. [3]

V. RULES OF COMPETITION IN THE TEACHING OF TECHNICAL EDUCATION FOR ELEMENTARY SCHOOL PUPILS IN SERBIA

Participation in the competition is achived through the following three elements:

A. Test (test theoretical knowledge)

This element is realized through the quiz, which includes teaching materials and technical education for students of seventh and eight grade cirriculum and teaching technical and IT education for students of the fifth and sixth grades. Students have 60 (sixty) minutes to complete the test. [3]

B. Technical Documentation

The technical documetation shall include:

- General design
- Sketches
- Technical drawings
- Operations-plan
- Tools and materials

In the application for the competition must specify the name of work, type, region and discipline from which the student competes. [3]

C. Demonstration and Defense of the paper

Competition TECHNICAL EDUCATION, area Informatics

- ARCHITECTURE AND BUILDING
- MECHANICAL ENGINEERING (agricultural engineering, transportation systems...)
- ENERGY (electrical engineering, alternative energy sources)
- INFOMATICS AS A FUNCTION OF TECHNIQUE AND TECHNOLOGY
- MULTIDISCIPLINARY WORK (cybernetics, robotics, ecology...)
- PHOTO/VIDEO TECHNOLOGY [3]

The paper will use the discipline INFORMATICS AS A FUNCTION OF TECHNIQUE AND TECHNOLOGY. It will examine how much are students interested in participating in the competition in these areas.

VI. MOTIVATION FOR THE CHOICE OF TOPIC

The motivation for the choice of topic is that we want to abandon the traditional way of working and offer students something different, and therefore try to increase the motivation of eight grade students to participate in the competition teaching of TIE. Teaching Information Technology area that is designated by the curriculum for the eight grade will be done in the wix-shaped site. Students will view the site through a link, and so will be to examine whether they liked the site and present how they are motivated to participate in the contest continued after the introduction of new software that can

help them with the preparation of presentation with which they can participate in the competition.

VII. THEORETICAL APPROACH TO THE PROBLEM

A. Description of the problem

The fact is that students today are less and less interested in participating in the competition. This study presents new methods to increase students' motivation to participate in the competition teaching of TIE. Broader problem is to examine whether and how students are interested in participating in competitions. The narrow issue is to examine whether wix as a new teaching method increases students motivation to participate in the competition.

D. The achieved degree of research

Not found any research that was done in wix in order to increase students' motivation to participate in the competition teaching of TIE.

VIII. RESEARCH METHODOLOGY

A. Subject of research

Point of this research result from need to determine how much students, in eight grade elementary school "Laza Kostic", are exactly interested in competition in the subject IT. Starting from problem definition, subject of research is 'Motivation of eight grade students for participation in competition in the subject IT."

B. Research goal

Basic goals in this research are: inquire students motivation for competition, classified the most usually areas in IT from which students go to competitions and examine if new wix method influence to increase motivation.

C. Research tasks

Based on the goals we will present research tasks by which we confirm or deny posted hypothesis.

Need to exemine:

- are the students and how much interested in competition in IT
- examine the most interesting areas for students
- conduct a poll whether students liked presented site or not

D. Research hypotheses

- Basic hypothesis is:
- there is a chance to increase students motivation for competition by using software created in wix
- Beside this basic hypotheses we could state and auxiliary hypotheses:
- it is possible increase students motivation for competition in IT
- sex of students does not affect the choice for competition

IX. RESEARCH

A. Methods and techniques

In this work is going to be used descriptive and causal method that is based on experiment. The main characteristic of this experiment is to examine efficiency upbringing and education impact. In the experiment we will see two variables: the procedure and the effect of procedure. [1]. Technique which is going to be used is questionnaire. Under the supervision of class teacher the students will be asked how much they are interested to participate in competition in teaching IT.

B. Sample survey

This research will be conducted in a primary school "Laza Kostic" in Gakovo. The study will include two eighth grade classes of 25 students. The research will be conducted during the second semester.

C. Test procedure

For the purposes of this study is need for students to fill two polls in the presence of class teacher. The first survey will consist from that which would be interrogated overall motivation of students eighth grade to participate in the competition IT. Later they will be presented to site-teaching Information Technology unit. Each student will be able to download on his computer the link by wich he or she could overview made site. After that, students will once again give poll, which they will fill in the presence of class teacher. Based on this survey determine whether to increase students' motivation eighth grade to participate in the competition IT and whether they liked the site presented.

X. DATA ANALYSIS AND CONCLUSION

Analyze the first survey which will show the total motivation eighth grade students to participate in the competition and give a graphical representation of the results obtained.

After the presented site, conducted a second survey and determine whether to increase motivation eighth grade students to participate in the competition and whether they liked the site presented and provide a graphical display of results. Then compare the results and give its conclusion on the feasibility of this work. State whether the hypothesis is proved or disproved. If it is disproved write the reason. List the factors that led to confirm or refute the hypothesis. Briefly relate the results of work and make recommendations for further work.

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THEORY AND MODEL OF FUNDS FOR MODELING AND SIMULATION IN TEACHING TECHNICAL EDUCATION

D. Tolmač, D. Dimitrijević, S. Prvulović
University of Novi Sad,Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
dragisatolmac@gmail.com

Abstract - The paper discusses the theory of models, simulations and tools for modeling and simulation. Modeling of the scientific method when natural or artificial structures we study the structure, systems, processes or phenomena that are analogous to some other facility, system, process or phenomenon that for some reason it is impossible to study directly. Modeling is a scientific method of knowledge about the characteristics of models of natural and artificial systems transmit at such hearings.

The model represents a static state of the system. System parameters are not defined as a function of time. The simulation just follows all the system parameters as a function of time and there is a chronology of events in the system changes. Modeling and simulation belong to research and experimental techniques. The simulation is suitable for examining the state of the system.

I. INTRODUCTION

We live in a time of rapid changes, the more requires fast and efficient acquisition of knowledge and its application. At the same time, science, engineering and technology will undergo tumultuous change thanks to the information technology and telecommunications.

Changes and developments in the field of science and technology affect the education system. Application of knowledge is the most important element. In this sense, the educational system of each country is an institution that will ensure that the company adapt to change, to ensure the future itself. It is therefore necessary to introduce into the education system dynamic changes that will provide rapid acquisition of special software tools are expensive and their use-value is reduced because of the frequent presence of those attributes that are important for research or for teaching.

The objectives of the technical and technological education of society to reflect the interest of scientific and technical literacy and for socio-economic development and prepare people for a wide range of science today, and for training those who will develop and direct the future.

This paper contributes to increased efficiency and modernization of computer simulations and technical education classes in our education system [1,2]. Modeling and simulation is extensively used in many scientific disciplines, but in teaching and education it is not present, not sufficiently explored.

II. THEORY MODEL

Modeling is the process of imitation phenomena, objects, processes and systems. The model thus contains only the essential features of the original or real system yet to be built. The model is a simplified aspect of the original. Simple models are the least expensive design, aspire to the ideal model can be easily described mathematically, but have the least validity, i.e. and practical usability. For such a model is said to have a high level of abstraction.

Models of low levels of abstraction, on the other side of the complex models that require functional knowledge. The aforementioned effects of education are largely reflected in the natural sciences mostly on technical education as a subject.

Modeling of the scientific method when natural or artificial structures we study the structure, systems, processes or phenomena that are analogous to some other facility, system, process or phenomenon that for some reason it is impossible to study directly. Modeling is a scientific method of knowledge about the characteristics of models of natural and artificial systems are transferred to an object of study [3, 4].

In the process of modeling we distinguish two types of modeling:

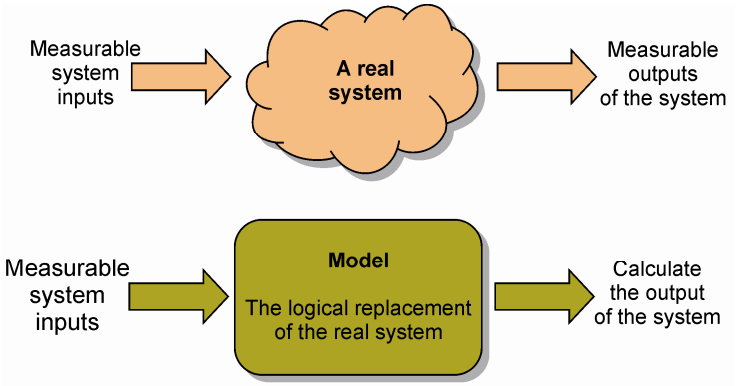

Figure 1. Model and real system

- THEORETICAL MODELING - every thought to the activity with the aim of the research of a phenomenon. Each equation or formula is a theoretical model.
- PRACTICALLY MODELING - means any material product of human activity (implements, tools, machines,) is a real model.

Cybernetics today appointed as the main objective of the research of complex dynamical systems and their functional design model. Such a complex structure modeling:

- An entity that cognitive function algorithm programmed machines,
- Program the machine that makes the algorithm, which imitates the model as a theoretical or modeled,
- Cybernetic machine (a physical model of a mathematical model or algorithm that performs machine).

In a double-reverse modeling process:

- The logic of the reviews is projected into the machine, i.e. modeled by a machine
- Mechanical logic is reflected in the brain.

The complex process of multiple modeling is done through the following phases:

- Natural and artificial models are described by function, to construct mathematical models of systems,
- Mathematical models to represent the technical models,
- Studying the model is studied, and I object, process or phenomenon.

Modeling is a thinking activity-theoretical construction of logical and mathematical systems, theoretical models of some objective system that is realistic models of various types (models, graphs, machinery).

Modeling is a complex cognitive-theoretical and practical, the active process. One definition of modeling is: Modeling is an educational and research procedures during which builds some real or ideal model is able to replace the real object that is being investigated [5].

The main objective of modeling is the deeper and more precise knowledge of an object, phenomenon or process. There are conditions that must be met in order to achieve this goal:

- There must be a similarity between the model and the original (physical, structural, functional),
- There must be a feature of object-original correspondence, i.e. model is a theoretical cognitive, practical and realistic, structural or functional reflection of the original,
- Based on the previous two conditions must be certain about the original

The general definition of the model is limited to a science. According to this definition:

"Every model is theoretical, conceptual, practical and real case studies analog system (S1) by which explores the principal object or system (S0)." The aim of modeling:

- Use the model instead of the real system to a knowledge
- Avoids the risk of the experiment on the real system
- Analysis of the results should provide more efficient management of the real system
- You should not reproduce reality completely
- You need to show (formally described) of the structure or behavior of real systems

Recommendations for model:

- Define a clear line system with the environment - to include phenomena of nature of interest
- Do not make too detailed and complex model
- Include important variables needed to describe the system
- Try to break down the components of the model - some functions of the whole
- Use proven methods for developing algorithms and programs
- Logical and check the accuracy of quantitative models.

III. SIMULATION

The model usually represents the static state of the system, ie the system state that is a function of time. Simulation can track changes in a certain time interval. State of the system is simulated in the model (simulation model) [6].

Zaigler: Modeling and simulation are a number of activities to create models of real system and its computer simulation.

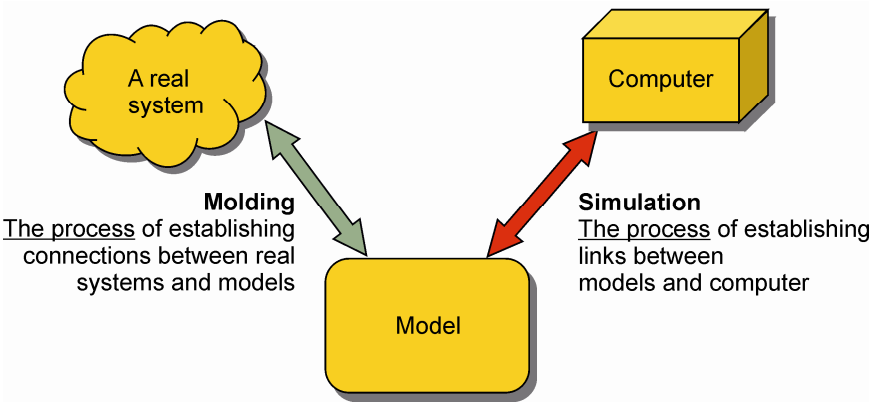

Figure 2. Modeling and Simulation

The system can be studied in several ways:

- Experimenting on the system itself is one way of testing the system but often not the best, because the experiment on the system and the most expensive and often dangerous for life and health researchers. Of course it is a real system that already exists. The experiment on the economic system, transport system and the like. certainly not desirable for two reasons: such an experiment is set in the case of incorrect assumptions of damage can be large.
- The study of the system in another way, using a model or simulation is often practiced as a rule, in
- Many cases give good results. Groups of experts (system engineers) are trying to find a solution and how to reach solutions.
- Mathematical analysis provides a good solution and is applicable for systems of lower levels of complexity. The solutions obtained in this way are idealized. At a higher level of complexity of the system are obtained by a single global solutions, specific solutions to invent some other method.
- Modeling and simulation are typically implemented using a digital computer.

Cases of modeling and simulation are:

- Production facilities
- Banks, post offices, supermarkets,
- Distribution network - transport of materials
- Distribution of water, electricity, gas an EMS
- Computer Systems
- Saobradajni Systems (intersections, ports,)
- Factories
- Restaurants "fast food"

The model represents a static state of the system. System parameters are not defined as a function of time. Simulation monitors all system parameters as a function of time and there is a chronology of events in the system changes. Modeling and simulation belong to research and experimental techniques. The simulation is suitable for examining the state of the system [7, 8]. Digital computers are now increasingly used in the simulation of system behavior. There are two possibilities in the way of simulating:

- The simulation using the simulation language
- The simulation without using simulation languages.

Today, the model for the design, modeling and simulation of the most commonly used computers:

- Analog,
- Digital and
- Hybrid computers

If possible some real systems and models to describe the same mathematical model, then there is a mathematical analogy between the two objects. A mathematical model of computing as a subject in a physical model value mapped and the results of testing physical models can be directly applied to the mathematical model. By setting the input size is measured by the output of which is the required solution of the mathematical model.

Simulation in the broader sense includes:

- Experimenting on real system
- Recording of data on real system- The formulation of the theory
- The construction of conceptual models
- Programming
- Planning of the experiments on the computer.

IV. CONCLUSION

Teaching technical education is directly related to practical work and a great role in this is a workshop for Technical Education. It is important to introduce students to design, preparation, adaptation and use of equipment of varying complexity [9, 10]. Successful learning can be achieved using common, inexpensive devices (table, models, samples of the elements of machines and devices, a collection of electronic components). Using appliances and devices that exist in every household, the student is encouraged to work with teaching at home. It is important for the continuation of education in secondary schools. In laboratories for science and technology in secondary schools, the equipment is already quite specialized and standardized. In almost all laboratories in computer science and business research computers are located [11, 12]. In science labs for technical use of various digital electronic devices, but in laboratories for scientific subjects there are small computers.

New technologies allow the presentation of information or problems in a way that suits the student individually. This allows you to control the volume of unknown facts that are presented to the student, as well as optimization of the motivational states of students. It should enhance and improve the processes that allow for the feedback, which depends on the students' knowledge. Recent trends in the theories of motivation suggest that the feedback itself is neither the information nor that it increases motivation and encourages. The interpretation of feedback is that this is the connection between these two components on which the success or failure of students.

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CREATING PRECONDITIONS FOR KNOWLEDGE SHARING IN ORGANIZATIONS

A. Božović*, B. Milić*, S. Cvetković*, J. Tasić**
*Faculty of Technical Sciences Novi Sad, Serbia,
**Primary School "Mihajlo Pupin", Veternik, Serbia
anabozovic@gmail.com, 26bojana@gmail.com, jeca25000@gmail.com

Abstract - In the age of rapid changes and business globalization, the issue of knowledge management assumes growing significance in creating and maintaining competitive advantage of an organization. This review defines the notion of knowledge and emphasizes its importance as a key resource in modern economy. Furthermore, the authors strive to offer a critical review in reference to the preconditions necessary for the efficient knowledge sharing process in an organization.

I. INTRODUCTION

In organizations whose business is knowledge-based, employees along with their knowledge, professional and organizational experience, interpersonal relations and motivation, constitute the most influential factor in ensuring the company's success. Whether production or non-production, organizations which run their business in a turbulent environment encounter constant and rapid changes resulting in their need to adapt to the changed circumstances. In such business conditions, learning and knowledge are the only contributors in solving a number of problems.

In accordance, the concept of knowledge management has been developed in response to the challenges of permanent changes, globalization processes, ever-growing competition, and to the requirements for achieving organization's goals in the most efficient and effective manner. Knowledge management that leads to creating an added value is one of the top-priority targets of every organization. By means of knowledge management, organizations strive to obtain or to create potentially useful knowledge and to make it accessible to those who can use it and make a maximum effective usage of it in order to create positive effects on organizational performances (King, 2009).

The main problem in the knowledge management process arises from the fact that implicit knowledge, i.e. knowledge which is in the mind of an individual, cannot be managed (Shariq and Thanning Vendelo, 2006). In order to make implicit knowledge attainable, it needs to be converted into explicit knowledge. The codification process alone has no meaning, unless there is the knowledge holders' readiness and wish to share their knowledge with their colleagues. Hans Berends and Peter van Baalen (2011) point in their research that the knowledge holder's will is prominent in knowledge sharing.

The research result indicates that if there are good interactions and relations in an organization, people will be more willing to share their knowledge. Therefore, it is essential to create preconditions for knowledge sharing in an organization by means of creating a trusting environment and an organizational culture to motivate employees in the direction of knowledge sharing.

The aim of this paper is to indicate the importance of knowledge as a resource which has a leading role in survival of an enterprise and in achieving its competitive advantage, as well as the importance of creating preconditions for knowledge sharing as key contributors in successful application of the knowledge sharing concept

II. PRECONDITIONS FOR EFFICIENT KNOWLEDGE SHARING PROCESS

In an organization, numerous reasons exist that inhibit people from sharing their knowledge with other employees. Drummond-Hay and Saidel list several of the reasons (Drummond-Hay and Saidel, 2004):

- "Absence of appropriate gratefulness and praise for knowledge sharing. Results created by individuals, who, by using their knowledge, contribute to the organization's

value augmentation, must be published and spoken of in public, so that other employees could follow their example.

- People are by nature competitive and believe that their knowledge increases their power.
- There are no adequate methods or means to collect or categorize knowledge, or at least the existing ones are too complicated for use. Technology should be simple to use, which is the only way for it to be fully operational.
- People are not aware of those who may be interested in the knowledge they possess. Identifying tacit knowledge of an individual, and how that knowledge can be used in the best possible manner, represents a genuine challenge for a manager.
- Individuals do not share their knowledge because they are not aware of what they actually know."

Stankosky (2005) in his research testifies that some problems exist in the knowledge sharing process. Research results show that cultures which do not support knowledge sharing, as well as a lack of initiative for the same, negatively influence successfulness of knowledge management.

The lack of understanding and time invested in knowledge management, along with an organizational culture that does not support knowledge sharing, and the lack of initiative for knowledge sharing in an organization, are quoted as the biggest problems in the knowledge management implementation process (chart 1). (Stankosky, 2005)

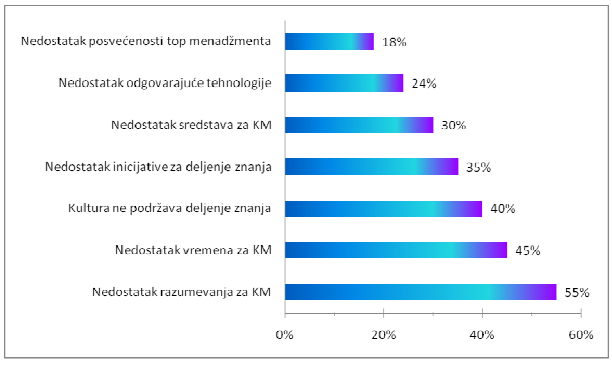

Figure 1. Problems in knowledge management implementation

Lack of devotion of top management

Lack of adequate technology

Lack of funds for knowledge management

Lack of initiative for knowledge sharing

Culture is unsupportive for knowledge sharing

Lack of time for knowledge management

Lack of understanding for knowledge management

In order to design an efficient knowledge sharing process in an organization, it is essential to create an environment in which information is available to individuals, and in which information is adopted, shared, and used by individuals, so they can develop their own knowledge and be encouraged to apply it for the organization's benefit(Harman and Brelade, 2000). Knowledge creates an added value for the organization provided that individuals share knowledge and experience of its application among themselves.

To manage knowledge that individuals in an organization hold, it is essential to motivate and stimulate employees to share knowledge with their colleagues and organization. Consequently, whether employees will allow the organization to use their knowledge depends on the leader, employees themselves, as well as the environment and culture in the organization

III. ROLE OF ORGANIZATIONAL CULTURE IN KNOWLEDGE SHARING

Creation of an organizational culture in which knowledge is properly valued, along with an atmosphere of efficient knowledge sharing, represents one of the radical challenges imposed in practice, not only for managers, but also for all employees of the organization. One of the preconditions of an efficient knowledge management process is creation of an organizational culture that will recognize the significance of collective knowledge in the organization and assist application of knowledge management process in order to put such knowledge into action, in a fashion that will contribute the creation of an added value for the organization.

Yang (2007) revealed in his findings that there was a strong and positive relationship between a collaborative organizational culture and the effectiveness of knowledge sharing.

Authors Becker and Geer offered one of the first definitions of organizational culture, as a set of common cognitions around which activities are organized, and which finds its expression in the language characteristic for groups (Becker and Geer, 1960).

Weinfield and Tiggemann consider organizational culture as a cognitive framework for attitudes, values, behavioral normative, and expectations common for all members of an organization (Weinfield and Tiggemann, 1990). Once determined, these attitudes, expectations and values become relatively stable, representing a strong influence equally on organizations and the people that work for them (Cameron and Quinn, 1999).

Consequently, organizational culture is a very important factor affecting success of the knowledge management program. This is supported by results of the research conducted in 1200 European top companies (Chart 2) which underline precisely organizational culture as the factor of a great influence on the success of knowledge management program (Mertins, Heisig and Vorbeck, 2001).

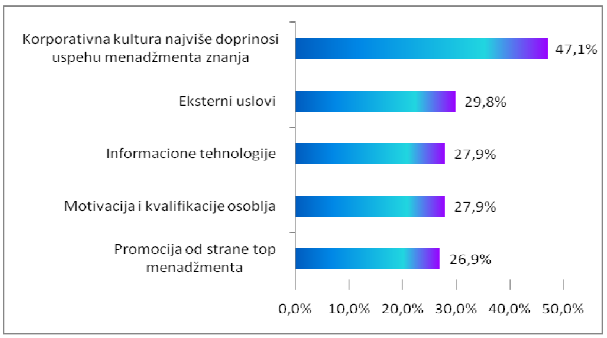

Figure 2. Sectors contributing knowledge management success

Corporate culture most contributes to the success of knowledge management

External conditions

Information technologies

Motivation and qualifications of the staff

Promotion by top management

Therefore, organizational culture represents a driving force that motivates employees to share their knowledge in the organization. In order to be motivating and supportive to knowledge workers, organizational culture should open up the following opportunities for them (Tisen, Andriessen and Lekan Depre, 2006):

- Personal development – possibility for individuals to exploit their full potential;
- Operational autonomy – working environment that enables knowledge workers to accomplish tasks they have been assigned within framework of the strategic direction, complying to self-assessment indicators;
- Task completion – opportunity for individuals to complete tasks as per level, standards, and quality that can make them feel proud;
- Money – earning as a reward for the contribution, allowing employees to share the wealth they created together.

In his work, Lin (2008) studies motivation of workers in the direction of knowledge sharing, and concludes that non-material motivators, such as acknowledgment, praise, promotion potential etc. influence employees to share their knowledge to a greater extent than material motivators (salary increase, profit sharing, bonuses …). The research done by Chang and Chuang (2011) speaks in favour of this statement, according to which people want to share knowledge only if they are motivated, that motivation being reflected in demonstrating the knowledge they possess and improving the image of themselves, i.e. being recognized as experts.

IV. CONCLUSION

Taking into account complexity of modern business environment, globalization, fast and permanent technological development, knowledge workers as carriers of innovative and creative processes, and the knowledge itself as the basis for the competitive edge of an organization, we can rightfully conclude that knowledge management process has the crucial effect for business operations of modern organizations.

The key issue for an organization heading towards strategies of knowledge and for the knowledge management program implementation is in the domain of creating an organizational culture that will support collaboration and trust. If knowledge represents a major resource of modern business as well as a means to achieve a competitive advantage for an organization, then creation of confidence and trust, as conditions for unhindered sharing and spreading of knowledge within an organization, also requires a leader capable of managing knowledge in the organization in such conditions, due to his or her special qualities and skills.

By creating an organizational culture that will recognize, nurture, and reward team working, trust, and knowledge sharing among the employees, a permanent flow of knowledge and information throughout the organization is enabled.

The fact is that knowledge, i.e. human creativity in the perception of world and its processes, cannot be fully managed, but without knowledge management, to an extent and in a fashion that are possible, there cannot be advancement of modern business organizations, or societies in entirety.

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ADJUSTMENT OF INFORMATION LITERACY ACCORDING TO NEEDS OF EDUCATIONAL PROFILE OF STUDENTS

D. Ranković*, M. Bjelica**
*Medical school "Dr. Miša Pantić", Valjevo
**TF "Mihajlo Pupin", Zrenjanin
drankovic@ptt.rs, bjelica@tfzr.unsac.rs

Abstract - The modern way of life, caused by too rapid development of ICT, requires that each individual's possesses for basic information literacy and usage of computer technology. Digital, computer or e-literacy is a person's ability to effective use a computer in his life and work. As it has application in almost all professions to perform various tasks, so it is important for each individual, which is used in daily life to perform the most elementary tasks, sending letters through e-mail, pay bills over the Internet and the like.

I. INTRODUCTION

According to the curricula of primary and secondary schools, the subject of Informatics and Computer Science is studied in primary schools as an optional subject in secondary schools with only 2 hours of exercise per week in first grade, while in high school in all four grades represented only by the natural course and specialized mathematical and IT classes. So students of all educational backgrounds are learning the same information technology curriculum, whether the three-year or four-year educational profile. Students learn only the most basic computer knowledge, regardless of the needs of their future occupation, or the need for further studies.

II. CURRENT STATE OF ART

Our educational development considers computer science as a subject in schools unsatisfactory, and it can clearly be noted, treating information as an optional subject in primary schools and the announcement of even smaller number of classes in secondary schools. The education system must follow the requirements and take care to educate students for life in the modern information society. Current computer science education of students is unsatisfactory which can be seen in the weak capability of most students to apply knowledge in practice and successfully start studying at universities in computer science. The data indicate that our country is among the last countries in Europe in terms of information literacy. The teaching of computer science should enable students to apply of information technology to solve business and other tasks.

III. THE NEED FOR THE STUDY OF INFORMATICS

Today, almost any job can not be done without the use of the modern information technology. Children grow up with a computer as a toy, and in many cases since primary school age-better and more efficiently use computer than their parents and teachers. This knowledge is a requirement for easier access to information, but only a part of general computer literacy of children. For professional and effective use of ICT in their future job performance and work or further education, it is necessary that the education system participates the creation of a modern information society.

This can be done in two ways.

- Introducing of the subject IT with applications for specific educational profile, in all grades of schooling.
- The adoption and implementation of new teaching methods through the study of general and vocational subjects, and using various forms of ICT, students will be on to effectively and responsibly perform future tasks for which are trained in the school, on a new and modern way.

IV. Equipping of schools and teacher training

Equipment of primary and secondary schools by computer technology is different. Almost all schools have a computer lab with some number of computers the connection to the Internet in rural remote areas is extremely rare, while in almost all secondary schools is realized. One can say that in almost half of all schools computer equipment is

pretty old and a little used. A small number of schools have licensed software.

However, far more important is the role of teachers in using ICT in the teaching process. Therefore, the school insists on the digital literacy of teachers, with emphasis on the skills of teachers necessary to improve their Internet searching knowledge, exchange experiences with their colleagues, create a multimedia preparations of lectures carry out the hour in class. With the help of computers it is possible to systematize and reduce the job of keeping school records at the school level, as well as the entire educational system. Messaging and Internet communication can be useful for communicating with parents of students also with students who are temporarily disabled to come to school, as well as with the offices of the Ministry of Education, which is the daily needs of the schools, which is done via the Internet quickly and efficiently with arbitrary number of participants in communication, preserving the paper trail.

V. STUDENT'S INFORMATION LITERACY

In addition to basic literacy, reading and writing, is increasingly important to talk about computer literacy. The information literacy of students mean:

Using computer technology and the Internet, having certain knowledge for finding necessary information and their use for performing the requirements of a given profession for which students are encouraged.

IT education includes:

- Awareness of the need for information,
- Knowing how to find needed information using ICT,
- Storage and reuse of knowledge required,
- Awareness of the constant, ongoing need for further learning and training.

Computer literacy of citizens in Europe is measured by number of persons able to use computers in their daily activities. This applies to pupils, students and staff, as well as the aged and disabled people with a computer can use to pay utility and other financial obligations, shopping and more.

Report of ECDL foundation from Dublin, established by European Commission

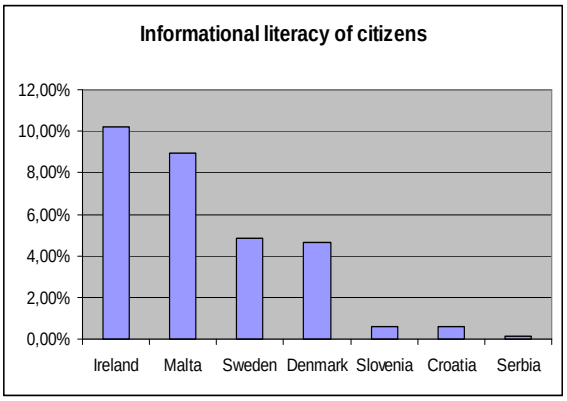

Figure 1. Computer ***literacy of citizens in Europe***

Serbia in the IT skills of employees, according to European statistics, is lowly rated late six times comparing Slovenia and Croatia, and even 30 to 90 times the European Union. More than eight million Europeans have ECDL - "European Computer Driving License", which confirms the level of training for computer skills. This certification, at the end of 2012 year, will acquire another 20 million, while Serbia has only 10 500 IT literate population.

There are many consequences of this state of art in informatics in Serbia. The delayed implementation of new technologies has a very negative impact on all sectors of the economy. The system of e-government that exists in the EU there is a long time, a system of electronic health, electronic education, declining investment in computer equipment, personal presence of citizens to administrative counters is ten times greater than in the EU.

Electronically we can buy foreign goods and services, but the bus fare home or the domestic product-very rarely this is incomprehensible, because the number of computers and internet connections are behind less than in the general.

VI. CONCLUSION

In contemporary society, IT has become a basic infrastructure for daily life and work. The development of quality personnel who are able to apply information technology is a prerequisite for overcoming the crisis and long-term development of Serbia.

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PREREQUISITES FOR DEVELOPING THE COMPETENCE "SENSE OF INITIATIVE AND ENTREPRENEURSHIP" THROUGH STUDENTS' TECHNOLOGY EDUCATION

S. Plachkov
South-West University "Neofit Rilski", Department of Education, Blagoevgrad, Republic of Bulgaria
pla4kov@swu.bg

Abstract - The aim of the article is to determine the theoretical, normative and practical prerequisites for the development of the key competence 'sense of initiative and entrepreneurship' through the technology education of the students in high school. Points of support in completing this task are sought in the contemporary situation in modern pedagogy and in the quality changes which have already taken place in the education process. Arguments have been pointed out for the innovation potential of the methods for entrepreneurship training through the acquisition of the basic economics elements and encouraging of enterprise in the youth. The expected curriculum changes have been outlined on the basis of the Bulgarian education experience.

I. INTRODUCTION

If we have to put the questions in common terms, the matter discussed here can be melted down to; 'What is entrepreneurship and does it have its grounds in secondary education?' The review of different education systems and curricula in a number of developed countries in Western Europe as well as in the States and Russia shows a serious orientation towards entrepreneurial training in both curriculum contents and practical training for both university and high-school. In Bulgarian experience, the problem of entrepreneurship is largely discussed in the curricula of higher education institutions and in professional high-schools.

The defining of the sense of initiative and entrepreneurship as one of the key competence by the EC[2], however makes it clear that this key competence should be developed in all types of high-schools and all levels of secondary education. It is necessary to systemize the character of entrepreneurship encouraging education because this type of education has the contents and methods to activate the personal development of the individual and most importantly to stimulate the initiative and the ambition to deal with problems in real-life situations. There are difficulties as far as the didactic aspect of such a type of education is concerned, especially in the integration of the entrepreneurial training and technology training of the students. The problems are mainly related to the designing of the curriculum and the conflict of opinions when decision has to be made if entrepreneurial training should be a separate subject or a matter of integrated education. The programmes and initiatives of Junior Achievement Bulgaria[1;7] have led to some good practices in encouraging enterprise, especially in the elementary level of education and the professional secondary education in Bulgaria. While the new Law for Pre-School and School Education is being made the question of a including entrepreneurial training in school curricula is still up-to-date. The main problems are linked to the lack of knowledge and active attitude towards the matters of entrepreneurship which in the developed countries has gained an important status and has clearly defined contents.

II. PREREQUISITES FOR ENTREPRENEURIAL TRAINING

The first and main prerequisite should be studied theoretically. As it is well-known entrepreneurship is mainly related to the undertaking of an 'enterprise' by an 'entrepreneur.' Some specialist believe that the terms 'enterprise' and 'entrepreneur' are close in meaning to 'business activity' and 'an owner of a small business,' however, their very nature does not allow seeing them as synonymous. The specific behaviour and way of thinking of the entrepreneur make him an object of multi-disciplinary analysis- economic, psychological, historical, sociological, etc. Historically, there are many examples for the place and the role certain

entrepreneurs have played in countries like the USA, Canada, France, Italy, Sweden, Holland, etc. Enterprise combined with the proper economic and political prerequisites has turned these countries into world leaders shaping the modern society development and prosperity. The enterprise models generated in these counties were called 'cultures of capitalism' [6] and as such have been adopted in countries like South Korea, India and Brazil which together with prosperous China have increased the number of the world economic leaders. One of the first authors to speak about entrepreneurship is the French economist and businessmen of 19th century Jean-Baptiste Say. He shared his liberal ideas for competition, free trade and no limits for business and entrepreneurship in his work 'Treatise on Political Economy' (1803). Say characterized the activity of the entrepreneur as 'qualified labour' and defined the entrepreneur's income as a 'salary.' It was him who for the first time paid attention to the importance of entrepreneurs in the social and economic development which is based on three main branches- manufacture, agriculture and trade. In his terms the entrepreneur is an individual who is very well acquainted with the activities concerning his enterprise, takes direct responsibility for the completion of the enterprise while investing his own or other people's funds in it. It is not difficult to imagine why people of this kind were at first also called adventurers. [4,78]. What Say points out is the necessity of a complex training of the entrepreneur in the fields of the procedures of manufacture, organization of management, transportation, trade, prices, currencies, currencies rates, markets, etc. In Say's terms, entrepreneurship is of 'a greater importance,' of a higher value than the routine activities of manufacture, and therefore 'it is no surprise that the labour of the a good farmer is less paid than that of a good tradesman.'

Despite the differences between the economic theories and schools, the model nowadays applied in entrepreneurship was developed and offered to the public in 1942 by the Austrian economist Joseph Shumpeter[5]. He based his model on technology, innovation and economic growth. Shumpeter believes that due to the so called 'entrepreneurial impulse' the activities of the entrepreneur lead to the innovations on the micro level in production, technology, markets and distribution, materials used, intermediate goods products, principles of organization and structure of management. The entrepreneur, however, does not simply execute the duties of a manger of an enterprise. His psychological portrait, according to Shumpeter is based on an extraordinary approach, on the ability 'to go against the flow' and 'to destroy in a creative manner.' The entrepreneur is the 'engine of progress,' he is not a professional in a narrow field, (probably the reason why there is no such a profession), he is a leader, a 'stimulator' of progress, he has a special attitude and approach in breaking manufacturing stereotypes, material supply dependence and dealing with inefficiency of labour power. Main characteristics of the functions of the entrepreneur include his strive for dynamics of productiveness, applying competition pressure, increasing of income and most importantly his ambition 'to get things done', i.e. the realization of the initiative and the achievement of a final result. This model of entrepreneurship is the basis of an innovative method nowadays used in education called 'learning through doing.' This method gives the methodology of technology education in high schools an innovation potential that should be fully used if we want to actually realize a modern practical technology education and not only to constantly improve the contents of its curriculum only. This potential will help secondary education in functioning within the context of the life-long learning paradigm and within Europe as a competition-based economic zone where the economics is developed on the basis of knowledge.

The second prerequisite for entrepreneurial training in school education is of practical character. It is based on the experience of Junior Achievement World wide (JAW) organization and its regional branch Junior Achievement – Young Enterprise Europe(JA- YE). JAW is a leading organization in the field of economics education of young people between the age of 6 and 25. The organization was founded in the USA in 1919 and has the longest tradition in applying educational programmes and courses for developing entrepreneurship through the innovative methods of 'learning through doing'. Junior Achievement has been working in Bulgaria since 1997 and has since then organized 23 educational courses for over 44000 students in 115 towns and cities which have been attended by 627 teachers from 292 schools. As a result of their work, there are now 500 student companies functioning and their activity is supported by over 200 corporations, including Hewlett–Packard Bulgaria, Nestle Bulgaria, also, the Government, and the President

institutions and a number of non-governmental organizations. The expectations are that encouraging enterprise in youngsters will lead to:

- Developing of personal ethical and leading quantities in the growing generation;
- Stimulating the forming of economic thinking and entrepreneurship;
- Stimulating critical thinking when solving problems related to real-life situations;
- Self-identification of the individuals as consumer and owners of a particular business;
- Stimulating of the 'learning through searching and finding' experience and the 'learning through doing' in programmes such as 'Young Entrepreneur', 'Manager for one day', 'Virtual enterprise.'

The third prerequisite can be found in the context of the reference documents of the European Council, namely:

- The Bologna Declaration
- (June 1999, harmonization of the objectives of the educational policy for the creation of a single European educational space);
- The Lisbon Council
- (March 2000, the continuing education and retraining are defined as one of the characteristics of the knowledge society);
- The Brussels Communiqué
- (February 2003, major emphasis is placed on the cooperation between the educational institutions and the business towards achieving the highest possible results in terms of human resources);
- European Parliament
- (December 2006, recommendations concerning the key competences for life-long learning);

The reference framework of the key competences was developed and approved by the European Parliament on this basis, where a definition and composition of components is given for each of the eight key competences [2]. The competence 'sense of initiative and entrepreneurship' is described as follows:

- **Definition**: the ability of the individual to transform ideas into actions through expression of creativity, innovation, taking risks and responsibilities associated with planning and management of projects of personal and social significance based on ethical norms and values of general importance.
- Composition of the competence 'sense of initiative and entrepreneurship':
  - Knowledge:
    - knowing the environment, in which people live and work;
    - searching and exploring opportunities for personal, professional or business activities;
  - Skills:
    - identifying and assessing one's own strengths and weaknesses;
    - individual project work, collaboration and teamwork;
    - evaluating and taking acceptable and justified risks;
  - Relations:
    - activity and independence in decision-making;
    - innovation in the personal and public life;
    - motivation and determination in accomplishing the set personal and society goals;

The fourth prerequisite arises from the objective socio-pedagogical situation. The main accents here are the current state of the labor market and the qualitative changes in the educational process.

The labor market is characterized with:

- reduction of the employment in the public sector;
- unstable industry employment;
- increased proportion of employees with higher level of education and qualification;
- inadaptability to the labor market situation;
- low-skilled workforce in Europe (one third);

The educational process is characterized with:

- orientation towards the individual

(the student – the center of the pedagogical interaction);

- learning in and through experiencing;
- learning through interaction and cooperation;
- Japanese experience summarized in three words – computers, communication, quality;
- project-based learning;

III. ENTREPRENEURIAL TRAINING IN TEACHING TECHNICS AND TECHNOLOGY

It is clear that entrepreneurial training aims at integrated development of the personality of the children. In this regard, positioning it within a school subject is a complicated task that is being discussed in two aspects: educational policy and educational practice. The abovementioned prerequisites leave no doubt that this is necessary, but the question is where and how. As in many other European countries, the training in the high school system in Bulgaria is focused on cultural and educational areas, which are composed of groups or individual general subjects set with a standard. In this state of standardized school curriculum, it is extremely difficult to differentiate a new subject as this would cause the Pandora's Box effect. Nowadays entrepreneurial competence is important for the adolescents' behavior, but so is integrative knowledge about ecology, digital world, health and hygiene, transport, economics, technology, etc., and placing these different competences and types of knowledge in new separate subjects not only runs contrary to the present design of the contemporary school curriculum, but also to the subject character of the training in the modern education of the 21st century[3].

The Bulgarian experience that respect is related to the formation of economic competence within the cultural and educational field "Customs and technologies", whose mission is primarily aimed at the formation of technological and digital competence. In accordance with the abovementioned accents of the modern social and pedagogical situation, educational standards need to undergo adequate changes to allow integration of entrepreneurship and technological training while keeping to the following principles of the educational process: expediency, orderliness, consistency, accessibility, feasibility, measurability. A meaningful and methodical core **"Organization and Economics"** with an age-appropriate context of practical activities is developed together with the technical and technological training set in the nuclei **"Design, planning and evaluation of technological processes and objects"; "Domestic and industrial equipment"; "Processing assembling and combining materials, products and modules"; "Communication and control in the domestic and labor processes"; "Agro- and zoo-technologies".**

The expected results from the individual student in developing sense of initiative and entrepreneurship in the period 5-7 grade (12 – 14 years old) will be the following:

1. For 5th grade:

- Describes and distinguishes between different industries, commercial activities and services;
- Understands the importance of the natural and human resources in the production of goods and services;
- Prepares the calculation of the manufactured product;
- Knows the different types of income and expenses in the family and prepares the personal and family budget;

2. For 6th grade:

- Identifies the firm as a typical unit of production, trade and services;
- Distinguishes between capital and production resources;
- Calculates the cost and price of the manufactured products.
- Compares prices of identical products and justifies his choice according to specific criteria (decision matrix);
- Identifies the entrepreneurial resource as a special type of human resource;
- Understands that entrepreneurs show sense of initiative, independence and innovation, and take risks in order to make profit;
- Develops a conceptual design for a small farm;

3. For 7th grade:

- Indicates the main features of the modern farming, fields and industries and the factors of its development;

- Combines the necessary resources (natural, human, capital, entrepreneurial) for the development of a project for economic activity;
- Describes the stages of production of goods and services – supply, production process and distribution of the product;
- Distinguishes between the specificities of the individual and group organization of the production process;
- Understands the importance of the marketing, advertising and investments for the successful organization of entrepreneurial activity;
- Accepts the rivalry as economic competition between the people and the firms.
- Develops virtual design of a small company producing goods and services, which contains the main stages of the economic activity.

The development of entrepreneurial competence integrated with the technological training of the students should continue in the high school stages of their education: first high school level (8^{th}-10^{th} grade) and second high school level (11^{th}-12^{th} grade – Specialized professional training).

IV. CONCLUSION

The components of the key competence "sense of initiative and entrepreneurship" have integrative nature and allow continuity of the process of their formation in all stages of secondary school.

Integrating entrepreneurial training with the technical and technological education of the students is possible if within the educational contents standard there are well-argued and defended cores of summarized topics and subtopics guiding students to learn through doing, which will stimulate their sense of initiative towards innovation and encourage them to apply the principles of entrepreneurship in solving real-life situation problems.

Thus entrepreneurial training will become part of the general educational curriculum, it will smooth the progress of the transition to professional education and choice of career, and hopefully, Europe will turn into a competitive economic zone, where smaller countries, such as Bulgaria will also achieve prosperity.

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THE EVOLUTION OF E-LEARNING IN SERBIA

J. Radanov, A. Jović, Ž. Branović
Technical Faculty "Mihajlo Pupin", Zrenjanin, Srbija
jelena_radanov@yahoo.com

Abstract - Development and use of information and communication technologies have transformed modern society in the "Information Society". Its main feature is that the information and communication technologies play a central role both in production and economy, and in all other aspects of life of individuals and society as a whole. In the past five years, the Republic Statistical Office of Serbia conducted a research on the use of ICT (information and communication technologies) and the results will be presented in this paper. The use of computers in education is no longer the exception but the rule, learning with the help of modern communication and information technology becomes better, faster, easier and more interesting.

The aim of the Digital Agenda Serbia is that all children have the same chances and opportunities in education, with a special emphasis on the project "Digital School" which goal is that all schools in Serbia have modern computer equipment cabinets. Finally, e-learning has already revolutionized the educational patterns in all areas. E-Learning is not limited to the boundaries of academic institutions like schools, colleges and universities but is applicable to all kinds of areas where leaning is a continuous process.

I. INTRODUCTION

There has been a spectacular development in the use of e-learning in the past few years, and consequently, computer-mediated communication has attracted more attention. When e-learning was introduced, it had created excitement among researchers and practitioners. Many educators and researchers had high hopes for e-learning, believing that it would provide more access to information and communication, and would ultimately lead to anew revolution in education.

E-learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers, but it will likely evolve into systems consisting of a variety of channels (wireless, satellite) and technologies (cellular phones, personal digital assistants) as they are developed and adopted. E-learning can take the form of courses as well as modules and smaller learning objects.

II. E-LEARNING DIMENSIONS

A. History timeline of e-learning

E-learning evolved gradually through the phase of time. Computers and Internet are major roles in bring e-learning to what it is today. Education has various standards in many countries and regions. Software's are designed to meet various these standards and academic curriculum.

The E-learning models of today are analogous to the earlier distance learning approaches. The roots of E-learning can be, therefore, traced back to the correspondence course model of learning. One of the first correspondence programs in the U.S. was developed at Pennsylvania State University in 1892, where the main mission was to provide higher education access to remote and rural areas. In later years, the correspondence model was further developed into a more robust distance education program with the integration of technology.

In recent years, the knowledge-based economy has exhibited a pervasive and ever increasing demand for innovative ways of providing education and this has led to dramatic changes in learning technology as well as organizations. As the new economy requires more and more people to acquire new knowledge and skills in an appropriate and effective manner, the advancement of computer and networking technologies are providing a diverse means to support learning in a more personalized, flexible, portable and on-demand manner. These radical and sweeping changes in learning needs and technology have catapulted a revolutionary transition in modern learning tools in the backdrop of the internet, commonly referred to as e-learning.

Today, live instructor led training (ILT) via the Web can be combined with real-time mentoring, improved learner services and up-to-date. This growth in Internet, Web enables instructors to deliver high quality content directly to the users. With the evolution of PDA (Personal Desktop

Assistants) and Smartphone and wireless technologies such as WLAN (Wireless Local Area Network), GPRS (Global Packet Radio Service) web based contents and emails can be accessed from anywhere, anytime. These enhanced training solutions provide greater cost savings, higher quality of learning experience and are the educational standards are being revolutionize and changing toad opt e-learning as the basis for many educations levels.

B. Advantages vs. disadvantages

Every application has two sides. E-learning has its advantages and disadvantages. The advantages can be summarized as follows:

- Flexibility, accessibility, convenience
- Multimedia capability
- Increased reliability
- Cross-platform capabilities
- Web browser software and Internet connections are widely available
- Inexpensive worldwide distribution
- Ease of update
- Just-in-time, personal, adaptive, user-centric.
- Travel cost and time savings.
- Can take it multiple times (improved retention, comprehension).

On the other side are disadvantages:

- Access capabilities
- Internet connection speed/bandwidth
- Cost (longer development time)
- Developer limitation
- Type of content (not all content is suitable for e-learning)
- Learner motivation and initiative
- Loss of a live (physically present)
- Portability
- Implementation barriers

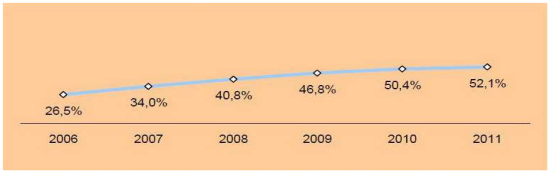
III. THE USE OF ICT IN THE RUPUBLIC OF SERBIA IN 2011

The Republic Statistical Office of Serbia has conducted two researches about the use of ICT. The first one was related to households and individuals, and second one included companies. These researches were performed in 2011 by Eurostat methodology. Household surveys conducted in the two-stage sample, which was stratified by the criteria of urbanity. The sample was allocated to the areas of central Serbia (without Belgrade), AP Vojvodina and Belgrade, in proportion to the number of households. This sample included 2400 households and 2400 individuals. A survey was performed by telephone and, in addition, it was allowed intermediately answering (giving answers instead of the absent person).

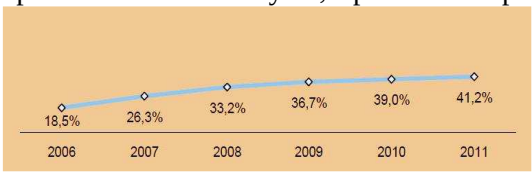
A. Computers in households

Figure 1. Shows the presence of computers in households.

The main results of this survey show the fact that 52.1% of households in the Republic of Serbia



own a computer, which was an increase of 1.7% compared to the 2010th year, up 5.3% compared



to 2009th year. Presence of computers in households varies depending on the territory, for example in Belgrade is 61%, 53% in Vojvodina and in central Serbia is 47.2%.

C. Internet in households

Figure 2. Does the household have Internet access at home?

In Serbia 41.2% of households have Internet access, which is an increase of 2.2% relative to 2010th year, 4.5% compared to 2009th year and 8% compared to 2008th year. Belgrade has the largest presence of the Internet connection that is 51.6%, next is Vojvodina with its 42% and finally, central Serbia has 36.3%.

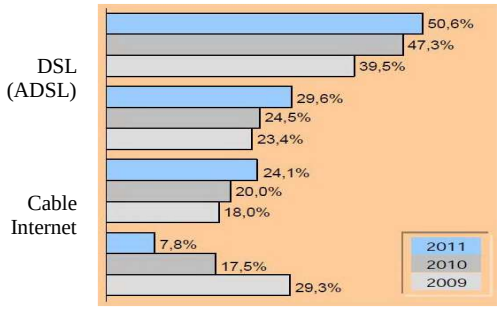


Figure 3. Types of Internet connection.

Regarding to access the internet (connection types), households were able to choose multiple choice answers. According to these results, the total households that have Internet access, DSL (ADSL) has 50.6% of households, 29.6% cable Internet, WAP and GPRS 24.1% of households, and modem connection has 7.8%. The results show reduction of use dial-up connections by 9.7% relative to 2010th year and 21.5% compared to 2009th year. This is primarily due to growth in the use of broadband (broadband) connection.

Figure 4. Broadband Internet connection in households

Broadband (broadband) Internet connection not only allows faster access to the Internet, but changes the overall way of using the Internet. It allows download (download) information from the Internet at significantly faster than the traditional method (dial-up) modem connection. In accordance with this, as one of the main indicators of development of ICTs in European Union since 2005th year, is the percentage of households that have this kind of Internet connection. In Serbia, 31% of households have broadband (broadband) Internet connection, which makes increase of 3.4% relative to 2010th year and 8.1% compared to 2009th year. Presence of these types of Internet connections is the largest in Belgrade and it is 43.4%, 28.8% in Vojvodina and lowest is in central Serbia 26.5%.

IV. SERBIA IN THE DIGITAL ERA

In the coming years action "Digital Serbia" will include many activities in the field of e-business, including e-governance, e-commerce, e-justice, e-health and e-education, but also in the area of Internet development and communications infrastructure. With these activities electronic services will be available to citizens in all parts of our country. The priority of the Ministry of Telecommunications and Information Society in the coming period will be improving the implementation of ICT at all levels of education, including secondary and higher education. The "Digital School", "Click Safely" and AMRES (Academic Network of Serbia), are all parts of the project "Digital Serbia" through which the Ministry of Telecommunication and Information Society will implement the priorities of "Digital Agenda for Serbia." This agenda consists of Society Development Strategy and the Strategy of electronic communications that are aligned with the priorities of the "Digital Agenda for Europe".

A. "Digital School"

The "Digital School" is a great step forward in education, because the process of digitalization of society is very important for citizens, and investing in young people and their education is crucial, because they represent the future information society.

The program "Digital School" includes the furnishing of modern computer equipment 2910 of schools, which makes over 95% of total primary schools in the Republic of Serbia. 1589 of schools will be equipped with digital classrooms, a 1321 lap-top computers and projectors. The implementation of this project is to enable that every school in Serbia gets a modern computer-equipped cabinet, which will provide that all pupils can use the computer.

In addition, the program includes small and rural schools with few students attend, and they are provided with laptop computers and projectors. Of special importance are digital cabinets that are installed in schools that belong to extremely underdeveloped local government units. The digital classrooms, besides information technology, pupils will be able to learn other subjects in an interactive and interesting way, in terms of learning that have their peers in the European Union.

Figure 5. Digital classroom in the elementary school Dr Jovan Cvijic, in Zrenjanin.

Installation of digital classrooms was conducted in Zrenjanin, too. Zrenjanin has eleven elementary schools and one secondary school with digital classroom. These schools are: "Jovan Jovanovic Zmaj", "Djura Jaksic", "Zarko Zrenjanin", "Sonja Marinkovic", "Servo Mihalj", "Petar Petrovic Njegos", "2nd Oktobar", "Vuk Karadzic", "Dr Jovan Cvijic", "Dositej Obradovic" and elementary and secondary school "9th Maj". Overall, Zrenjanin municipality has nineteen schools witch have digital classroom. The number of computers in these schools depends on the number of pupils, and it goes from five to thirty. The competition "Digital Hour" is in the framework of Digital School and the main idea of the competition is to motivate teachers on the greater use information and communication technologies in education and thus contribute to the further development of information society in Serbia. This contest is announced with the aim that all digital cabinets received by each elementary school in Serbia, a project that began the Ministry of Telecommunication and Information Society and successfully completed the Department of Digital Agenda, are used for all subjects in the classroom. Therefore, this is one of the largest projects of its kind in the world.

B. "Click Safely"

Through organized training for teachers, as well as overall information campaign of Ministry of Telecommunications, shows the importance of proper and safe use of the Internet. In the global campaign "Think before you start" Ministry of Telecommunication and Information Society campaigning "Click Safely" to protect as much as possible of children who use the Internet from the potential dangers of this way of communicating. Within the campaign "Click Safely" that was initiated in order to protect the safety of children on the Internet, the Ministry of Telecommunication and Information Society of Serbia organized a series of educational meetings for psychological pedagogical services, counseling of parents and interested teachers in primary schools in Serbia. Project training on safe use of the Internet is realized with the support of the Ministry of Education of the Republic of Serbia.

Figure 6. Presentation of the www.kliknibezbedno.rs site.

Figure 7. Example of brochure for educating the children.

www.kliknibezbedno.rs site includes a number of educational brochures and presentations, both for children and for teachers and parents. In the category of "materials" parents can take an interactive presentation of "Small online school for parents" which can offer them closer information about how to better monitor their children's activities on the Internet, as well as to offer them the right advice.

As we have already mentioned, "Click Safely" campaign, supported by the Ministry of Telecommunications and ICT companies, educate the youngest members, their parents and teachers. In this way children are encouraged to use new technologies appropriate to their age, to recognize and properly respond to the challenges of modern communication in the way to expand perspectives and meet only a useful and entertaining side of communication via new media. Telecommunications industry is rapidly changing, so only active use of new media can acquire contemporary knowledge, have a look at the latest achievements, be in touch with their peers and grow into a modern person of 21st century.

C. AMRES (Academic Network of Serbia)

"Academic Network of Serbia" (AMRES) is a scientific research and education computer network that provides modern information and communication services and Internet connection for its members. In early '90s, AMRES was created by linking several major universities.

Figure 8. Topological map of AMRES.

Today is one of the most advanced computer networks in Serbia, with over 150 associated scientific research and educational institutions and

has more than 150,000 active users. Thus, AMRES is one of the most important resource scientific research and educational work and the holder of the information society.

By establishing this portal to support e-learning within the AMRES, academic society of Serbia offered a platform for developing electronic content related to university teaching, as well as a channel for sharing experiences and disseminating information on current practices.

AMRES eLearning service is aimed to modernize the teaching in universities using a variety of computer and communication technologies. The service is based on the MOODLE platform, high performance computer and it is designed for professors and assistants who want to implement eLearning technology in teaching.

I. CONCLUSION

Education is a planned and organized knowledge, skills and habits, the process of encouraging and developing the overall capabilities figures. It can be said that is lifelong, but different in form, content and methods. Education is conceived as a personal process. Emphasizes the importance of education "itself" and in this respect, it is constantly improving and monitoring of new trends in education that bring information and communication technology.

E-learning as a new form of education, has become an indispensable part of modern methods of education, whether in the formal education or other forms of education that occurs throughout life.

The development and rapid expansion of the Internet, have led to the opening of numerous opportunities in the field of e-learning. Today, e-learning is realized partially or completely based on web technology.

The development of the Internet as a global phenomenon has contributed that Internet has become the most popular system of mass communication. Internet brings many benefits that are reflected in the fact accessibility of huge quantities of a wide variety of information and communication possibilities. However, on the other side, it brings some much risk, such as fraudulent misrepresentation and hiding locations from which to take certain action. This is why it is necessary continual education of Internet users, which is one of the unavoidable segments of internet safety, in terms of new risks that may arise on the Internet, the way how to recognize certain malicious activity and how to protect users.

In this sense, the program Digital Serbia, which includes the campaigns described in this paper, is extremely important and provides a major contribution to raising the awareness of users, particularly children, about the potential risks, and further development of their knowledge.

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E-LEARNING

S. Pantić, Ž. Branović
Technical Faculty "Mihajlo Pupin" Zrenjanin, Serbia
sanjapanticka@gmail.com

Abstract - ICT implementation in learning strongly influences not only each basic element of learning individually, but learning as a complex as well. Influence is being manifested in different ways and with different intensity. The final form of learning with significant usage of ICT is known as e-learning. Learning as a serious process requires a thorough preparation of a complete realisation. Every such preparation should necessarily have a predictive character. Within e-learning assignments are divided among members of a team that prepares and realizes learning. In this spirit, a teacher shares his responsibility with other team members: a designer, a tutor, a manager etc. depending upon a total number of team members. This paper will demonstrate the advantages and disadvantages of e learning and development of e learning in our country.

I. INTRODUCTION

The term e-learning covers a broad scope of electronic assisted teaching. It can refer to classroom aids, making PowerPoint presentations accessible for students away from the classroom and the use of laptops by learners in class. Hybrid learning is where traditional face-to-face teaching is supplemented with online elements. E-learning is also naturally suited to education where teaching is fully online with no classroom elements. Many education establishments create Virtual Learning Environments (VLE) whereby courses and content can be managed through an institutional wide consistent user interface. Through these VLEs students can manage many aspects of their course and gain quick and easy access to course content from anywhere with Internet access.

E-learning is in one of the following forms:

- Computer Based Training (CBT)
- Web Based Training (WBT)

CBT

CBT or Computer Based Training is the term used to refer to any form of training that can be delivered via a computer to one individual. Typical CBT is packaged on one of the following media:

- CD-ROM
- Floppy
- IVD/DVD
- Any other storage device that can run on a computer

A term similar to CBT is TBT which stands for Technology Based Training. This is not the same as CBT as it used to be used as a collective term for the above mentioned packaging types as well as for video courses. But with the use of the Web, very little video is sold in packaged form making CBT the generally accepted term for this form of training.

Key elements of CBT are:

- User installed and user driven learning
- Packaging on media such as CD-ROM/floppy/IVD/DVD/Video
- Installation on common platforms
- No instructor/expert supervision required
- Multiple media should be used from text, graphics, audio, video, animation, simulations

WBT/Online Learning

WBT or Web Based Training is any form of online training delivered via the Web to individuals or groups. Typical WBT is delivered by training companies that develop their own Web learning content and tools, or by distance learning entities such as Online/Virtual Universities which may be extensions of training companies or actual universities.

Key elements of WBT/Online Learning are:

- Online registration
- Online payment processing and clocking of learning hours/sessions
- Online content delivery
- Easy site navigation
- Time/session independent training
- Personalized learning which tracks scores and suggests further training

II. DEFINITION OF E-LEARNING

Definition 1

Tom Kelly, Cisco: "E-learning is about information, communication, education and training. Regardless of how trainers categorize training and education, the learner only wants the skills and knowledge to do a better job or to answer the next question from a customer."

Definition 2

"E-learning provides the potential to provide the right information to the right people at the right times and places using the right medium."

III. ADVANTAGES OF E-LEARNING

- Flexibility, accessibility, convenience: Users are able to proceed through a program at their own pace. Users can access an e-learning course anytime, anywhere, and learn only as much as they need.
- Browser software and internet are widely available: Most computers have access to a browser, are connected to the organization's intranet or the internet.
- Inexpensive worldwide distribution: There is no need for a separate distribution mechanism.
- Travel costs and time savings: there are no travel costs for bringing remote employees to a centralized workshop.
- Training efficiency is increasing significantly. Not only from a qualitative standpoint (i.e. pedagogical by the use of a new method, personalization, learner autonomy, memorization and follow-up, operational by learning by opportunity and the speed of the learning updates, and organizational by creation of knowledge sharing community) but also from a quantitative standpoint (i.e. learning elapse decreases, learning cost may be reduced and learning effectiveness is increasing).

IV. DISADVANTAGES OF E-LEARNING

- Bandwidth limitations. Limited bandwidth means slower performance for sound, video and intensive graphics, causing long waits for download that can affect the ease of the learning process. Future technologies will solve the problem however.
- Loss of human contact. There is a general concern that as we move towards more computer usage, a terminal will replace a friendly face. Gradual introduction of e-learning or the use of blended learning may be the answer to this concern.
- E-learning programs are too static. The level of interactivity is often too limited.
- Not all courses are delivered well by computer. Some training topics are not best served by computer based training and require a more personal touch.
- Resistance to change. Introducing e-learning initiative in an organization is not an easy-to-do task. Resistance may be hard to overcome, lack of communication and commitment from champions within the organization may jeopardize the chances of a succeeding e-learning initiative.

V. LEVELS OF E-LEARNING

E-learning falls into four categories, from the very basic to the very advanced.

The categories are:

- Knowledge databases - While not necessarily seen as actual training, these databases are the most basic form of e-learning.
- Online support -Online support is also a form of e-learning and functions in a similar manner to knowledge databases. Online support comes in the form of forums, chat rooms, online bulletin boards, e-mail, or live instant-messaging support. Slightly more interactive than knowledge databases, online support offers the opportunity for more specific questions and answers, as well as more immediate answers.
- Asynchronous training -This is e-learning in the more traditional sense of the word. It involves self-paced learning, either CD-ROM-based, Network-based, Intranet-based or Internet-based. It may include access to instructors through online bulletin boards, online discussion groups and e-mail. Or, it may be totally self-contained with links to reference materials in place of a live instructor.
- Synchronous training -Synchronous training is done in real-time with a live instructor facilitating the training. Everyone logs in at a set time and can communicate directly with the instructor and with each other. We can raise our cyber hand and

even view the cyber whiteboard. It lasts for a set amount of time -from a single session to several weeks, months or even years. This type of training usually takes place via Internet Web sites, audio- or video-conferencing, Internet telephony, or even two-way live broadcasts to students in a classroom.

VI. DISTANCE EDUCATION IN SERBIA

Serbia does not have extensive experience deploying online studies and virtual faculties. Forming an international learning network may enhance e-learning opportunities in Serbia as well as in countries that are developing or in transition. If Serbians or citizens of other nations become more familiar with the techniques, potential learners as well as educators may be able to effectively discern the pros and cons of how e-learning enhancing and improving education.

Open schooling in Serbia is meant to offer each individual capability for a complete social participation, improvement in a quality of life, personal choice, employment, ability for a continual professional development, and ability for a life of a higher quality in a healthy environment.

Strategy of Serbian Government concerning adult education is actually invitation to creation of learning culture, organization of society and economy on the bases of knowledge and advancements in achievements and capabilities of adults (Government, 2009). Lifelong learning considers educational programs and processes that happen after finishing of obligatory education and entering of working environment, in order to:

- advance knowledge, skill competences,
- achieve new competencies, and
- further personal and professional development

Professor Radović-Marković conducted a study in 2009 that aimed to measure the role of online learning and how much the process has been accepted among learners and entrepreneurs in Serbia. Marković interviewed and asked 54 participants (34 women and 20 men) between the ages of 18 and 30 the following associated sub-questions:

- What do you think about online learning?
- What do you think about virtual professors?
- What is the interaction between students, students and professors?
- Does new technology isolate students from teachers?
- Do you prefer online learning than face-to-face? Why yes or why not?
- Does gender matter in online learning for entrepreneurs?
- What are online learning outcomes vs. Face-to-Face?

Although the majority of participants (68 %), think that online learning is great as an new alternative for learning, the great amount of participants (63 %) are not familiar with online courses for entrepreneurs and are unsure how virtual faculties function. Although it is fair to state that virtual learning will not obviously inspire every learner, it is fair to state that since a lack of knowledge exists concerning the process, most learner will consider the alternative as means to achieve knowledge in most subject areas thereby stimulating human progress.

Thirty percent of participants stated that lots of reasons exist for taking online courses. Low cost was a primary reason. Several participants (45 %) proposed that women and elderly learners are more motivated to enrol in some online course because they are better at communicating online and scheduling their learning. Although 50 % of the participants do not desire to have discussions with other learners and professors who cannot be seen, most participants (95 %) stated that computer literacy is the most significant for online studying.

Although women choose some computing courses when offered in combination with other disciplines that emphasize social issues and computer applications, women think that online studying and virtual faculties are not so much popular in Serbia because of the lack of computer literacy, specially among women. It is fair to state that if women in Serbia as well as other nations are readily to enroll in virtual courses due to the low costs, women may not (a) readily participant in discussions due to computer literacy or (b) be open during discussions due to resistance, thereby, limiting human progress.

Technology

In order to enable legal environment for the development of ICT, Government enumerates a

list of regulations already existing in Serbia. The most important ones, in connection with computers, are:

- Law about the legality of electronic documents, Law about the protection and security of public information system,
- Handbook for creation of information system of government agencies, Laws covering copyright protection, privacy, data protection,
- Law concerning free access to information of public interest,
- Law about electronic signature.

Some statistical data available for 2008, about Internet usage in Serbia (Internet, 2009), in comparison to Europe and whole world are given in Table 1.

Population (2008 Est.)		Internet users	% Population Penetration	User Growth 2000-2008	% Users Europe
Europe	803,903,540	393,373,398	48.9%	274.3 %	100 %
Serbia	8,032,338	2,602,478	32.4%	550.6 %	0.7%
World	6,710,029,070	1,596,270,108	23.8%	342.2 %	

As can be noticed, while covering approximately 1% of population of Europe, Serbia has somewhat less percentage of Internet user than that (only 0.7%), and Internet penetration of population is also bellow European average (32.4% vs. 48.9%). Yet, with the user growth being double higher than for the whole of Europe, Serbia is on a good way of improving its' position.Within the report of Economist Intelligence Unit about eReadiess, there is no data for Serbia, but as can be found in "The ICT Sector Status Report" created by United Nations Development Programme, The Stability Pact for South-Eastern Europe, data for the Serbia is the following (data is from year 2004):

- Penetration of fixed telephony > 95%
- Access to computers > 16%
- Access to Internet > 14%

Computers are available in almost all elementary and secondary schools in Serbia, but not all of them are available to pupils (70% of the ICT is used by pupils, 8% by teachers and 12% is reserved for school administration). According to the total number of pupils in Serbian schools, there are 0.03 computers per student. According to UNESCO study (Unesco 1, 2009), when this area is considered, Serbia is approaching the leading countries in the region. Schools generally have Internet access, though in some cases it is not available to pupils. Some of the national Internet providers directly supported ICT development in Serbian secondary schools by providing broadband access to a large number of schools.

The majority of Serbian schools (79%) have their own Web sites (not rarely developed and maintained by students), and some initial steps towards the application of eLearning tools and methodologies can be noticed (Ivanovic Bulgaria, 2007).

New generations, currently enrolling elementary and secondary schools, experience computers as a part of everyday life, so naturally they expect different education.

Within a project "Application of eLearning Teaching Methods in Secondary Vocational Education" (Student World, 2009), data is reported, that almost 2/3 of pupil has "medium" level of knowledge of computers, while almost 20% of them can be characterized as having a "high" level knowledge.

The same source also documents intentions of pupil to continue their educational progress, especially in the field of expanding existing knowledge. On the other hand, official data of a Statistical Office of the Republic of Serbia (Statistical Office, 2009) for 2006. claims the following: 26.5% of houses in Serbia own a computer (highest rate in Belgrade, with 30.7%); within homes with income higher than 600 euros, 65.9% own a homes with income lower than computer, while homes with income lower than 300 euros, only 15.7% own a computer. 97.3% companies use computer in their work;

VII. CONCLUSION

E-learning is becoming increasingly prominent in tertiary education. All available evidence points toward growing enrolments and provision albeit from a low starting point. However, after the hype of the new economy, growing disenchantment

with e-learning has replaced over-enthusiasm. Failures of e-learning operations have, at least temporarily, overshadowed the prospects of widened and flexible access to tertiary education, pedagogic innovation, and decreased cost that was once embodied by e-learning.

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[5] http://elearning.ppu.edu/file.php/1/eLearning/elearning.pdf
[6] http://www.upet.ro/anale/economie/pdf/20100227.pdf

ELECTRONIC RESOURCES OF INFORMATION IN PREPARATION AND IMPLEMENTATION CLASS TEACHING

M. Bogdanović
University of Niš, Teacher Training Faculty in Vranje, Serbia
mb2001969@beotel.net, milenab@ucfak.ni.ac.rs

Abstract - Today at elementary schools educate a generation that will work in mid-21st century. The question is what IT skills should be learned and how. What are the functional tasks of the educational process can be developed through teaching computer science? Are the students prepare for the process of lifelong learning and training? The role of contemporary modern teachers, among other things, to direct students to the creative use of information technology. This article provides answers to the above questions are presented and some of the electronic databases that can help teachers in the modern preparation and implementation of classroom teaching. Children receive new technology in a different way than adults, because they grow with new challenges. It is our task to take advantage of new technology by raising the level of education in general.

I. INTRODUCTION

The beginning of the new millennium is a very dynamic period in the development of computer science and technology. Digital makes the world support their daily life. The digital world makes support their daily life. The rapid development of computer discipline has substantial effects on education, both on educational content, and the educational methods. Thus, for example, networking and Web become a critical foundation of computer science, at the same time and one of the basic pedagogical resources, conditioning and changes in the educational process, not only in computer science but also in other areas.

The progress made in multimedia technology at the level of personal computers, as well as in networking technology and especially internet and web, created new opportunities to transform the teaching process and educational systems of significant scale, primarily in the developed world and in our country. The teacher's role in this process change. In planning the teaching process should be planned in such a situation in which the students will get to own the knowledge. Should be given to problem solving, and create problem situations students face the facts. The task of teachers is to determine the most reliable and efficient methods, forms of labor, facilities, teaching resources and sources of knowledge. Learning from different sources of knowledge is particularly important for active learning, which is one of the important features of modern education [1].

We are in a time that many call the *era of modern information technology.* It is quite real need for protocols and information form to digital form. There are many advantages - the systematic storage of information to an unlimited number of copies and nepropadanja in the physical sense. In practical terms, availability and reduces trpškove intangible form, and we task to take advantage of new technology by raising the level of education in general.

Modern educational technology with multimedia systems, creates the preconditions for engaging all the senses in the process of acquiring new knowledge, develop students' creativity and provide more active students in teaching and learning. Because the computer science and information technology relevant content of education at all levels of education, from preschool to university [4].

Modern education requires a new model of learning - active learning, based on real-world information resources. Teachers today have to know how to use modern techniques and methods in education. Although its activities should change teaching contents and methods of procedure all levels of education, it is important to do these come informacji universities, and to the fakultetitima to educate students - future teachers, teachers in preschools. Basic education is one of the factors responsible for the development of society, so it is very important to its adaptability to change that now brings the information age. In order to successfully achieve these changes, it is not enough to change and modernize the teaching content, but it is equally important to make changes nestavnih methods and define new

educational content and standards in teaching computer science. Find the most suitable solution for the education of young generations tomorrow to take on complex assignments in the modern information society, it is very responsible and delicate task. It was therefore necessary to allow the best preparation for entry into the modern business environment [3].

II. INTERNET AND KNOWLEDGE BASE

The Internet is a "virtual company" computers and computer networks from around the world. With the help of computers, modems and phone lines, can be easily connected to all parts of the globe.

Internet, or popularly known as the "network of networks" has become by far the most popular means of communication. Internet services provide a simple, efficient and cost-effective solution for the exchange of information in various forms - content on the internet presents a multimedia way: using text, images and sound. It is available to everyone regardless of location, age and education - can be used by Internet experts, and computer illiterate. At each step, the Internet and information technologies are changing many aspects of life. We live, we buy, work, manage and communicate new ways that technology has enabled. Communication technology is the most pervasive technology of today. It is applied in every branch of industry, and in all areas of education and the basis for the successful operation of all social and state structures. Information and communication technology (ICT) provides a good foundation for creative and effective use of knowledge.

Computer literacy is a necessary part of today's business literacy. With classical knowledge needed to master the elements of information literacy, and enable it for use, development and understanding of information technology and its diverse applications in the economy and society, in other words - are trained to use computers and computer software. A lessons learned to know the procedure used in collecting and processing information for making correct and effective decisions about activities that should be followed - that is **information literacy**.

Today, the children are flooded with a variety of multimedia effects. Children who have a home computer with internet connection, know how to find pages of Pokemon or Harry Potter, but very few are on the Internet looking for some content that would help them to write a work of such. biology. There are few students who are looking for online educational games from which something can be learned, most would rather play a "destructive game." The task of teachers in schools to show children what a computer is actually used. Then the children, discovering new possibilities of the computer often leave their past activities on the computer [2].

Today, every computer literate teachers want a multimedia classroom libraries with educational software that could refresh their teaching that is now in many cases done with chalk and blackboard. Such "computer lab" had the students in the United States has more than twenty years. It is necessary to encourage domestic production of educational software and provide a quality translation of foreign software (especially in science). This will ensure that information technology becomes a means of teaching in each subject.

Numerous electronic knowledge base offers nearly unlimited amounts of information about all the scientific achievements in all fields of science. Only need curiosity and a willingness to explore such content, and teaching shall, at all levels of education to become better and more effective.

Some of these sources of information in science are [5-12]:

- Kobson
- CiteseerX
- Journal Citation Reports (ISI Web of Knowledge)
- Scopus
- Web of Science (ISI Web of Knowledge)
- Academic search complete (EBSCOhost)
- ACM Digital Library (ACM portal)
- CAIRN
- Cambridge Journals - HSS Collection (Cambridge Journals Online)
- Academic search complete (EBSCOhost)
- SpringerLink
- Classics in the History of Psychology
- Current Contents (OVID)
- ERIC - Educational Resource Information Center (OVID, EBSCOhost, ERIC)

- Open J-Gate
- Project MUSE
- PsycARTICLES (OVID)
- Questia
- ScienceDirect
- SocINDEX with Full Text(EBSCOhost)
- Journal Citation Reports (ISI Web of Knowledge)

Access to Faculty: http://www.isiknowledge.com/JCR

List: http://scientific.thomson.com/mjl/

Description: Contains citation information that allows evaluation and comparison of the magazine. Using the JCR-and we know that the most cited journals in a field (with upward impact factor). It is published in two editions: JCR Science Edition (includes data from 5900 journals in the natural, biomedical sciences and engineering) and JCR Social Sciences Edition (includes data from 1700 journals in the social sciences).

More information:

http://thomsonreuters.com/products_servi ...

Scopus

Access to Faculty: http://www.scopus.com
List: http://www.info.scopus.com/detail/what/
Description: Scopus is the largest bibliographic and citation database of scientific literature and quality web sources.

More information: http://www.info.scopus.com/

Web of Science (ISI Web of Knowledge)

Access to Faculty: http://newisiknowledge.com

list: http://scientific.thomson.com/mjl/
Description: WOS includes products ISI (Institute for Scientific Information): Arts & Humanities Citation Index (A & HCI), Social Sciences Citation Index (SSCI) and Science Citation Index Expanded (SCI-EXPANDED). In addition to bibliographic information for works contains information about the citations / references.

More information: http://thomsonreuters.com/products_servi ...

Academic search complete (EBSCOhost)

Access to Faculty: http://search.ebscohost.com/login.aspx?a ...
List: http://www.ebscohost.com/titleLists/ap-c ...
Description: A multi-disciplinary database, including full text nearly 4500 journals, including the 3600 peer-reviewed.

More information: http://www.online-baze.hr/baze/1

ACM Digital Library (ACM portal)

Access: http://portal.acm.org/dl.cfm

Right of access: access possible to the full text with the membership fee.

List: http://portal.acm.org/contents_dl.cfm?co

Description: Searchable digital collection of ACM publications, the records of more than 50 years.

More information: http://portal.acm.org/understanding.cfm? ...

CAIRN

Access to Faculty: http://www.cairn.info/
List: http://www.cairn.info/listerev.php
Description: CAIRN is a collection that contains more than 200 French and Belgian journals in the field of humanities and social sciences. Access is achieved thanks to the initiative Wallonie-Bruxelles International.

More information:

http://www.cairn.info/apropos.php

Cambridge Journals - HSS Collection (Cambridge Journals Online)

Access to Faculty:

http://journals.cambridge.org/

List: http://journals.cambridge.org/action/sub
Description: The collection of Humanities and Social Sciences Publishers Cambridge includes 156 journals. In addition to the current volumes of journals are available full text of older age in a different band.

More information:

http://journals.cambridge.org/action/str ...

ERIC - Educational Resource Information Center (OVID, EBSCOhost, ERIC)

Access to Faculty: http://www.eric.ed.gov/ERICWebPortal/Hom...
http://ovidsp.tx.ovid.com/spb/ovidweb.cg...

http://search.ebscohost.com/

Right of access: Free access

List: http://www.eric.ed.gov/ERICWebPortal/Hom ...

Description: The most important bibliographic databases for the area of education (teaching methodology, pedagogy, learning, pedagogy, glotodidaktika, education, education, education).

More information: http://www.online-baze.hr/ob/abeceda?_v1 ...

MasterFILE Premier (EBSCOhost)

Access to Faculty:

http://search.ebscohost.com/login.aspx?a ...

List: http://www.ebscohost.com/titleLists/f5-j ... http://www.ebscohost.com/titleLists/f5-o ...

Description: Designed specifically for public bibloiteke, this multidisciplinary database provides full text from nearly 1950 publications in various areas of public interest (books, biographies, documents, images , maps and flags).

More information:

ttp://www.ebscohost.com/thisTopic.php?m ...

Open J-Gate

Access: http://www.openj-gate.com/

Right of Access: Free access

List: http://www.openj-gate.com/Browse/ByJourn ...

Description: Search collections of scientific and technical freely available electronic magazine. *More information*: http://www.openj-gate.com/Footer/About.a ...

Persee

Access: http://www.persee.fr/

Right of Access: Open Access *Description*: Persea is a digital collection of French humanities journals (and fewer arrays and collections of books) in the open approach. Contains digitized and old age ('French JSTOR')

More information:

http://www.persee.fr/web/support/apropos

Project MUSE

Access to Faculty:

http://muse.jhu.edu/journals/index.html

List: http://muse.jhu.edu/journals/

Description: The complete text database covering the fields of humanities and social sciences.

More information:

http://muse.jhu.edu/about/muse/overview ....

Classics in the History of Psychology

Access: http://psychclassics.yorku.ca/ *Right of Access*: Open access. *List*: http://psychclassics.yorku.ca/author.htm *Description*: The attempt to make the Web accessible to historically important texts in the academic literature in field of psychology and related disciplines. Currently comprised of over 25 books and 200 articles and chapters online. Contains links to over 200 relevant works on other web pages.

More information:

http://psychclassics.yorku.ca/what.htm

Current Contents (OVID)

Access to Faculty: http://gateway.ovid.com/ovidweb.cgi?T=JS ...

List: http://scientific.thomson.com/mjl/

Description: The most popular multidisciplinary bibliographic database, contains bibliographic records on articles from more than 7600 leading scientific journals and more than 2,000 books and proceedings from conferences. It contains seven sections: Agriculture, Biology and Environmental Sciences (AGRI), Clinical Medicine (CLIN), Engineering, Technology and Applied Sciences (TECH), Life Sciences (LIFE), Physical, Chemical and Earth Sciences (PHYS), Social and Behavioral Sciences (BEHA) and Arts and Humanities (ARTS).

More information: http://www.online-baze.hr/baze/17

JSTOR

Access to Faculty: http://www.jstor.org/

List: http://www.jstor.org/action/showJournals

Description: JSTOR is a multidisciplinary digital archive of scientific journals. Provided access to collections of Arts & Sciences I, Arts & Sciences II, Arts & Sciences III, Arts & Sciences IV and Arts & Sciences V.

More information: http://www.jstor.org/page/info/about/ind ...

PsycARTICLES (OVID)

Access to Faculty:

http://ovidsp.ovid.com/ovidweb.cgi?T=JS&...

List: http://www.apa.org/psycarticles/covlist

Description: PsycARTICLES database all journals issued by the APA in electronic form.

More information:

http://www.ovid.com/site/catalog/Group/8 ...

ScienceDirect

Access to Faculty:

http://www.sciencedirect.com/

List: http://www.sciencedirect.com/science/jou

Description: ScienceDirect's electronic collection of journal publisher Elsevier.

More information: http://www.online-baze.hr/baze/18

SocINDEX with Full Text (EBSCOhost)

Access to Faculty:

http://search.ebscohost.com/login.aspx?a ...

List: http://www.ebscohost.com/titleLists/si-c

Description: One of the key and most comprehensive database in sociology.

More information:

http://www.ebscohost.com/thisTopic.php?m ...

questia

Access: http://www.questia.com/

Right of Access: Access to full text of the charge (individual subscription)

Description: Free access to bibliographic information about the texts of professional and scientific books and journals in the humanities and social sciences. Contains news and articles. Access to full text is charged (possibly the only individual, not institutional subscriptions).

More information:

http://www.questia.com/aboutQuestia/abou ...

KoBSON

Serbian Library Consortium for Coordinated Acquisition (KoBSON) is a new form of organizing a library of Serbia. The initiative to form the Consortium launched November 2001. The major research libraries in Serbia. KoBSON portal is available free of charge and authentication of all the academic domain IP in Serbia. It is necessary in the internet browser to set the appropriate proxy server university.

Since 2004. the customer is enabled and remote access ("the home" through a commercial provider) and under the same conditions as in the IP space of academic networks. Monitoring the usage of KoBSON indicates that about 30% of our users use information sources outside of normal working hours (night, weekends, holidays). In this mode, up to now we have registered 9500 researchers from Serbia, which is about a third of total number of researchers to the latest census, the Statistical Office. The only additional requirement consists in the fact that the customer signs a license which is obliged to comply with the terms of use. The right to own a license to all employees of the academic and scientific institutions founded by the Republic of Serbia and the Ministry of Science Fellows. Obtaining a license is free.

Past experience with KoBSON are very favorable. For less money than in the past in Serbia are now well over subscribed journals, including those of the highest quality. Success KOBSON a visible and internationally. In the first year of operation KoBSON is within a eIFL-occupied 32nd of 40 countries with respect to the number of downloaded articles and scribed resource, which is used as an indicator of success states. Today we take fourth location. In addition, according to UNESCO study on access to scientific literature, a Serbian leaders in the region. KoBSON provides customers more than 35,000 foreign scientific journals in electronic or paper form. The collection is offered to customers in Serbia, a large percentage of overlap with a list of Web of Science magazine, that the most significant world magazines. The source of the world in many libraries used for collections.

Figure 1. Home KoBSON

III. CONCLUSION

Introducing such electronic information resources in science, the students will be able to use the same in both - in the preparatory and in the implementation of classroom teaching, with the aim of modernizing the teaching process.

Computer education is an essential prerequisite for inclusion in the contemporary trends. The time in which we live is marked by rapid development of computers and technology informacionalnih, and therefore imposes the necessity of computer literacy of citizens. More and more economic and other activities require a higher level of knowledge in this field, because in the modern information society, information literacy is a prerequisite not only for business but also for everyday life.

There are eight key competencies in education prescribed by the European Union. IT competencies are in fourth place, behind the mother tongue, foreign languages and mathematics. Research shows that Serbia is in terms of information literacy at the very bottom of the list of European countries [3].

Serbia has a long and successful history of development of Education and Science. Successful development of Serbia in equal measure depends on reaching naučnot ehnoloških modern standards and preserve the national character of education and upbringing. Openness to international developments in these areas assumes the existence of clear national goals and values [4].

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THE USE OF E-LEARNING IN HIGHER EDUCATION KNOWLEDGE ASSESSMENT

I. Ristić
Faculty of management, Njegoseva 1A, Sremski Karlovci,
Serbia, E-mail: risticig@famns.edu.rs

Abstract – The authors of this paper try to show how important it is to include e-learning system into today's educational streams. The aim of the paper is to present advantages of e- learning system in the process of knowledge assessment. It presents the results of empiric research which was conducted at the Faculty of Management. The authors tried to identify not only the satisfaction of the management students with the use of e-learning system during knowledge assessment, but also the advantages which e-learning system offers to professors. The result of the research showed that the respondents were satisfied with knowledge assessment by the use of e-learning system.

I. INTRODUCTION

Education using classical methods, although existing for millennia, has many disadvantages. One of the biggest is the necessity to be present at lectures. This fact forces students to spend a lot of money on accommodation, travels and other telecommunication services. There is also the time spent on travelling. Another major problem is that the lectures are adjusted to a, so called, average student, and this is a limiting factor for all those who do not belong to this category, no matter if the learning process is too slow or too fast for them. With the expansion of computers and the Internet, new learning techniques have been developed which are called e-learning and which overcome all the mentioned problems.

Uniting a large number of courses, electronic universities are being created. They can be completely independent or they can serve as a support to existing universities.

Taking exams from the programme of electronic universities you acquire the same knowledge as at one of the 'real' universities. However, the same rule applies here as on the classical universities: the higher ratings of the universities, the graduates get employed easier and they have the possibility to choose companies and jobs.

The courses are mainly aimed at higher education and at some specialist needs of different industries. It should not be expected in the near future that e-learning will push back the existing primary and secondary schools, but universities and colleges should be a subject of interest for the investors in this area. Electronic learning is now applied in some industrial branches. For example, shop assistants can learn about new products, workers can learn about new technologies, etc. The common denominator is greater efficiency of economic systems and introducing new knowledge through technological processes.

The great flexibility of e-learning is a significant advantage in relation to classical learning. In other words, with the classical form of learning, it is not possible to attend lectures when that suits one, but at the time determined by the institution. Secondly, one must be present at a certain place that can be a problem if the student does not live near that place. Thirdly, the student has to learn at a pace determined by the institution and it cannot be changed. Beside all this, in classical learning a student cannot choose the quantity and the structure of the learning material. For example, a person may have to study a certain area important for his profession ten more years after the completion of his studies. Distance learning enables him that, and its great flexibility stimulates creativity and work satisfaction which makes this way of education a lot better.

II. COMPUTERISED TESTING

Questions, tasks, activities and other methods of receiving students' answers are often called items in the assessment process. During computerised testing, almost every type of interaction can be considered a subject of assessment. Definition of the subject of assessment (in relation to technology) is that it is any kind of interaction with a student from which data are gathered with the intention of coming to a certain conclusion about the student.

According to this definition, there are a lot of ways for subjects of assessment to be inventive while computerised testing. One organisational

scheme describes innovative characteristics of computerised subjects, such as technological amplifying of sound, drawing, animations, video clips or other new media of this subject, possibilities of answers or both [1]. Classifications are numerous, including the way how subjects function. For some innovative formats, students can, for example, click on the drawing, move objects, write their statements again, or make a graph or another type of presentation. Innovation does not have to relate to only one subject, but to the way subjects move, like it is the case of branching through changeable series of students' answers.

A large part of literature concerning subject types deals with innovations in monitoring – question and answer (or cause and consequence) – and the focus is on the research of construction level according to the selection, or the level of limitation according to open possibilities in the format of answers. A certain number of characteristics are common for most formats concerning suggested answers and the work of subject assessment:

First of all, these alternative formats demand from the respondents to ensure, develop, do or make something. And, typically, these tasks try to be more demanding for the respondents than classical multiple-choice. They often introduce real problems that people of the same age and status as the respondents face in the everyday life, like asking children to calculate while buying in a market or asking students to fill in the form for a driver's license or to check an insurance policy. These tests often compare the answers with already determined criteria, sometimes with lengthy explanations called "columns".

So called items “with filling in" cover a lot of space, and organised schemes with a certain degree of limitation and other measurable aspects concerning subjects of assessment can be very useful [2].

The potential limitation for getting benefits from computerised testing in the instructional and in other assessments is achieved during writing questions and tasks which computers can efficiently deal with (for example, while assessing and reporting about that) while they, at the same time, gather useful data for assessment. The main type of questions in computerised testing and in many Internet learning assessments is the standard type of multiple-choice questions and a student has to choose the best answer. This type is easily evaluated through different electronic tools and it offers some attractive characteristics as a form of assessment. However, if the authors of e-learning use only this form as the main assessment form, then much potential that computerised testing offers may be lost.

According to some researchers, testing through multiple-choice questions sometimes encourages "a bad attitude towards learning and incorrect conclusions about its purpose…for example, the one that there is only one correct answer, that the correct answer is in the heads of the professors or authors of the test, and that students should find the answer by speculation"[2]. Moving towards authentic assessment, alternative assessment, work assessment, dynamic assessment, portfolio systems, calculated answers and other approaches that favour wider assessments is often based on the arguments that deal with validity of consequences of damaging effects of narrow assessments of teaching and learning processes within a class.[3] Some theoreticians agree that a form of multiple-choice assumes, often without an adequate foundation, that complex skills can be separated and put outside the context in which they are applied. Moreover, some critics emphasise that in practice this form relies on well-structured problems with algorithm solutions and, theoretically, on the learning that says that knowledge is more of an additional than the basic part in the development of learning structures [4].

Potential use and limitations of computerised testing:

Objectivity and consistency to the standards. Computers will always obey the rules of assessment which are built in their programmes. However, in traditional, manual assessment, subjectivity may appear.

Automatic, prompt and detailed return information to all students. This is not possible to do with manual assessment with a larger number of students.

Informative return information for the examiner. A computer can record details of a student's progress by assessing every question, wasted time, history of repeats and all marks during studies. A group return information can be given in a form of notes put on discussion forums. CAA improves the accuracy while testing and assessing.

Time saving while assessing. A student's marks can be directly sent to his/her file in contrast to the manual system of assessing.

Self-assessment at the time determined by the students, in a tempo that suits them and when they are ready. This is important for distance learning institutions where students are employed adults.

Using multimedia The key element of CAA is its ability to include pictures as a part of questions and/or answers. Pictures like photographs, diagrams, maps, musical partitions, equations and other can be made and exhibited. Other types of multimedia like audio, video and animation can be used in order to get excellent effects.

III. RESEARCH DESCRIPTION

For the needs of this paper research has been conducted with the aim to study students' satisfaction with the knowledge assessment in distance learning education systems and also the advantages that such a system offers to professors.

Empirical data for the research have been gathered and processed using the following methods. A comparative method has been used to analyse the marks that students from the Faculty of management got on the preliminary English exams. The same group of 72 students took preliminary English exams in the classical way and through the system of distance learning «Moodle». The examining method has gathered data about students′ attitudes towards taking the exam through distance learning education system. The means for gathering data was a questionnaire with 23 questions.

IV. RESEARCH RESULTS

During this research we had to establish what kind of results the students achieved taking the exam by the classical method and through the distance learning education system. The result was that more than half of the respondents (61%) got the same mark in both methods, 20,8% of the students got better marks through the distance learning education system, and 18,1% got worse marks taking the exam by the classical method. The received results of taking the preliminary English exam by the classical method show that the average mark of the students was 7,90, while the average mark of the students taking the exam through the distance learning education system was 7,94. With the analysis based on T-test for reliant samples it has been determined that there are no statistically significant differences in the marks received from knowledge assessment by the classical method and the one using the distance learning education system (p=0,63). We can conclude, based on the results that most students (61%) got the same mark taking the exam by either method and that there are no statistically significant differences between the two methods of taking the exam. In other words, the method of taking the exam (the classical method and distance learning education system) does not influence the results achieved by the students, i.e. their marks.

The majority of students (63%) believe that knowledge assessment using distance learning education system is less stressful, 18% claims that it is not less stressful, and 19% of the respondents remained undecided. They say that they do not know whether taking the exam through distance learning education system is less stressful, or not. In further research, we have examined the relation between the year of studies of the respondents and their attitude to whether knowledge assessment through distance learning education system is less stressful. Although in this analysis we have come to the result that only 33,3% of freshmen believe that knowledge assessment through distance learning education system is less stressful, we have concluded that majority of sophomores (73,9%) and third year students (75%) agree with this statement. The addition to these results is that a non-irrelevant number of freshmen (33,3%) remain undecided and have answered "don’t know". Moreover, it should be taken into consideration that to a freshmen everything is still new at the university and that the concept of taking exams is creating quite a lot of stress, so they are not able to see the difference between taking exams by the classical method and through distance learning education system. They are also not aware of the advantages of this system.

This research shows that more than half of the students (63%) believe that knowledge assessment through distance learning education system is more interesting and attractive, and only 15% of the students do not agree with this statement. A majority of students (90%) consider distance learning education system easy to use. Almost all students agree that it is important for them to have the opportunity to see their results immediately after the exam which is possible through distance learning education system (90% of the respondents agree with this statement) and the fact that the system immediately shows them their mistakes (88% agree with this statement). Moreover, only 3% of the students believe that tests for self-

assessment that are found in distance learning education system would be of no use to them, 39% consider them of some use, while more than half of the students (58%) claim that these tests would be of great use for their academic education. As the addition to the thesis that students are largely satisfied with the possibilities offered to them by the distance learning education system, there are the results that we have achieved while examining students′ general impression about this system. The average mark of the students for this system is 4,03. In other words, majority of the students (81,9%) have given a positive mark to this kind of taking exams. When we were examining the relation between the year of studies of the respondents and their satisfaction with distance learning education system, the results have shown that there are some significant differences among the students from different years of studies (differences are significant on the level p=0,02). The results of this analysis have shown that third year students gave the best marks to distance learning education system, so that their average mark is 4,39. The sophomores′ average mark of this system is 4,22, while the freshmen gave the worst marks and their average mark is 3,33. Statistically, the difference on the level $p<0,05$ exists only between the first and the third year students. We can conclude, based on these results, that older, and thus more mature students, are more interested in new aspects of knowledge, information technologies and new methods of taking exams. On the other side, it is quite expected that first year students will not eagerly accept taking exams through distance learning education system when the whole concept of academic studying is still new to them. In the end, we must not neglect the fact that 53% of the students said that they would like next knowledge assessment to be through distance learning education system, and only 24% of them said that if they were to start studying again, they would like to be distance learning students.

The analysis shows that the majority of the students (65%) believe that subjective attitude of a professor has been eliminated through distance learning education system, 24% remain undecided, and only 11% do not agree with this statement. So, most students consider knowledge assessment through distance learning education system more objective than that of the classical method. The addition to this thesis is the fact that with this system professors do not have any influence while checking the tests or evaluating. In this case it is impossible to make mistakes while checking the test or to influence the marks. The same rules apply to all students.

V. CONCLUSION

The research results show the satisfaction of the students with the knowledge assessment through distance learning system. Even though the students have achieved the same results in both methods of taking exams, most of them consider this system less stressful, more interesting and attractive, eliminating the possibility of cheating and easy to use. It is also very important that students can, during the exam, always know how much time they have for writing, and the fact that they receive the results immediately after the exam and they can see their mistakes. We suppose that because of the above mentioned reasons most students said that they would like to take the next exam through distance learning system and that if they had the chance to start their studies again, they would like to be distance learning students.

This research had an aim to establish the validity of introducing distance learning education system only from the aspect of knowledge assessment. At the same time, these research results create possibilities for future research in this field. Due to samples being limited, research results are hypothetical in character. If they bring about research on bigger samples and more in depth in this field, our objective will be fulfilled. New research fields refer to real, factual distance education. The next step would be to determine validity and efficiency of distance learning education system using the experimental-comparative method. In other words, two balanced groups of students would be found according to gender, knowledge, psychological characteristics and intelligence. One group would be a control one and it would represent the classical method. The other, experimental group of students, would be taught using a distance learning education system at least one semester.

At the end of the experiment, knowledge assessment of both groups would be done: a) immediately after the lectures, b) a month after the end of the lectures, c) 6 months after the lectures, d) a year after the lectures. In that way it would be possible to determine empirically the permanence of knowledge received through the distance learning education system, as well as the relation between this knowledge and the one achieved through classical teaching.

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COLLABORATIVE USER SUPPORT AS A CONTRIBUTION TO NAVIGATION IMPROVEMENT OF ADAPTIVE WEBSITES FOR DISTANCE LEARNING

Ž. Eremić and D. Radosav
* Technical College of Applied Sciences, Zrenjanin, Serbia
** Technical faculty „Mihajlo Pupin“, Zrenjanin, Serbia
zeljko.eremic@gmail.com, radosav@tfzr.rs

Abstract - Adaptive Web sites are characterized by altering its structure and presentation based on past user behavior. The resources required by users are often found scattered in remote locations. Based on previously collected data about user behaviors, it is possible to propose some navigation improvements of adaptive Web sites so that users spend less time and effort to obtain the required resources. A new contribution to the navigation improvement of adaptive Web sites could be cooperation between the users where users, who have knowledge of where to find the required resources, would give suggestions to other users looking for such resources during the searching process. In the field of distance learning teachers could monitor their students' activities and give them suggestions which web pages students should visit. The solution could be based on use of AJAX on the adaptive web sites.

I. INTRODUCTION

Significant benefits have been enabled by using modern electronic technologies in the field of education. Information on studies and learning materials can be downloaded from the web sites of educational institutions. E-learning and its part distance learning are enabling knowledge sharing and organizing courses between distant geographic points.

“One of the tendencies in education is the continually growing amount of learning content which must be acquired by the student. Almost every generation’s curricula are extended by a certain amount of new, updated or revised material. With this swelling of learning contents, another issue arises, namely that the time which is intended for learning these amount of contents is growing ever shorter for each subsequent generation.” [1]

Since materials intended for learning, as well as the available literature, are becoming more numerous it is necessary to allow access to such materials with less effort and time. Aggravating circumstance is that useful materials are often distributed in different categories and locations of web site.

“It is often the case that useful information about an issue is scattered across different categories and locations of the web site which contains plenty of articles in various fields.” [2]

Some of the first papers dealing with the adaptive web sites are [3] and [4], while the efficiency of adaptive Web sites is discussed in [5]. Usage of Waypost documents is discussed in [6], and the idea is further developed in [7] and [2].

Adaptive Web sites can use the records of previous behaviors of users (such as log files described in [8] and [9]) in order to build models of user behavior. Based on this model, it is possible to predict future needs of users and meet users' needs by improving existing navigation. Characteristic of this navigation is that it is generated from information which users automatically leave each time they send a request to the server.

Another dimension of improving the navigation could include inter-user cooperation in which the users, with knowledge about the location of the resources, would suggest to other users where they can find those resources. This work focuses on such cooperation.

II. E-LEARNING AND DISTANCE LEARNING

User collaboration that takes place on adaptive web sites is particularly suited to systems whose users have expressed interest in mutual assistance. A website for distance learning is a typical example of such system. The following are definitions of E-learning and its subset - distance learning.

“E-learning can be defined as instructional content or method of learning by use of electronical technology.” [10]

"Distance learning is an integral part of e-learning, it allows present-day students to acquire an education without having to move out of their offices or away from their home computers." [10]

There is a need for educators to have a good insight into the learning process of students. On the other hand, a system, that helps students by recommending them certain activities and resources which could help them in the learning process, would be of great help to students.

"Educators, using Web-based learning environments, are in desperate need for non-intrusive and automatic ways to get objective feedback from learners in order to better follow the learning process and appraise the on-line course structure effectiveness. On the learner's side, it would be very useful if the system could automatically guide the learner's activities and intelligently recommend on-line activities or resources that would favour and improve the learning." [11]

The example shown in [2] represents an approach to improving the accessibility of information in adaptive web site, which is achieved by inserting shortcuts between previously unrelated documents where there is a need for that. An example from the mentioned paper will be the starting point for improvements that are proposed in this paper. By analyzing previous user behavior recorded in the log files, links, presented in Figure 1, have been suggested in this example. The links that are considered to be a better recommendation are placed at the top of the list so that users can obtain knowledge about which links have more "weight".

In the learning system, an important contribution to choosing the appropriate link for a student, who is hesitant in choosing the next resource and has to make a decision, could be suggestion of an educator or a fellow student.

III. ADAPTIVE WEB SITES

Adaptive web sites change their structure and presentation based on previous user behavior models. The usage of adaptive web sites has its own justification, primarily because the users interests are changing over time and because the website designer often has a different idea about the optimal navigation in relation to the users. Adaptive web sites use information from previous user activities recorded in log files.

"Visitors to a site do not always have the same conceptual model of the material as the site's designer. An adaptive site can recognize when user expectations differ from the site structure." [4]

"Although a web site's structure is usually static, user needs change with time. An adaptive site can learn these patterns and decide what information to present when." [4]

Cooperation between users in real time enables users to actively participate in the optimization of navigation in a manner that would share their knowledge with other users on a voluntary basis.

IV. AJAX

Ajax could be defined as a combination of several technologies that work together.

"Ajax isn't a technology. It's really several technologies, each flourishing in its own right, coming together in powerful new ways. Ajax incorporates:

standards-based presentation using XHTML and CSS;

dynamic display and interaction using the Document Object Model;

data interchange and manipulation using XML and XSLT;

asynchronous data retrieval using XMLHttpRequest;

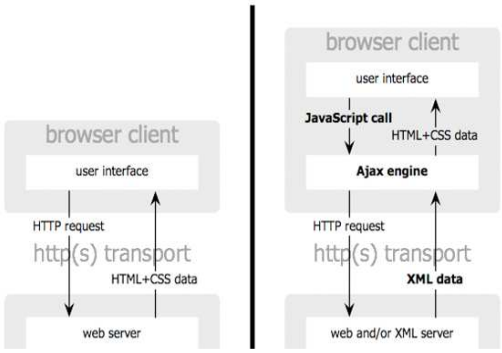
and JavaScript binding everything together." [12]

In traditional web applications by using an interface the user creates HTTP request which is forwarded to a web server. Web server sends the HTML page back to the client after required processing. In the meantime, the user waits. Ajax applications, on the other hand, have the Ajax engine between the user and the server. In this way the browser loads Ajax engine at the beginning of the session instead of Web pages. The Ajax engine is usually realized in hidden frame by using JavaScript and it is responsible for two activities:

- Rendering the interface intended for users
- Communication with the server on user's behalf

"The Ajax engine allows the user's interaction with the application to happen asynchronously — independent of communication with the server. So the user is never staring at a blank browser window and an hourglass icon, waiting around for the server to do something." [12]

Customer requirements, that do not include the participation of the web server such as various data validation, are being carried out on Ajax engine.



There is usually a wealth of information and documents on the website intended for distance learning. If such website is adaptive, it is possible to obtain recommended links from log files that lead from some pages to the appropriate locations. This list of links is loaded along with the page and lasts until the page is loaded. By using Ajax, it is possible to request and receive assistance from other users in one section of the page without undue delay and with the availability of the rest of the webpage area.

V. INTER-USER SUPPORT ON WEBSITES INTENDED FOR DISTANCE LEARNING

Improvement of navigation of adaptive web sites, that incorporates inter-user cooperation, has two groups of actors:

- actors who seek support
- actors who provide support

Actors who seek support on the website for distance learning could typically be students. Actors who provide support could be educators as well as students who are willing to share their knowledge with their fellow colleagues. The approach proposed in this paper assumes that the list of suggested links has been formed between documents based on the approach described in [12]. Suppose an actor who seek support is on the web site, on a particular page, where in a separate section he can see a list of suggested shortcuts to resources ("Suggestions"). The actor who seek support can press the help button "Ask for help" to request assistance from support providers. Section with links "Suggestions" takes advantage of Ajax benefits. Pressing the help button, a script is called for assistance. Then, in a website database the script records that particular user (identified by session or better by user account) has asked for help on a particular page. This section with links called "Suggestions", every few seconds checks if a reply is received from the support provider by using Ajax, and when that happens, actor who seek for assistance is provided information about who is the provider who has suggested a link or multiple links. It is also possible that more support providers give their suggestions.

Users who are assistance providers may also be assistance seekers. For example, after Tom (the user has logged in with that username) has pressed the help button (Figure 3), Ajax sends information to the web server where the request for assistance is recorded in the database. Other users, who are assistance providers, also have a section that is updated every few seconds. A new section, where an assistance provider review is requested, may be added to this section. For example, Figure 4 shows that the user Tim is on the page "Eternal Derby" and that his review is asked regarding the assistance that was requested by Tom a few seconds ago. Suppose that the user Tim was previously on the page "Sport in Belgrade" and that he is now on the page "Eternal Derby" where he found the useful information. Therefore, the user Tim provides his opinion to the user Tom that it would be worthwhile to visit the

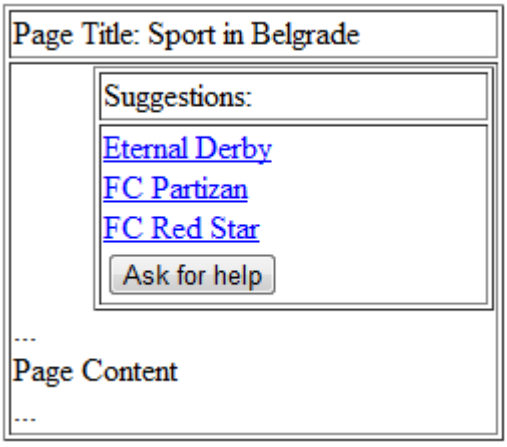


Figure 3. Page entitled "Sport in Belgrade", which was visited by the user called "Tom" contains three links to recommended web pages

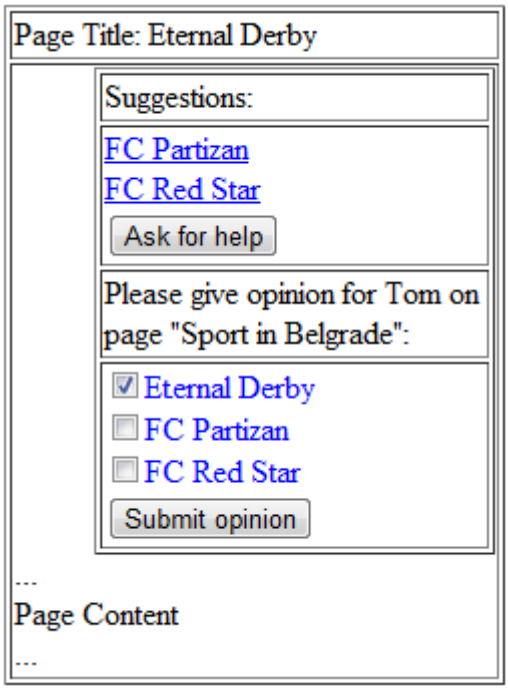


Figure 4. Page entitled "Eternal Derby", which was visited by "Tim" contain two recommended links to web pages, but it also contains the request for the suggestion to "Tom"

page "Eternal Derby". After the opinion of assistance provider has been confirmed, the information about the user's opinion is sent via AJAX engine to the web server and recorded in the database.

After the next time period the user Tom is informed that a user named Tim gave a suggestion that he should use a link that points to the page "Eternal Derby" (Figure 5).

This is an example of a simple system for inter-user cooperation, where one user has requested assistance from other users and one of the assistance providers helped him with his suggestion. The time passed from sending the request for help and providing the assistance, might be a few seconds, depending on the time interval of checking the new balance on the website pages and response time of assistance provider. In addition, the main page can normally be used and due to the advantages of using Ajax only the section with links is periodically updated.

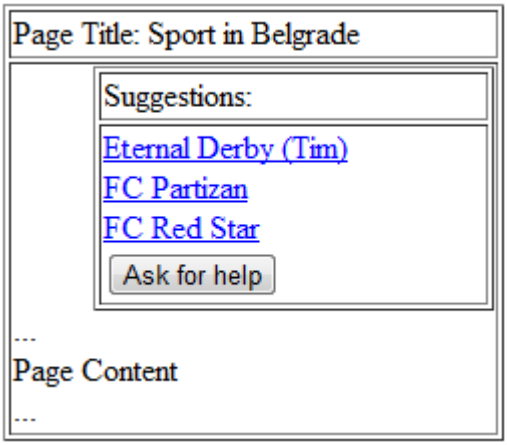


Figure 5. Page entitled "Sport in Belgrade", which was visited by the user "Tom", contains three recommended links to web pages, with the stated recommendation made by the provider of assistance identified as Tim

VI. CONCLUSION

There is a need of educators to monitor the learning process of students, and student's need to find the necessary resources in distance learning field with the least expenditure of effort and time. Since the available materials are becoming more numerous it is important to have effective navigation that would allow easier and faster access to such materials that are often deployed in various locations. Adaptive web sites enable the improvement of navigation on the sites by using the information about past user behaviors usually by adding links between previously unrelated documents. This paper illustrates that it is possible to realize the system by combining adaptive websites and Ajax, in which the educators could, in a few seconds, direct students to useful resources, and of course, the mutual assistance between the students is also possible.

The further development goes in direction of further elaboration of this idea, consideration some of the motivational techniques for user involvement in the current system and implementation of the system in an adaptive web site. It would also be useful to examine the possibility of using the knowledge obtained by such system for improvement of the adaptive websites navigation in the future.

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PRE-SERVICE CHEMISTRY TEACHERS TRAINING AND CHEMISTRY TEACHING/LEARNING AIMS

D. Trivić and B. Tomašević
University of Belgrade, Faculty of Chemistry, Belgrade, Serbia
dtrivic@chem.bg.ac.rs , bsteljic@chem.bg.ac.rs

Abstract - In this article, the pre-service chemistry teacher education at the Faculty of Chemistry of the University of Belgrade is presented. The students' activities related to the development of their understanding of the curricular chemistry learning goals of different educational levels, their relation to general educational aims, the understanding of the relations between the goals and the aims, outcomes and standards are described. Through these activities the students should be prepared to set realistic, realizable lesson goals that will contribute to reaching the goals of chemistry teaching and learning on a given educational level and general educational aims stated in the curriculum.

I. INTRODUCTION

The development of a curriculum for chemistry pre-service teacher training must take account of elementary and secondary education chemistry curricula (ESECC) in order to prepare future teachers for planning, organizing, performing, monitoring and evaluating teaching and learning in view of these documents. Also, future teachers need to be trained to follow the development of science and technology, social changes and labour market demands, which all will affect ESECC in the future. In some areas (e.g. information technology) changes are intensive and require frequent adaptations of the contents and methods in the curricula of certain school subjects, while in some fields knowledge bases to be transferred to students are maintained (e.g. science) regardless of rapid developments in the field.

The competencies that future teachers construct during their pre-service training must include knowledge, skills and attitudes which serve as the basis on which they can further develop professionally through practice and permanent in-service teacher training in order to enhance the quality of their teaching and be ready to face successfully the challenges of subsequent reforms. The pre-service chemistry teacher curriculum should enable formation of such professionals who will understand why the young should learn chemistry, i.e. to understand the aims of learning chemistry on different educational levels. The teacher must be trained to evaluate realistically: which chemistry contents pupils should internalize depending on their level of education or the type of school; how much they can achieve regarding psycho-physical age characteristics, previously acquired knowledge and the needs of various professional orientations; how to monitor and evaluate pupils' achievements; what kinds of interventions to apply in order to help them increase their results. The chemistry teacher should be a partner in pedagogic communication, someone who monitors and supports his pupils' development by different encouraging interventions and relevant feedback, someone who motivates pupils to study chemistry and successfully regulates social relations in affective communication. Successfulness in performing each of these roles requires adequate and developed professional competencies.

Having perceived a need for support provision which will focus on real challenges and needs of science teachers in the classroom, some authors have identified, based on numerous researches, the areas that science teachers must understand. These are: (1) science contents, (2) students (how they learn and develop, respecting personal differences and approaches to studying), (3) teaching (understanding principles and techniques, advantages and limitations of different teaching strategies and their application), (4) learning environment (how classroom space should be organized for productive learning, encouraging positive social interactions, active involvement in students' learning and enhancing their intrinsic motivation, understanding the principles of effective class management, supporting positive relations, cooperation and purposeful studying), (5) professionalism [1].

Questions that are often posed by teachers on how to get their pupils to understand a certain scientific concept, what additional materials could be used to that end, what pupils already know and what might be problematic, how to assess what they have learned indicate clearly the differences between a teacher's and a scientist's knowledge of a particular area. Shulman named this type of knowledge, specific for teaching profession, pedagogical content knowledge, PCK [2]. The value of PCK is in what it has to tell us about learning to teach science, which should ultimately affect how students learn science [3]. The use of PCK offers another way of thinking about learning to teach and encouraged pre-service teacher to begin to delve into deeper understandings of practice based on better linking of teaching and learning purposes [4].

Knowledge of science curriculum, a component of PCK, consists of two categories: mandated goals and objectives, and specific curricular programs and materials [5]. It includes teachers' knowledge of the goals and objectives of the subject(s) they are teaching, as well as the articulation of the guidelines across the topics addressed during an academic year [6]. It also includes the knowledge teachers have about their subject(s) vertical curriculum; that is, what students have learned in previous years and what they are expected to learn in subsequent years. The role of teaching experience and reflection in science teacher education is to creating possibilities for pre-service to build on the dynamic interplay between subject matter knowledge, pedagogical knowledge and contextual knowledge [7].

The chemistry learning goals are associated with chemistry triplet (macro, submicro, and symbolic), which has been the subject of different adaptations and reinterpretations, the subject of different models that may be useful in the analysis, evaluation, and reflection of educational research results and teaching practices [8].

II. PRE-SERVICE CHEMISTRY TEACHER TRAINING

One of the challenges posed to teacher educators relates to how to frame their courses in such a way to ensure that novice teachers be familiar with all contexts and methodology, be trained to reflect upon their own preconceptions and thus refine their own understanding of their own learning styles, in order to be able to facilitate the learning of their students [9].

The Faculty of Chemistry at the University of Belgrade has been training chemistry teachers for forty years. There, students receive full education and preparation for teaching in schools, i.e. besides the group of study subjects belonging to different fields of chemistry which are proscribed for elementary and secondary schools they also receive psychological-pedagogical and methodological education and have practical training in schools. After the latest reform in 2004, from the very start of study, our students are being prepared for work in schools and different roles a chemistry teacher has to play. Whichever the field of chemistry they are studying they consider the ways of its elaboration with elementary and secondary school pupils within the subjects Chemistry Didactics 1-4. In this way they transform content knowledge into pedagogical content knowledge according to the requirements of chemistry curricula for different educational levels and different types of schools throughout their studies. Such an approach increases the responsibility of students towards their own construction of knowledge of chemistry since, simultaneously with learning certain chemistry themes they are confronted with the question how to teach the same contents to others. Additionally, while they study how pupils learn and how to ensure their understanding, they also stabilize their own knowledge.

Within the curriculum for future chemistry teachers the subjects Chemistry Didactics 1-4 links the contents of chemistry as a science and classroom activities aimed at knowledge and skills formation relevant for this science. The Chemistry Didactics Syllabus includes the following themes:

- Goals and outcomes of learning chemistry. Achievement standards
- Teaching contents
- Teaching/learning methods
- Monitoring and assessing pupils' achievements
- Introduction to pedagogic research methodology.

Practical covering of the stated topics is interwoven with activities aimed at enabling students to use a school curriculum, i.e. to plan, organize and perform teaching according to it, to monitor and evaluate the pupils' progress in view

of the goals and expected outcomes and within the frame of the pupils' achievement standards.

In order to raise our students' awareness of the teacher's responsibilities, and make them focus on their own efforts to develop into competent chemistry teachers and govern their own learning process, the chemistry teacher's competencies, which are necessary for successful fulfillment of various teacher's roles, are discussed in the initial stage of Chemistry Didactics 1. The list of competencies is repeatedly discussed at the beginning of the fourth year of study with the aim to check what has been achieved during the previous three years and to asses which competencies need further strengthening.

Within the first theme general educational aims in primary and secondary schools are discussed and special attention is paid to how chemistry contributes to their achievement. That is, the place and role of chemistry is defined regarding the totality of education of an individual in primary and secondary school. The next step focuses to chemistry teaching/learning aims based on the current curricula in Serbia and how they can be achieved by teaching different chemistry themes. Then follows an analysis of documents in different countries, in which chemistry is studied within a separate school subject or within the subject Science, specially the analysis of chemistry learning aims stated in these documents (curricula). Common objectives are singled out, as well as the objectives that are specific for a particular education system. Such analysis of the Science and Chemistry curricula reveals common objectives for modern chemistry teaching, regardless of the country in which it is realized. These objectives relate to: scientific facts and concepts, knowledge and comprehension as general categories of educational aims, observational and analytical skills, experimentation and application skills, research and scientific methodology, communication skills and positive personal attitudes. Students are instructed to assess the justification of the considered aims and to what extent the pronounced intentions lead to knowledge and abilities pertinent to everyday life, continuation of education and future professional orientation. They also discuss the issue of how to provide support as wide as possible for the young in their efforts of acquiring knowledge and skills defined by the aims by engaging parents, peers, and all others interested in education of the young.

The next step includes studying long-term and short-term objectives of chemistry learning, which can be reached within a block of lectures, one lecture or a section of a lecture, e.g. by observing a demonstration of an experiment, individually, through pair or group work.

III. CHEMISTRY TEACHING/LEARNING AIMS AND FUTURE CHEMISTRY TEACHERS ACTIVITIES

In the future chemistry teacher education special attention is paid to teaching and learning aims of chemistry, since according to these the activities of the teacher and learners in the teaching/learning process are planned, organized, performed and evaluated. The achievement of the teaching and learning goals is the measure of the efficacy of the whole education system. It is important that future chemistry teachers understand how these goals are formulated, and that numerous factors, situational, organizational and personal, affect the probability of goal achievement. Therefore, opting for goals that are satisfying, desirable and most probable to be reached should be encouraged.

What follows is a description of our students' assignments and activities through which they develop deeper understanding of the aims, outcomes and standards in chemistry curricula and syllabi in Serbia. Through these assignments the students are trained to formulate the goals of study units according to curricular aims and perceive the relations between general educational aims and the goals related to studying chemistry. In carrying out these assignments the students use not only Serbian curricula but also some science curricula from other countries [10]. Thus they learn what intentions related to educating the young in the field of science and chemistry exist in different education systems, how educational aims are formulated in other countries, which aims are common, etc.

For example, among general educational aims in Malta there is a goal to enhance learners' awareness of the role of science and technology in everyday life. The curriculum offers a general list of abilities (e.g. ability to develop and enhance cognitive skills, ability to actively contribute to environment protection, etc.) and attitudes which should be developed (e.g. evaluating the importance of science and technology in the life of each individual). Our students are expected to concretize these abilities into those that are

specific for chemistry and can be developed by studying chemistry.

Our students also get assignments to compare the aims and outcomes of studying chemistry in England, New Zealand and Hong Kong concerning learners' age (11-14), which corresponds to the ages when pupils in primary schools in Serbia study chemistry. They are expected to single out five outcomes they estimate the most important for primary school and evaluate whether such results are achieved in our schools, according to their personal experiences. Then follows a discussion on the reasons why some outcomes are not obtained in our education system. The next task requires the students to assess, based on personal high school experience, which of the common outcomes in the curricula from Slovenia, England, Denmark, Malta, North Caroline, Utah, Ontario and Singapore are achieved by pupils in Serbia. Then follows a discussion on why some outcomes are reached by smaller percentages of high-schoolers, i.e. which contextual reasons lie behind such eventual failures.

The fulfillment of this task opens the question of how to monitor goals achievement in the teaching/learning process. Students receive the curricula of the countries which contain descriptions of goal achievement monitoring. They are expected, again according to their experiences from previous schooling, to assess up to which level such monitoring is practiced in our schools and to express their assessment on a three-level scale: 1 - completely, 2 - partly, 3 - nonexistent.

In order to be able to assess the quality and efficacy of teaching students are provided with the following list of chemistry learning goals in primary school:

- perceiving and understanding basic differences between pure substances and mixtures,
- knowledge of a substance structure, i.e. which particles (atoms, ions and molecules) build it,
- understanding of the causes for numerosity and diversity of substances and understanding of the chemical bonds,
- learning how to present compounds via molecular, rational and structural formulae,
- understanding chemical reactions as the changes of substances and energy,
- development of the ability to describe chemical changes orally and by equations,
- understanding of physical and chemical properties of the selected substances and the relations between structure and reactivity,
- knowledge of natural sources of biologically important substances and their functions in human body,
- knowledge of the properties of the substances used for making products for everyday practice,
- acquiring skills necessary for correct and safe work in school laboratory and with everyday substances,
- understanding the effects of substances on the environment and the need ways of preventing contamination,
- development of the ability to use acquired knowledge when seeking solutions related to environment, economic growth and ethical issues.

For each goal the students make assessments whether they are reached 1 - in full, 2 - partly or 3 - not reached at all. The results are analyzed and discussed with the focus on establishing which goals are reached in the majority of our schools, which goals are partly reached, and which are not reached at all. Students then give their opinions on the reasons for success or failures in schools, be it working conditions, state or lack of equipment, time allotted to certain themes, textbooks, or teachers, teaching and learning methods, classroom communication, etc.

The following task illustrates how students can be trained to provide vertical connections of chemistry teaching contents by de-structuring learning goals of different educational levels. They are expected to concretize (elaborate, state precisely) the goals for primary and comprehensive secondary school. These goals are:

- to achieve that learners:
- know terminology used in chemistry,
- develop abilities and skills necessary for conducting experiments/research of real world by using the instruments and procedures specific for chemistry,
- develop analyzing and problem-solving skills, and

- develop the ability to communicate by using the language of chemistry.

The development of understanding of the relations between chemistry learning goals, outcomes and standards is the aim of a task in which the students determine the outcomes of the theme *Chemical reactions* based on the previously defined learning goals. They are expected to single out those goals which should be reached by each learner after learning this particular theme. The students also assess whether the learner's progress can be monitored, determine the indicators and so formulate the standards for minimal accomplishments.

Our practice has proved that the described tasks do enable our students to formulate clear and realizable lesson goals, and plan appropriate pupils' activities for reaching these goals, which is all documented by the analyses of their lesson plans. It is particularly important that the distribution of the student's marks given within the school practice during the past period have been moved towards the higher valuaes. The average mark of the lessons given by the students was 8.82 on the scale 5 to 10 (standard deviation is 1.05, and the variation quotient 11.93, wich shows that the results are homogeneous).

IV. CONCLUSION

The paper described the students activities related to the development of their understanding of the curricular chemistry learning goals of different educational levels, their relation to general educational aims, the understanding of the relations between the goals and the aims, outcomes and standards. Through these activities the students-future teachers should be prepared to set realistic, realizable lesson goals that will contribute to reaching the goals of chemistry teaching and learning on a given educational level and general educational aims stated in the curriculum. While performing the described tasks our students:

- compare the aims and outcomes of chemistry learning in different education systems, single out common outcomes and evaluate whether these can be expected or are obtained in Serbia,
- discuss the reasons why some goals are reached and some are not, considering current teaching practice in Serbia (teaching/learning methods, usage of teaching aids) equipment, time allotted to different themes, teachers' competencies),
- concretize expected learner activities/behaviours according to Bloom's taxonomy of cognition for one of the curricular themes for both primary and comprehensive high school pupils,
- determine minimal achievement standards according to the learning goals of that particular theme for both types of school.

Within the described activities our students face a question on how professional intentions related to education in the field of chemistry should be formulated. They get prepared to use not only the Serbian curricula, but also those from other countries and different education systems as significant indicators of what is globally considered necessary in the field of chemistry education.

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VISUAL PROGRAMMING ENVIRONMENTS FOR TEACHING OBJECT-ORIENTED PROGRAMMING

S. Maravić Čisar*, D. Radosav ** R. Pinter* and P. Čisar ***
*Subotica Tech-College of Applied Sciences, Subotica, Serbia
**University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
***Telekom Srbija, Subotica, Serbia
sanjam@vts.su.ac.rs, radosav@tf.zr.ac.rs, probi@vts.su.ac.rs, petar.cisar@gmail.com

Abstract - Object-oriented programming is currently very much in focus and object-oriented languages (such as C++ and Java) are used as the first language to teach programming at colleges and universities. The object-oriented concepts such as objects and inheritance are difficult for understanding by novice programmers. Due to their lack of general problem solving abilities, students do not know how to create algorithms, resulting in them not knowing how to program. This paper researches different educational visual programming environments in courses of object-oriented programming in higher education.

I. INTRODUCTION

Programming is a major subject in Computer Science (CS) departments. However, students often face difficulties on the basic programming courses due to several factors that cause these difficulties. Maybe the most important reason is the lack of problem solving abilities that many students show. Due to their lack of general problem solving abilities, students do not know how to create algorithms, resulting in them not knowing how to program.

Learning programming requires the ability to decompose some real problems and to create the general (abstract) model of solutions. The next step is writing down the solution in the form of a program code in a programming language. Writing a program code for students is a difficult task and seems very demotivating because the smallest error in a code leads to failure.

Programming is a difficult cognitive skill to learn. It requires knowledge and skills in many areas, such as the syntax, semantics and pragmatics of programming languages, creative problem solving, development environment and a multitude of software tools (e.g. IDE, compiler), algorithms and data structures, programming concepts and paradigms (e.g. object-orientation, functions, variables), program design and programming patterns [1].

This paper gives an overview of some of the existing educational visual programming environments and compares some examples of their application.

II. EDUCATIONAL SOFTWARE VISUALIZATION

Most students are visual learners and instructors tend to present information verbally [2]. Some studies [3, 4] estimate that between 75% and 83% of students are visual learners. Because of their highly textual rather than visual nature, the use of either traditional programming languages or pseudo-code provides a counter-intuitive framework for expressing algorithms to the majority of students. Scanlan [5] showed that students understand algorithms presented as flowcharts better than those presented in pseudocode. Carlisle et. al [6] showed that, when given a choice, 95% of students chose to express algorithms using flowcharts rather than using a traditional programming language, even when the majority of their instruction had been done in a traditional language. Several studies [6,7,8] showed that students performed better in courses when taught with iconic programming languages.

Visual programming is the use of graphics and graphical techniques in computer programming. It is becoming more common to see many approaches to visual/graphical programming languages emerging that incorporate the object-oriented programming philosophy. To this end, developers of new programming languages and programming environments are exploring how to combine visual programming with object-oriented programming by investigating how the basic concepts of OOP - data abstraction, instantiation, composition, and specialization - create new opportunities for

programming using visual means of construction [9].

Software visualization (SV) is "the visualization of artefacts related to software and its development process" [10], and is used in the presentation, navigation and analysis of software systems. Price [11] presents the following general definition of software visualization: "Software visualization is the use of the crafts of typography, graphic design, animation and cinematography with modern human-computer interaction and computer graphics technology to facilitate both the human understanding and effective use of computer software."

The primary goal of visualization is to convey information. It should convey this information in an understandable, effective, easy-to-remember way [12].

Despite its intuitive appeal as a pedagogical aid, algorithm visualization technology has failed to catch on in mainstream computer science education [11]. While those few educators who are also algorithm visualization technology developers tend to employ their own algorithm visualization technology, the majority of computer science educators tend to stick to more traditional pedagogical technologies, such as blackboards, whiteboards and overhead projectors. Why do computer science educators tend to not use algorithm visualization technology? Instructors commonly cite several reasons, including the following:

- They feel they do not have the time to learn about it.
- They feel that using it would take away time needed for other class activities.
- They feel that creating visualizations for classroom use requires too much time and effort. Note that, in the algorithm visualization technology literature, this reason is frequently used to motivate new technology that is easier to use, and that supports the more rapid creation of visualizations.
- They feel that it is simply not educationally effective.

The reason that "it is simply not educationally effective" stands out as very important because there is no reason to adopt new technology if it does not bring some improvements in educational process.

III. VISUAL PROGRAMMING ENVIRONMENTS

This section presents an overview of some of the existing Visual programming environments for learning OOP. Each environment is described, and some results obtained by its application are presented.

A. Alice

Alice, by Carnegie Mellon University, is an innovative 3D programming environment that makes it easy to create an animation for telling a story, playing an interactive game, or a video to share on the web. Alice is a freely available teaching tool designed to be a student's first exposure to object-oriented programming. It allows students to learn fundamental programming concepts in the context of creating animated movies and simple video games. In Alice, 3-D objects (e.g., people, animals, and vehicles) populate a virtual world and students create a program to animate the objects [27].

In Alice's interactive interface, students drag and drop graphic tiles to create a program, where the instructions correspond to standard statements in a production oriented programming language, such as Java, C++ and C#. Alice allows students to immediately see how their animation programs run, enabling them to easily understand the relationship between the programming statements and the behavior of objects in their animation. By manipulating the objects in their virtual world, students gain experience with all the programming constructs typically taught in an introductory programming course [27]. Although Alice uses object terminology, it does not directly support inheritance [27].

Many studies were focused on how the Alice's environment had an impact on a student's learning process [13]. In study [14] was described an approach for introducing recursion by using Alice, as part of a course for novice programmers. The authors concluded that using Alice, offers computer science instructors an approach to introduce fundamental concepts to novice programmers, that allows them to quickly identify and learn from mistakes.

In study [15] development of a course for non-computer science majors to teach students computer science concepts and programming is described. In that course students were given five visualization tools: HTML, JAWAA, StarLogo, Alice, and Karel++. Based on the evaluation survey that was given in the course, the author

concluded that Alice was clearly the favorite and the easiest to use.

In [16] is presented implementation of Alice for an objects-first strategy. The authors concluded that the Alice's tool was quite useful in teaching objects-first strategy to help students master the complexities of object oriented programming, it provided stronger object visualization, and a flexible meaningful context for helping students to see object-oriented concepts.

The purpose of the research [17] was to assess the performance of novice programmers in King Abdulaziz University (KAU) female CS department in Saudi Arabia, and the effectiveness of the visualization environments in Alice. During the experiment students in the Treatment group statistically performed better in OOP than students in the Control group. It is believed that the success of using Alice was due to the visual representation of objects. Students could see and relate to the objects and their animation actions, thus developing good intuition about objects and OOP. The researchers concluded that Alice helped students (the treatment group) to master the complexities of OOP. Based on the statistical results of this research, the satisfaction survey results, and how Alice affected the students' performance in learning OOP, the researchers recommend that Alice must be integrated into the introductory OOP in the CS department in KAU in order to improve a high level of students' involvement and the ability to develop an intuitive understanding of OO concepts in a visual feedback environment [17].

B. Jeliot 3

Jeliot 3 is a program visualization application. It visualizes how a Java program is interpreted. Method calls, variables, operation are displayed on a screen as the animation goes on, allowing the student to follow step by step the execution of a program. Programs can be created from scratch or they can be modified from previously stored code examples. The Java program being animated does not need any kind of additional calls; all the visualization is automatically generated. Jeliot 3 understands most of the Java constructs and it is able to animate them [19].

Jeliot 3 can be used in several ways for teaching and learning to program. Here are some examples [20]:

- Lecturers can use Jeliot 3 as a part of the lecture material. They can explain the different concepts of programming through Jeliot animations. This will facilitate the construction by the students of the correct relationship between the animation and the concept, and enable them to apply it later with a reduced possibility of error [21].
- The students may use Jeliot 3 by themselves after lectures to do assignments.
- Jeliot 3 can be used in an interactive laboratory session, where students may utilize their recently acquired knowledge by writing programs and debugging them through Jeliot 3.
- Finally, Jeliot 3 provides a tool that can aid in courses where external help is not available (e.g. in distance education). Its visualization paradigm creates a reference model that can be used to explain problems by creating a common vocabulary between students and teacher [21].

The Jeliot family's key feature has been the fully or semi-automatic visualization of the data and control flows. The development of the Jeliot family has taken more than ten years with different kinds of stages. Several versions of the concept have been developed, namely Eliot (developed at University of Helsinki, Finland), Jeliot I (developed at University of Helsinki, Finland), Jeliot 2000 (developed at Weizmann Institute, Israel). This has led to the stage when the software has become product-like both usable and stable.

The new version Jeliot 3 is a free piece of software published under General Public License (GPL). This means that the future platforms can be developed by networked teams presenting the idea of learning communities. In these communities the distinction between a teacher, a learner and a developer disappears, thus learner can develop the tools he or she needs with the other members of the community. Jeliot—together with its documentation, research publications, and learning materials—can be downloaded for free from [21].

Boyle, Bradley, Chalk, Jones, and Pickard [22] defined the new curriculum for London Metropolitan University's course of introductory programming. They paid particular interest in a visual approach. Over 600 students took part on the course. The increase in pass rates was between 12 and 23% compared to previous year. Boyle et al. reported some major issues in handling the course transition, but on average they described the graphical approach 'very successful with the students'.

Kannusmäki, Moreno, Myller, and Sutinen [19] evaluated the use of the Jeliot 3 program visualization system during the second course of programming in the Virtual Studies of Computer Science distance learning program at the University of Joensuu, Finland. Gathered data showed that the students most successful in the course used Jeliot more than the other groups involved in the research. However, most of the students in general still used other tools to code and test their programs. The usage problems reported were mostly technical or related to the usability of the editor. The animation was criticized on being too slow and some students even found the whole system unnecessary and unsuitable for advanced courses. The positive aspects identified in the feedback included the ability to make conditional statements, loops, and objects more understandable.

Hundhausen, Douglas, and Stasko [12] conducted a comprehensive meta-study, analyzing 24 experimental studies on effectiveness of algorithm visualization. They state that one of the main reasons visualizations are not widely used is because the teachers responsible for the courses refuse to use new methods in teaching. They also found out that the main focus in articles about visualizations is their visualization capabilities instead of their learning benefits. Of the 24 studies examined, 11 showed statistically significant results of visualizations positive effects on learning, meaning that the group using a visualization system gained better learning results than the control group. Hundhausen et al. [12] also discovered that the sole use of visualization systems doesn't necessarily improve the learning results; it is more important to engage the learners in the subject using visualization system as an aid.

The paper [19] discussed the problem of the applications of software for visualization Jeliot3 in learning the programming language Java. The study involved 400 students of two higher education institutions in Serbia. Students who were in the experimental groups after completing the course filled out the survey in order to obtain information about their opinion on learning using Jeliot3 visualization software. The students of the experimental group were asked what they think about the educational possibilities of Jeliot3. Their answers depended on the level of knowledge of Java and object-oriented programming concepts in general. Responses were ranged from the answer that Jeliot3 is a great help for beginners, that is a powerful educational tool thanks to the visualization and because of that it made learning Java easy, to the opinions of some students who have already had experience in Java programming that it was pure waste of time for them. Students who expressed a negative opinion about the Jeliot3 said that it was difficult for them to adapt their knowledge of object-oriented programming and their style of programming to the new tool; also they had objections about the elements of visualization code which disturb their attention. What all the negative comments had in common was that they were given from students who have already used the Java, but almost all of them pointed out that they believed that Jeliot3 can be very useful at the beginning of the process of learning Java. Based on the research, which lasted for two years, it can be stated that there are significant differences in the achievements of students who were taught in the traditional way, and those who have used Jeliot3.

C. Game Maker

Playing computer games is very popular among young people. Many of them dream that one day they will create a computer game. So, that could be used in teaching computer science. Developing computer games involves many aspects of computing, including computer graphics, artificial intelligence, human-computer interaction, security, distributed programming, simulation, and software engineering. Game development also brings into play aspects of the liberal arts, the social sciences, and psychology [24]. Game Maker is a program that was created in 1999 by Mark Overmars. It was designed in a way that can be used in education as a programming tool that develops logic and design skills through the programming and production of 2D and 3D games. The main feature of the program is that in the process of making the application it is not necessary to write code in the text mode, but the user could program by using drag and drop technique or by combining graphical icons. The graphical way of writing program code eliminates syntactic and lexical errors (that could occur in a textual form of coding) which make it easier for the students to come up with solutions and development of program code.

Educators have increasingly incorporated game design into high school computer science curricula. Generally, students respond enthusiastically to these courses because they prefer programming in Game Maker to doing their usual assignments. But game design offers more

than mere programming. In order to design an effective game, students must think about the rules that define the game play. Such rules must be consistent and fair. A gripping storyline is often required for a game. The user-interface must be designed and effective artwork and sounds must be created or sought. Thus after the programming, the game must be tested and tuned for best playability. Finally, documentation must be written. Creating a game makes an excellent group project in which students can combine their creativity and interests [24].

The paper [25] presents a discussion about the topic of teaching fundamental programming to freshmen, along with a case study where computer games are meant to be developed by students in a first programming course, through the use of a game engine which allow students to develop fundamental programming skills without having to learn syntax and idiosyncrasies of any programming language.

This experience allowed the initial presentation of the concepts of visual programming, event-oriented programming and object-oriented programming, without formalizations or specifications. Students start to build these concepts themselves – or at least they begin the knowledge construction about these subjects – through teacher-oriented controlled experimentation, they practiced in a simple development environment and in collaboration with their classmates. It is possible to conclude that the use of a simple, interactive and intuitive development tool like the Game Maker engine allows teachers to introduce to freshmen the basic principles of programming logic, without dealing with paradigms' idiosyncrasies or in programming languages' details of syntax. Based on this analysis, the students' performance improvement in a posterior course on programming can be verified in the class of 2009, compared to 2008, when students did not have this course before having contact with real-world programming

In introductory courses, computer gaming can be used as a motivational technique to improve recruitment and retention in computer science. In such a course, the teaching and learning of fundamental concepts can be embedded in hands-on problem-solving and design activities focused on designing and building a game. Students can develop a more thorough understanding of the algorithms, data structures and other topics in computer science while engaged in active learning.

D. RAPTOR

RAPTOR (the Rapid Algorithmic Prototyping Tool for Ordered Reasoning) is an open-source tool that fully supports object-oriented programming, including encapsulation, inheritance and polymorphism. RAPTOR enables students to execute their algorithms within the environment, rather than having to separately compile and execute their programs. This means that debugging can be done on the visual representation of the algorithm, rather than the textual one and prevents having to use multiple tools. This combination of features makes RAPTOR unique, providing functionality not available with any other currently existing educational programming environment [26]. RAPTOR is written in a combination of Ada and C#, and runs in the .NET Framework. RAPTOR begins by opening a UML diagram, in which users can create classes, interfaces and enumeration types and specify relationships between them [26].

The UML Designer allows users to create classes, interfaces and enumeration types. These can be given the Java access modifiers of public, private, protected or default. Additionally, classes can be specified as abstract, sealed, or static. A zoom bar allows the user to resize the diagram as desired, or make it fit the current window. The UML diagram can also be annotated with comments. Each of these UML elements can be moved on the diagram. The UML window also allows for the specification of relationships between entities. Possible relationships are inheritance, interface implementation, class nesting, association, composition, aggregation and dependency. As with the elements, the arrows indicating the relationships can be moved on the diagram [26].

IV. CONCLUSION

Programming is a difficult cognitive skill to learn. Mastering the basis of a programming language for many students is a huge problem. In order to write a simple program they need to have a basic knowledge of variables, input/output of data, control structures and other areas. An even greater problem is mastering the more complex concepts such as pointers, abstraction or exception handling. And even when they have the necessary theoretical knowledge, the problem arises when they have to apply their knowledge as a whole and actually write a programming code. The student groups in introductory programming courses are typically very large and heterogeneous in

knowledge of programming concepts. In teaching system "one size, fits all" is very difficult to design curriculum that would be interesting and beneficial for everyone students. The novices to programming need to do a lot of independent work to keep up with the course and lot of them are unable to follow such a rhythm, thus the dropout rate on the introductory programming courses is high.

The aim of this paper was to give an overview of visual programming environments in courses of Object-oriented programming. Of course, further researches in this field are required. It must be noted that it is already clear there is a need for different tools for learning depending on the level of students' knowledge of the studied materials. Advanced students and even students with only superficial experience in programming are very sensitive to the change of tools that are used as a code editor, if it does not provide significant improvement over the tools they get used on. In other words, the individual characteristics of students, including the level of knowledge, must be taken into deeper consideration because the demands of students are changing rapidly.

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SECURITY E-TRAINING OF EMPLOYEES IN BANKING SECTOR

V. Kanižai and A. Povazai
OTP banka Srbija a.d. Novi Sad, Novi Sad, Serbia
viktor.kanizai@otpbanka.rs

Abstract - We live in a time that can be characterized as the time of extraordinary possibilities and challenges. Modern banking is just unimaginable without modern achievements of Information Technologies and all the possibilities it presents, without the basic IT grounds, no bank can function properly. There is almost no activity that doesn't rely on computers and IT equipment, and it's the main means of banking processes. But, the development of IT brings certain negative events which jeopardize the data and IT security, which results in threatening the bank and all banking activities. Security training of employees within the banking sector is one the greatest responsibilities of the bank as a significant financial institution, whose activities include money transactions, financial services and other confidential tasks. Since the training should address all employees, the most efficient way to achieve that goal is to introduce online, e-training through the IT network of the bank.

I. INTRODUCTION

We live in an era of computerization, joint networks and the rapid development of all Information Technologies. Modern business processes are simply unimaginable without the usage of automated machines, computers. It's the same with the financial, banking sector. Data processing is the basic operation of a bank in terms of IT, and it can be only done with computers, IT network, and proper hardware equipment.

That means that the way of usage of this equipment is essential in the business process. In order for everything to work as desired properly trained personnel should be running and administering the computers, and also operating the network.

But the number of persons who realize that there are many users who are not "typical", who have goals other than the proper operation of the IT system, is very small. The majority assumes that every user is a "user with good intention", but there are a significant number of those who are trying to use the given system to gain material or reputational benefits in a criminal manner.

The banking sector completely relies on IT, extraordinary events in this field have key significance on the business of the bank. If the IT system is not running, the bank cannot function. This is why it is of a great essence for the users of the computers and IT network to have proper education. Not just in the field of how to operate with a certain technology, but also how to protect that technology and how to use the technology for protection. All employees in the bank should therefore attend a security training which would address the issues of proper and secure handling of all Information Technologies within the bank.

Clients of all finance institutions have big expectations from the clerks, which are not easy to accommodate. Those expectations can be fulfilled only by properly educated personnel, and that's way it is very important to conduct trainings within the banking sector.

II. IMPORTANCE OF TRAINING ON SECURITY

The matter of the security training of the employees within the bank should contain the possibilities of using the IT infrastructure. Also it would be very helpful to address the clients and users of the financial services. With the rapid development of modern technologies, the client also has to be instructed how to safely use these technical achievements. It is just not enough to show how to use a given functionality, they also need to know how to protect it. To give an example, transactions can now be done with a mobile phone. The client, in this case the user, is given instructions how to use the various options in the mobile banking application. But the user is not instructed how to protect the data within the mobile phone, nor how to assure secure communication. In case of a cyber attack the client would lose all his money on the account that he manages through his mobile phone. Taking care of security in this manner is the obligation of the client, so in cases of criminal activity the client would be the one who would have material losses, not the bank.

The security training should point out that computers cannot only be the object of an attack, but also:

- Resource to conduct criminal activity and
- Resource to plan, hide and organize criminal activities with high losses.

Also, the security training should emphasize that computers can be used as:

- Resource to fight criminal activities endangering the data processing and therefore the bank entirely, which means preventive measures,
- Resource to detect, clarify and prove criminal acts against the bank as a financial institution, which means repressive measures.

Besides protecting data and Information Technologies, the employees have to be trained in the field of general security also. They need to know how to recognize fraudulent activities by potential clients in order to prevent material damage to the bank. To give an example, the clerk in the bank must have basic knowledge in recognizing counterfeit documentation. If not then he could accept counterfeit ID card, employment certificate, etc. which would result in giving a loan that never will be returned.

Security training should also address how to react in case of armed robbery, bomb information, etc. It is of a great essence to teach employees how to prevent material damage and how to react in case of an extraordinary event. That's what the clients expect and also the employer. Training is the only efficient way to achieve this.

Training should be continuous. As the technologies and methods of attacks are continuously changing, so are the methods of preventive and repressive protection. Also, the employees have to be aware of the need of security training in order to be open for knowledge of this kind. They have to recognize that although security is not a business process that brings profit, it is very important in order to ensure continuous business processes and therefore to ensure profit, and employees have to be aware of that. Security should not prevent business processes from executing but it should ensure the security of these processes.

Figure 1. shows an example of good and expected training results among employees in a corporate environment. It shows the number of virus events in a bank in Serbia for the year of 2008 – 2012Q1. It can be seen that thanks to the continuous training in the field of security, the employees were more and more careful in using their computers in their daily work. The picture shows that even there are more and more viruses developed, the actual number detected in the bank's IT system is less and less. Achieving this could not happen without fundamental and continuous training.

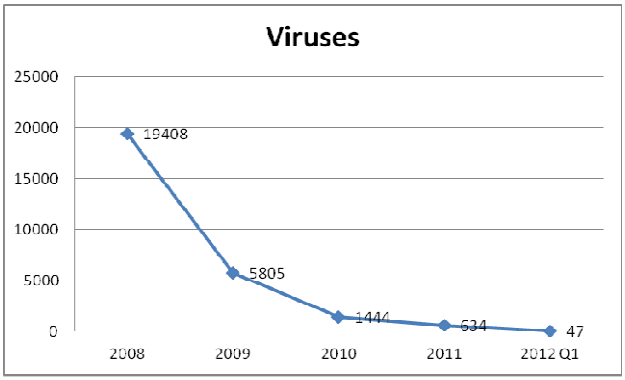

Figure 1. Number of virus events in an IT system continuously descending

On the other hand the number of IT security related events is continuously rising in that same bank. This is also a very important indicator that security training is necessary and unavoidable.

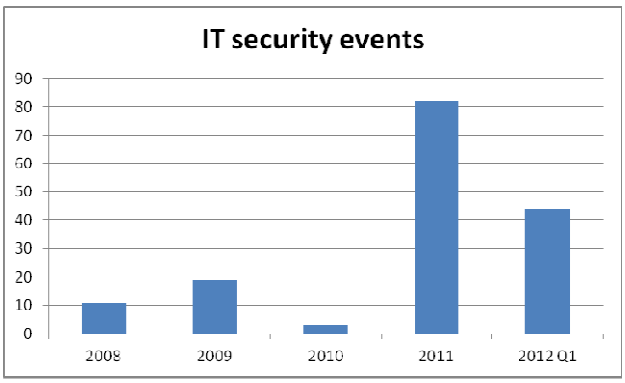

Figure 2. Number of security events is rising

Figure 3. and 4. show that there is a constant threat that should be addressed properly. Attacks on the bank's IT system over the internet is always present, just as firewall events.

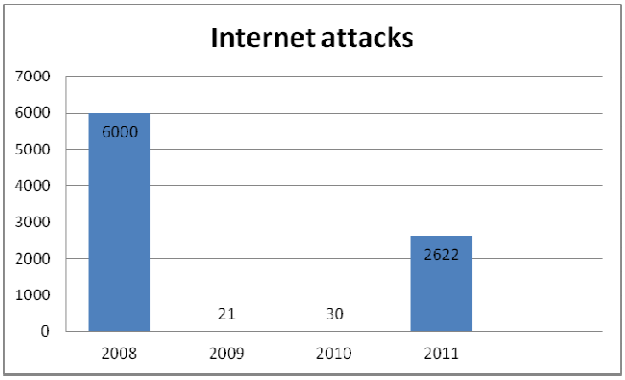

Figure 3. Number of attacks on the system from the internet

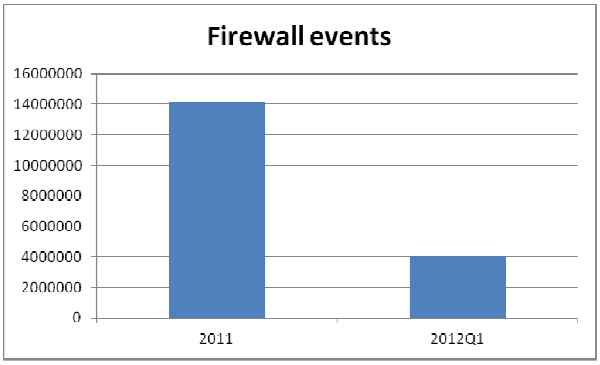

Figure 4. Number of firewall events during 2011 and the first quarter of 2012

III. SECURITY TRAINING MODEL

Modern training model means the usage of cyclic knowledge adopting. Every employee has to actively participate in the training which should address practical analyses of experiences as in local and also in the world. The training should reside on modern technologies, to use these technologies to achieve the ultimate goal: provide basic security awareness and knowledge to all employees. The training should be active and provide motivation. It has to be comprehensive, planned and well organized.

In the market there are many commercial, short term training to be found that last only a day, or even just a few hours. But, security training should not be the matter of a course, it should be the matter of education. It is always easier to buy some services than to provide them by ourselves, but when it comes to security it is keen to have efficient and comprehensive education, even if that means extra work for those who are appointed to assure security in the bank. Training is the best way of preventive protection. If the employees have proper knowledge in security, than the bank is safer regardless of the level of technical and technological solutions of protection. Let's not forget, employees represent the first line of defense.

Training can be done on site or remotely. When conducting training on site the lecturer has to prepare a presentation for the given occasion and he has to organize the place where the training will happen. Also, organizing employees to attend the training is a very tentative task. In case something is not clear, or in case of any questions, the attendees can ask them immediately from the presenter. They can even stop him at any time. When conducting remote training it can be done through e-mails or using an online method in or outside of the company's IT network. If the lecturer chooses the conduct training through e-mail correspondence he should be aware that sending training material to a significant number of people can affect the e-mail system and the network load. In case of questions from attendees the lecturer can address them by e-mail or by phone. If the lecturer chooses the conduct online training then he has multiple choices. The training could be done through an intranet or internet. Again, the network load and internet access is something to consider.

Online training, e-learning that is conducted in-house, through the company's IT network can be done in several ways:

- Create a presentation with slides (example PowerPoint printed into PDF) and make it available for employees to download.
- Create an internet presentation and send the link to the employees.

Using internet presentations there are many choices available, whether to use PHP, HMTL, SharePoint, Shockwave animations, etc. Also there is the possibility of time limited links. That means the training material is not available always, only at given time periods.

If the company has good IT network and broadband links, then it is also possible to organize video conferences or webinars. It's just very important to assess the number of attendees and expected network load according to that.

Conducting remote training also means cost savings. There are no costs of travelling, place organizing and which is probably even more important: it is time-efficient.

After a finished cycle of training there has to be efficiency assessment in order to see whether the training was successful or not and what needs to be improved for the next cycle. One way to achieve this is to conduct testing of employees after training. Test result would only be used as

information on training efficiency and it would not influence the employee's future job position.

Testing can also be done on site or remotely. It can be done through filling out paper forms and giving or sending it back to the lecturer, or it can done through filling out online forms. When using paper forms the lecturer has to collect papers from all employees and analyze them, as individual, as group results. In the online option the results would be processed through an IT system with various reporting capabilities. When using online testing it should be considered to use authentication with user name and password in order to avoid cheating. And there would also be the possibility of closing a test if the user tries to open another window on his computer to find possible answers on the internet.

IV. E-LEARNING IN A SERBIAN BANK

A. Past experience

Until 2011 security training was conducted on site. Not all employees were directly affected with the training, only a selected group for each geographic region. Those who attended the training had the obligation of passing the received knowledge to their colleagues. If they did not understand anything they had opportunity to ask a question immediately. There was no other feedback, so in case of no questions asked there was no certainty whether everything was understood or the attendees simply weren't interested. Organizing training this way was preconditioned with organizing the place where the training would be held, the attendees and traveling to the place – sometimes a few hundred kilometers.

In 2011 an improvement has been introduced. Security training in the field of IT security was no longer conducted on site, but online through the bank's IT network, namely the e-mail system. The training material was sent to the managers of the employees. They had the obligation to distribute it to their employees via e-mail. Again, training was divided into several groups of attendees, not all employees were affected at the same time. But as the final result all employees were trained in the field of IT security. If they didn't understand something in the material, they had the opportunity to ask questions through e-mails or telephone conversations. The bank also introduced testing after the training, in paper form. Every employee who read the material filled out the test form, signed it and sent it back. This was a good solution since every employee was affected, there was a feedback and there were no travelling costs and organizing obligations. But, the training meant an extra load to the e-mail system (materials sent and signed tests received). Also, it was not a trivial task to collect tests from all employees (more than 500).

B. Present solution

In 2012. a fully online training is being introduced in the bank. The training material is available online through the bank's intranet network which means that only the employees can access it, whenever they would like to. The material is a PowerPoint presentation printed into PDF and in the field of IT security it covers the next 10 important subjects:

- Responsibility of securing information.
- Use and protect your own password.
- Use internet in line with the bank's normative acts.
- Use corporate e-mail in line with the bank's normative acts.
- Protect your computer.
- Protect data.
- Protect data carriers.
- Protect data from visitors.
- Protect information outside of the bank.
- Report all incidents and malfunction of data carriers.

When choosing a group of attendees the link to the material is sent to their managers who have the obligation of forwarding it to their employees. If an employee is currently out of office for a time period then he will be selected into another group as well. After the link is delivered a certain amount of time is given to study the materials and then a test will be done.

The test is formed through PHP programming. There are 12 questions, all the same weight, and coefficient. The employees access the training material without authentication, but the test is available only by entering a user name and password. That is how the lecturer knows who filled the test and not by entering name and surname by the employee because there would be no effective control measure to eliminate filling test in another person's name (whether to help that person or to deliberately cause bad results). After

the employee logs into the testing site he has 20 minutes to mark his answers. 70% achievement is considered as positive result. Since the testing is done only to check the effectiveness of the training, the marks are only used to see whether there is a need for an additional, extended training for the employees. If someone doesn't fulfill the required result then an additional, onsite training will be held.

Choosing online training, e-learning is more effective since it addresses all employees and not just a selected few of them. The results are easily processed since they can be exported into a simple Excel file which can be used to create various reports. Also it is more cost effective since there is no need for traveling (there are more than 500 employees all over Serbia). And it is environmentally friendly because tests are being filled online and not on paper.

V. CONCLUSIONS

Security training in the banking sector is very important as for the safety of the employees as for the entire bank and its business processes. Training has to be cyclic and continuous, it shouldn't be something that lasts only a few hours on a commercially available course. Employees have to recognize that they are the first line of defense in protecting the bank's business from criminal activities which can be a result of internal, external or combined abuses. They need to be aware of their responsibilities and also to recognize if someone is trying to produce material or reputational damage to the bank, and if possible prevent it from exploitation.

Based on the experiences from the past it can be concluded that the online training method is the most effective one. It covers all employees, no matter of their number and geographic location. It reduces costs and is time effective. And it is environmentally friendly. With this work the authors wanted to contribute to the constant development and prevalence of e-learning.

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NEW TYPE OF QUESTION IN LMS MOODLE

H. Telepovska*, M. Toth**
* Technical University of Kosice, Department of Computers and InformaticsKosice, Slovakia
** Graduated on Technical University of Kosice, Department of Computers and Informatics
Henrieta.Telepovska@tuke.sk

Abstract - In the paper, there is a module of a select statement evaluation presented. The module is intended for SQL knowledge assessment in the database systems course. The module is based on matching database server answers. At present, it enables to process various types of select statements – inner and outer join, group function and subquery with all select statement optional clauses. It was designed and implemented a new type question which is integrated in LMS Moodle.

I. INTRODUCTION

Automated knowledge assessment becomes quite popular in the last years [2][3][4]. The main idea of advanced support of SQL knowledge assessment is to automate the process of student examination. At present LMS (Learning Management System) Moodle is used as an electronic support in education on Department of Computers and Informatics of Technical University in Kosice. It provides 69 courses in all three degrees of university study – undergraduate, graduate and postgraduate. At first, the Database Systems course was developed to provide learning materials for students. Later, this course was extended on verification and evaluation of students' knowledge. The quiz module of LMS Moodle was used with its standard types of questions.

II. SUPPORT OF KNOWLEDGE ASSESSMENT

A quiz module is a component of LMS Moodle [7]. This module enables to develop tests consisting of various types questions. The questions and the answers are stored in database. It is possible to generate a test from database by defined requirements automatically.

LMS Moodle supports following question types: embedded answers, matching, multiple choice, calculated, random short-answer matching, short answer and true/false. It is possible to set up various test parameters or features. For example: shuffle questions, shuffle answers, permit or deny to review a quiz, single or multiple attempts at a quiz, review correct answers, students responses, scores or general feedback, different grading methods.

The quiz module enables to create the categories of questions in which it is possible to distribute developed questions. One category can contain one or more thematic parts of a particular subject. The questions of Database System course is organized into two basic parts – theory and practice. The category of database system theory is a collection of database system fundamental questions. This category has 11 subcategories. The second category named Database System Examples has 7 subcategories. It contains practice examples that verify student knowledge of database objects manipulation.

The examples are focused on mapping logical database schema into physical schema. The next examples are aimed at SQL (Structured Query Language) statements for database objects creation – table, triggers, and stored procedures. The very important questions are examples that verify correctness of select statement writing. The select statement examples are mainly focused on inner and outer join, subquery and usage of aggregate functions. All optional clauses of select statement are used in the test examples. The newest examples deal with data control language and transaction control language.

III. MODULE OF SELECT STATEMENT CHECK

The objective of this module is processing a new type of question. The module of select statement analysis evaluates a syntax correctness and logical equivalence of select statements. The evaluation of the questions must be secure because the module will be used in the examination of database system course. The module of select statement analysis was developed and tested within students' projects [10][11]. The module is integrated as an additional component of Moodle quiz module [7].

The implementation must be fast and effective with respect to amount of students that can be sampled at the same time. It may not contain weak points that could be allowed to use some of web hacker techniques, for example: XSS – cross site

scripting, SQL injection, etc. These techniques do not enable students to impose evaluation logic. The solutions of specified problem differ in the methods, fastness, responsibility, modularity, and scalability. The possible solutions are patterns matching, syntax analysis of select statements or matching database server answers [5][6].

IV. MATCHING DATABASE SERVER ANSWERS

The solution by matching database server answers method eliminates programming of existing products. It is based on database server capabilities. The block schema of designed solution is shown on. It is not necessary to implement any analysis, check up syntax and semantic correctness of student SQL statement. The whole syntax analysis is realized on database server side and it is encapsulated in specified select statement execution. The particular statement is executed and if a server does not return any error a select statement is syntactically correct. If execution of select statement is correct the results of student select statement are compared with the results of the correct statement given in a question definition. If the results are equivalent a student's answer is accepted. If the results are different a student is not successful.

The solution is responsible and effective. It is necessary to be aware of the possibility that student statements can have destructive nature. For example a student could write statement for dropping the database or table and to disable next evaluation. The security policy is multilevel. Firstly, a student is allowed to connect to database server with restricted object privileges. A student does not access to an exam database directly but via a special username and session. The special user is not an owner of exam database and he has restricted privileges in exam database. In case of a student taking destructive statement, the database server denies a statement execution.

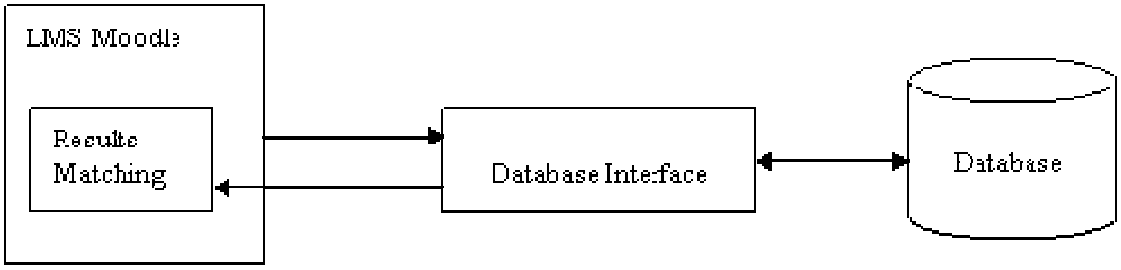

Figure 1. Block schema of designed solution

V. SQL STATEMENT EVALUATION

The ratio of designed solution is based on comparison of two relations – a correct relation and a student relation. SQL statement processing is based on the relational algebra operations [12]. The relational algebra is collection of operations that are used to work with whole relations [1].

As mentioned our module processes select statements. A query or a retrieval request over the main database object (table respectively relation) is realized as a sequence of the relation algebra operations. The tuples are selected from individual relations. The related tuples from several relations can be combined by specifying query. The result of each relation algebra operation is a new relation that can be further manipulated [1].

The block schema of select statement evaluation is shown on. A correct relation is result of the correct answer processing. The correct answers are stored in database server by teacher and their correctness is checked by database management system.

A student relation is a result of a student select statement. Syntax correctness is checked by database management system. If any error occurs, the query evaluation is stopped with error message. If a syntax of a student select statement is correct it follows a comparison of relations.

The next step is the comparison of the relation degrees. The degree of a relation is the number of attributes of its relation schema [1]. In our case the degree of a relation responds to the number of items in select list of select statement. If degrees of both relations are not equal, a select statement evaluation is finished with error message. If degrees of both relations are equal a cardinality of student relation compares with a cardinality of correct relation.

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The cardinality of a relation is a number of the tuples. If cardinalities of both relations are not equal, processing of a student query is finished with error message. In the case of equality of both cardinalities it follows the last step of SQL statement evaluation. In this phase the individual records of both relations are compared. A comparison of relation records can also accept order of the tuples if it is required. If comparison of the tuples is true, a student select statement is correct. In other cases the Moodle quiz module evaluates a student select statement as incorrect.

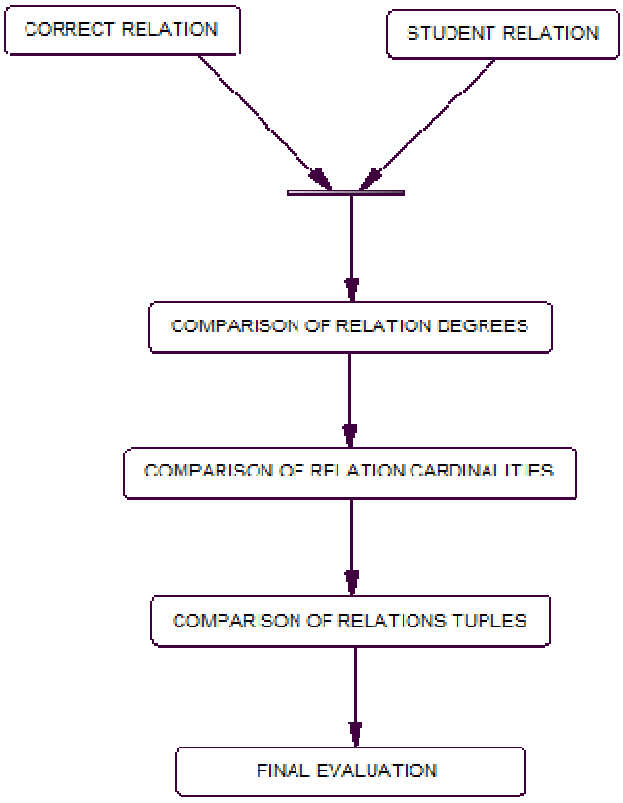

Figure 2. Block schema of SQL statement evaluation

VI. Implementation of Designed Solution

The implementation consists of two main components:

1. the first component is a new type of Moodle question
2. the second one proceeds connecting to database server, executing given SQL statements and returning results in form which is independent of database server

Usage of the enhanced quiz module is very simple for a user that has experiences with LMS Moodle. A process of creating new question is the same about as if we created any question in Moodle. displays a new type of question form – SQL statement check. The new type of question form has standard section such as general settings. There were added two new sections and are owned by this type question. There are the database connection settings section and the answer section.

The general settings section includes basic settings of a question – a category of a question, a question title. The question text is a detailed description of a problem with reference to the picture. The subsection of the picture contains link to corresponding relation schema. Next there are set a default grade and a penalty factor. One or more correct select statements are stored in a general feedback subsection. The general feedback is displayed after student answer sending.

The section of database connection settings contain special username and password through which the students connect to exam database and hostname and databasename for connecting to database server. This information is invisible and unknown for students. There is set by an administrator of database systems course or users/teachers with particular privileges.

The answer section has three subsections. The first one contains information whether it depends on ordering result in answers evaluation or it is necessary order by clause. In the second subsection there is stored a correct select statement, the result is compared with a result of the student answer. The last subsection is a feedback. It can be empty because the general feedback is always displayed after the student sends the answer.

The module checks syntax correctness of the teacher correct select statement before storing question into database. If a query is not executed LMS Moodle does not allow storing a question. It eliminates a typist's error and following no correct evaluation.

The implementation is realized in PHP 4 language [8]. The database connection is realized by interface that can be defined formally in respect of language type scope and object-oriented possibilities. The interface consists of:

- a constructor without the parameters
- Execute Query method with one parameter – a select statement that has to be executed

The method returns two-dimensional array containing all rows (indexed by number) and all columns (indexed by column name) of database

result or FALSE value when SQL statement was not executed.

It is possible to use the designated interface for other database servers, too. It is necessary to keep the interface and SQL statements evaluation is functional and without problems. The actual interface is set for Oracle database management system [9].

If any error occurs in time SQL statement results taking a question is evaluated as a no correct answered. A student is notified about an error. If student's select statement is correct a database server returns a collection of data and it starts results comparison.

First, there are numbers of rows controlled in both results. The same number of rows is the necessary condition of equality. If numbers of rows are equal, the results evaluation continues by method that depends on requirement to sort or not to sort result rows. If results are equal student's answer is correct. Student's answer is not correct if results are different.

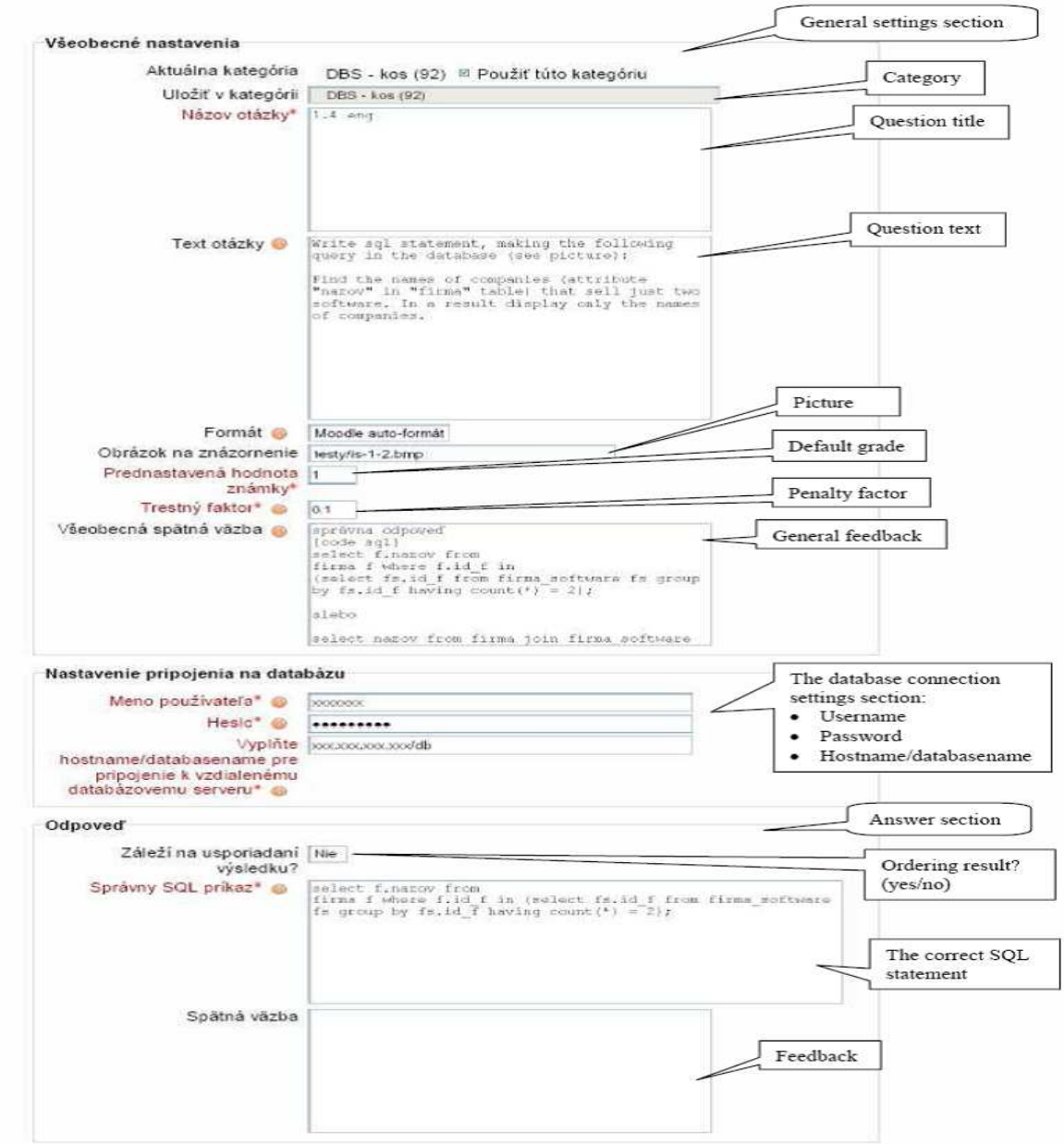

Figure 3. New type of question – SQL statement check

VII. THE NEW TYPE OF QUESTION IN ACTION

On the there is a view of the new type question. The view contains a question text and corresponding relation scheme. The help part recommends how to write select statement. It is necessary to keep a columns ordering in the select list of select statement following a question text. It is impossible to use column aliases. The table aliases are permitted. The select statement must be ended by a semicolon.

The answer part is intended for a student answer input. The collection of buttons is standard for each type of questions. Send or send page buttons submit a student query to database server on evaluation. The wrong answer can be corrected in this case. The send all and finish buttons send a student query to database server on evaluation also but a reparation is impossible. The fill correct button makes up a correct select statement from general setting to input field and a page is prepared to sending. A revert button refreshes a question page. The close view button encloses a question page.

A report is displayed after answer submitting. The report includes evaluation of student's answer, a feedback and error message if student's answer is wrong. A comment part contains a report with probable error.

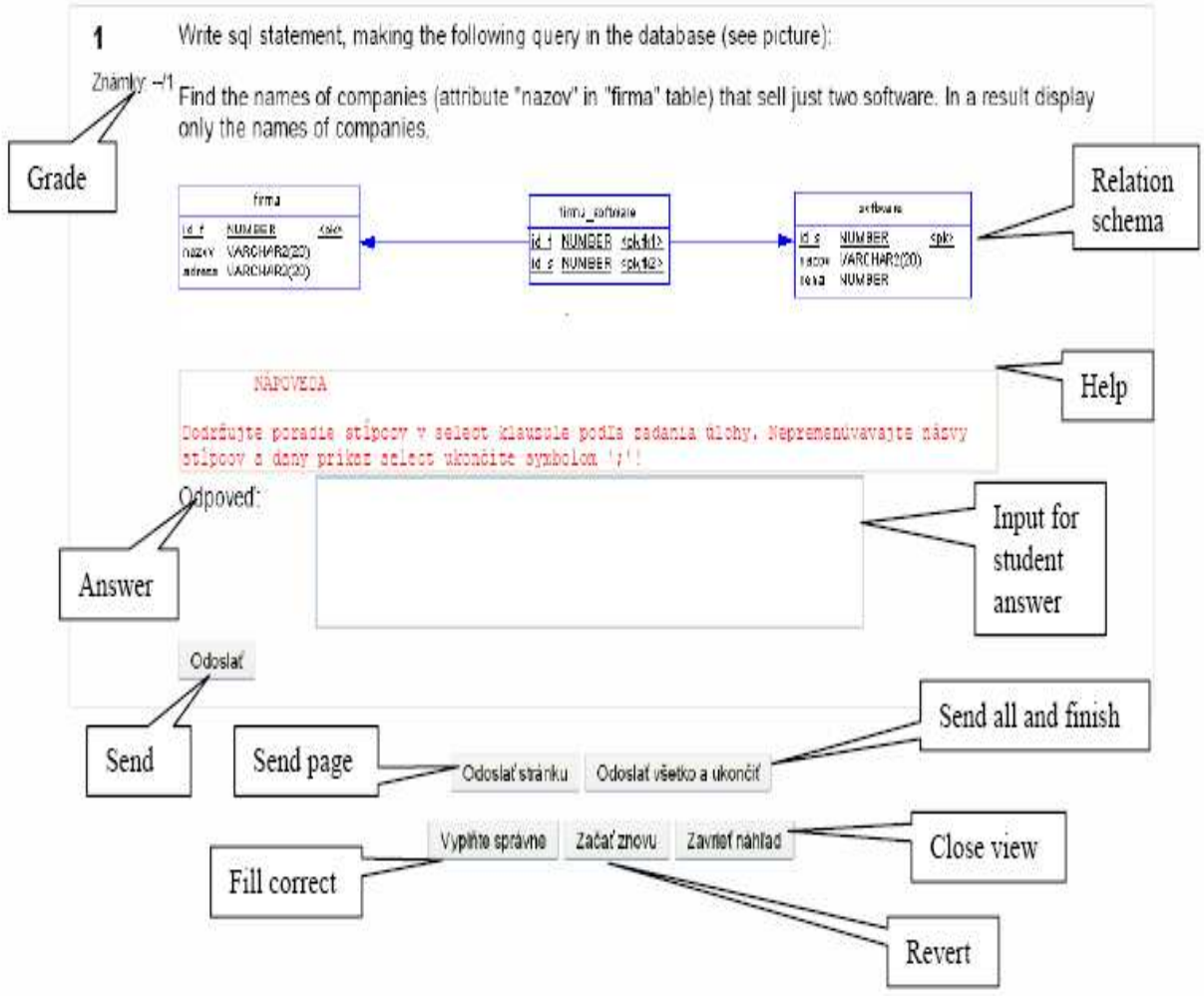

Figure 4. The question view

VIII. CONCLUSION

Our solution is used in the education more than three years. More than 500 students were examined. Our solution has one disadvantage. It is impossible to use column synonyms or column aliases in select list of select statement. Although student's select statement will be logical and syntax correct, it is evaluated as incorrect. It is possible to use table aliases.

Despite of a solution described in this article has many advantages:

- Students verify their knowledge of a select statements writing and thus understanding the relational database schema.
- Taking off visual check correctness of the student select statements.
- Automation and acceleration of examination.
- Error messages that approximately specify errors in a student select statement.
- Usage of the module in verifying correct transcription of select statement into relational algebra.
- Principle of this solution is also used in developing DML check module. (DML – Data Manipulation Language as a part Structured Query language (SQL) includes insert, update, delete and merge statements.)

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MOODLE AS PEDAGOGICAL ENVIRONOMENT

D. Glušac, K. Vančo, S. Lukić, G. Terzin, E. Eleven
Technical faculty "Mihajlo Pupin", Zrenjanin, Republic of Serbia
glusacdragana.zr@gmail.com, gocabakos@gmail.com, sebastijanlukic@hotmail.com

Abstract - The key words in this research are Moodle e-learning system and the teacher motivation for the application of Moodle to the teaching process.

Due to distance learning, teachers would be more informed about their course and with the help of e-learning, a well trained teacher would be able to get remarkable results from his or her students. Moodle provides teacher with an opportunity to create and manage the course as easily as possible and thus enables them to focus on teaching. The activities available in Moodle motivate both the students and the teachers and as a result, better results are achieved.

The significance of this research is that it may start a discussion. This project represents an effort to introduce contemporary forms of the teaching practises in our country, but moreover, it represents an effort to teach and motivate the teachers.

I. INTRODUCTION

Moodle is a free source e-learning software platform, also known as Course Management System (CMS), Learning Management System (LMS), or Virtual Learning Environment (VLE). Since January 2010, its user base has included 45,721 registered and verified sites. Moodle was developed in order to help teachers create courses usually taught in English and the number of users is estimated to be around 32 million[8].

Moodle is the acronym for Modular Object – Oriented Dynamic Learning Environment). The working environment of Moodle system was being developed from 1999, and from 2001, with recognizable architecture. Moodle development as an open, gratis software is being continued and it is supported by a team of computer programmer and the international association of users. As a software of the open code under GNU Public Licence, it is copyrighted, but some additional privileges are allowed as: copying, using and changing Moodle, provided that the access to the open code is enabled to the others. It is not allowed to alter or remove the original licence or the information regarding copyright.

Moodle provides teachers with the technical support which they need for developing, organizing and teaching online courses and helping teachers create online course is one of its main purposes. In order to facilitate the creation of the courses, Moodle is equipped with various properties that can help teachers both to create a course and teach it. Some of those properties are[7]:

- planning the intensity and the dynamics of the course,
- managing user roles,
- managing user groups,
- incorporating the existing files and different educational material,
- creating different types of online tests,
- monitoring user activity,
- using tools for communication and team work,
- creating glossaries,
- complete system support etc.

Moodle is a standardized tool that provides continuity when content enrichment is in question; it helps students with active learning and enables the communication between students and teachers.

II. MOODLE AS PEDAGOGICAL ENVIRONOMENT

The initial pedagogical philosophy on which is Moodle established, includes constructivism and social constructionism. Constructivism is a psychological knowledge theory established on assertion that knowledge can be acquired through experience, while social constructivism emphasizes that trainees (not only lecturers) can take part in education experience in many ways. The functions of Moodle environment reflect experience in a form of various design aspects, so that we can say that Moodle is enough adaptable for various teaching forms. For example, Moodle enables adding the resources that present materials read by users, but they have no interaction with them and activities that present the interactive

teaching material. In the extension will be given the disposal for these possibilities, but test as the means of knowledge evaluation, will be stressed.

III. AVAILABLE TOOLS IN MOODLE

Already now are obvious the advantages resulted from using distance learning program. In addition that very learning can be improved, through distance learning, this system experiences and familiarizes students, their families and teachers with the work on Internet during the education process. Distance education enables students to gain new skills and qualifications, and to prosper in new trends. The future will show that this kind of learning may be better and more interesting than traditional way of learning.

Combining virtual environment and classical methods, we create flexible, hybrid learning systems that adjust to users' necessities. Moodle is one of representatives of such way of education, and it is a significant factor in now–a–days education. Its successful integration with development of new technologies and modern communication has stipulated this system, so that it is now one of the leading systems of the environment.

Many advanced tools are very applicable in a pedagogical sense:

- **Lessons.** Lesson is a tool that is used for adding a lesson in a very flexible way.
- **Assessment**. It is used for assessing the knowledge of the students and there are numerous types of tasks:

-Multiple choice questions,
-True or False,
-Matching,
-Short answers,
-Numerical answers,
-Fill in the blanks.

- **Giving assignments.** Assignments are divided into:

-Offline assignments – they do not require the students to be online while doing the assignment (these assignments are homework)

-Online assignments– assignments that require the student to be online while the assignment is being done.

- **Communication tools**

-**Forums** This activity is considered to be one of the most important ones as far e-learning goes. This is the place where students communicate and the place where the majority of discussions take place. A student's forum activity can be graded because teachers can give points for each discussion. This is an asynchronous form of communication.

- **Chats** represent a synchronous type of communication.
- **Calendar**. Calendar is visible as one of the options on the main page of the course. Moodle automatically adds each activity that is added to the calendar of the course. A manual scheduling of the important events regarding the course is possible as well.
- **Progress** Tracking is used for monitoring the students' progress.
- **Glossary** is used for finding and explaining different terms and expressions used in the course.
- **Choice** – A very simple activity where the teacher asks a question and specifies a choice of multiple responses. The teacher can use this tool in order to get feedback about anything relating to the course.
- **Wiki** enables users to work together in order to create a document, but only one user can work at a time.

IV. THE APPLICATION OF MOODLE (BY TEACHERS)

Creating a lesson in Moodle is very simple. A teacher does not need to have advanced computer skills in order to come up with a lesson that will be interesting to the students. This helps teachers accomplish their lesson objectives and it helps them improve the quality of teaching.

V. A. CREATING COURSES IN MOODLE

The creator of the course is the main teacher who has control over adding a course and allowing access to other teachers. In order to add a new course, the creator has to go the page 'All courses' where he can select 'Add a new course'. Only those that have Administrator, Course Creator or Manager rights can add new courses.

A. B. Adding and editing a new course

B. By selecting the option 'Add a new course', a page will open where the title of the course, a short name, an identification

number and a summary (a short description of the content of the course) have to be provided.

A course can have different formats:

- Weekly – with a clear start date and a finish date. Every week consists of different elements of the course. Some of them, such as the notebook, are available for a certain period of time, two weeks for example. After that, they are no longer available to students.
- Topic is very similar to the weekly format, but it is organized into topic sections. The availability of topics is not limited and there are no start and finish dates.
- Social format is oriented around one main forum. The list of announcements is shown on the first page. This format is very useful for situations that are more free form and it does not have to be a course per say. It can be used as a notice board.

When a weekly or topic format is chosen, the number of weeks or topics in the course can be determined in advance so that the students can know how long and how intense the course is.

This page is the page where different parameters are adjusted. This includes information regarding the signing up process, deadlines for signing up and if necessary, the information regarding groups.

The availability of the course is defined here – the policy on guest access as well as the password setup (if the course is protected, the creator has to inform the students of the course about the password either personally or via e-mail).

The creator of the course must define one language as the obligatory one, but he or she can also add more languages. The option of adding more languages applies only to the names of the activities and labels for different options on the editing page. The option does not, however, apply to the resources unless the creator of the course added various resources of the same content in different languages.

The creator of the course can edit all settings relating to the course. He can access the course settings on the front page of the course by selecting the option Settings, then Course Administration and finally, the option Edit, which is marked with . The parameters that can be edited can be seen in the following picture.

The changes are confirmed by selecting the option 'Save changes'.

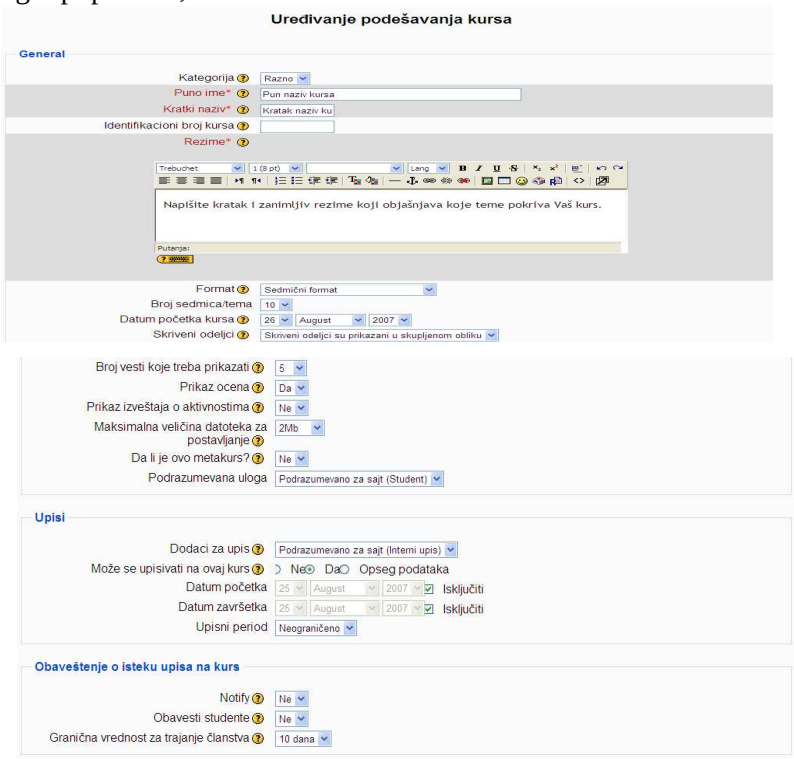

Figure 1. Course Settings

VI. LEARNING ACTIVITIES IN MOODLE

One of the main advantages of the Moodle platform is a wide variety of activities that can be used in courses. For every topic or lesson, a teacher can choose from the list of activities by selecting the option 'Add an activity' (Picture 2.). By selecting some of the available options, a new window opens where teachers can set up different parameters regarding the activity selected.

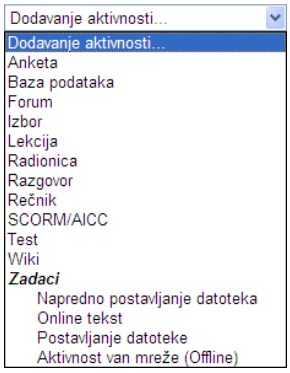

Figure 2. Dodavanje aktivnosti

The activities available in Moddle:

- chat,
- assignments,
- workshop,
- choices,
- quizzes,
- forums, and
- glossary.

VII. CONCLUSION

E-learning is a challenge and a means to improve and enhance education while also being one of the cornerstones of novel and improved ways to manage knowledge. Because of that, the introduction of information technology into the teaching practise has become a priority when it comes to educational institutions all over the world.

Students have an opportunity to be in charge of their learning and the role of the teachers has transformed into that of a mentor or coach. The courses are not limited by the working hours of regular schools and universities, which means that everybody has a chance to learn no matter how old they are.

Distance learning changes the habits of both teachers and students. Successful students become more hard-working and more organized while teachers gain the opportunity to perfect their skills when using information technology is in question. This type of learning does not include the use of computers and the Internet only. On the contrary, it includes much more. In order to make distance learning not only possible, but successful, teachers are the ones that need to be trained first because they are the ones that will train students, who are, after all, our future.

Information technology is developing very quickly and it plays a significant role in all lines of work. This is why our attitude to this science has to change. Even 12 years after IT was introduced into primary schools, this course is still an optional one. Students, who are the future of this society do not have to choose this course, which does not seem logical when we consider the importance of information technology.

All students in primary school should acquire enough IT knowledge so as to be able to utilize it in whichever profession they choose, as opposed to simply being able to 'turn on a computer'. In a research that was carried out at the Singidunum University, it was concluded that all teachers should be motivated to use Moodle e-learning system in the teaching practise, because this would improve the effects of teaching [7].

The most common problem is the lack of financial resources needed for investing in technology so that all teachers could implement what they know about new technology and so that they can enable their students to learn by using Moodle, a learning platform that is essential in cases when students are unable to come to school, when they have additional activities for homework or when they have to prepare themselves for various competitions.

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ADAPTATION OF TEACHING CONTENTS IN MOODLE SYSTEM

M. Josic, E. Tobolka, S. Dobrosavljev
Tehnical faculty „Mihajlo Pupin“, Zrenjanin, Republic of Serbia
milorad.josic@gmail.com, tobolka@eunet.rs, svetlana.dobrosavljev0604@gmail.com

Abstract - This paper presents the possibility of adapting the teaching contents in the Moodle system, ie. adjusting them through Moodle resources and activities which e-learning system has.Teaching content is adapted in the Moodle system using static and interactive teaching materials available for the creation of electronic courses. Static teaching materials such as text pages, web pages, links, labels and catalogs, as well as assignments, journals and lessons as interactive teaching materials, in Moodle environment provide the opportunity to create powerful, flexible and interesting experience in e-learning.

I. MOODLE

Moodle is a software solution for production and maintenance of online learning materials through the Internet. The project is in a state of continuous development with the purpose of supporting the so-called educational environment of social constructionism. It is a view in which the society actively build new knowledge in interaction with its environment.

Moodle is available as open source software (under GNU Public License). He will work on any computer that can run PHP, and supported by a well-known databases (especially MySQL). The word Moodle stands for Modular Object Oriented Dynamic Learning Environment. This is a free system for learning that enables creation of powerful and interesting online courses. The term "online course" often indicates a sequential series of a web pages, some images, maybe a few animations and an online quiz set.

Moodle is designed to support the learning style that is called social constructionist pedagogy. Philosophy of social constructionism believes that people learn better when they interact with the learning material, produce new materials for others and communicate with other students about course materials. The difference between traditional teaching and social constructionist philosophy is the difference between the lectures and discussions. Learning system Moodle does not require that the social constructionist method used to create courses. However, it is best supported by this method.

Moodle allows you to add five types of static teaching materials. This is the material that students have no interaction. These are: the text, web pages, links to anything on the web (including material on the website of Moodle), course catalogs, labels that display some text or an image. Figure 1. shows the front page of Moodle demonstration site.

Figure 1. Moodle demonstration site

Moodle also allows the addition of six types of interactive teaching materials. This is the teaching material with which students interact, entering text, answering specific questions, adding files, which are:

- Tasks,
- Choices (question),
- magazines / newspapers (online magazine)
- lessons
- test (online test)
- questionnaire.

Moodle also allows the five types of activities among students, which are used to create social teaching materials, as follows:

- chat
- Forum,
- vocabulary,
- Wiki,
- workshops.

On Figure 2. is the front page themes "Worksheet (Excel) and forms" from Computer Science course made in Moodle environment.

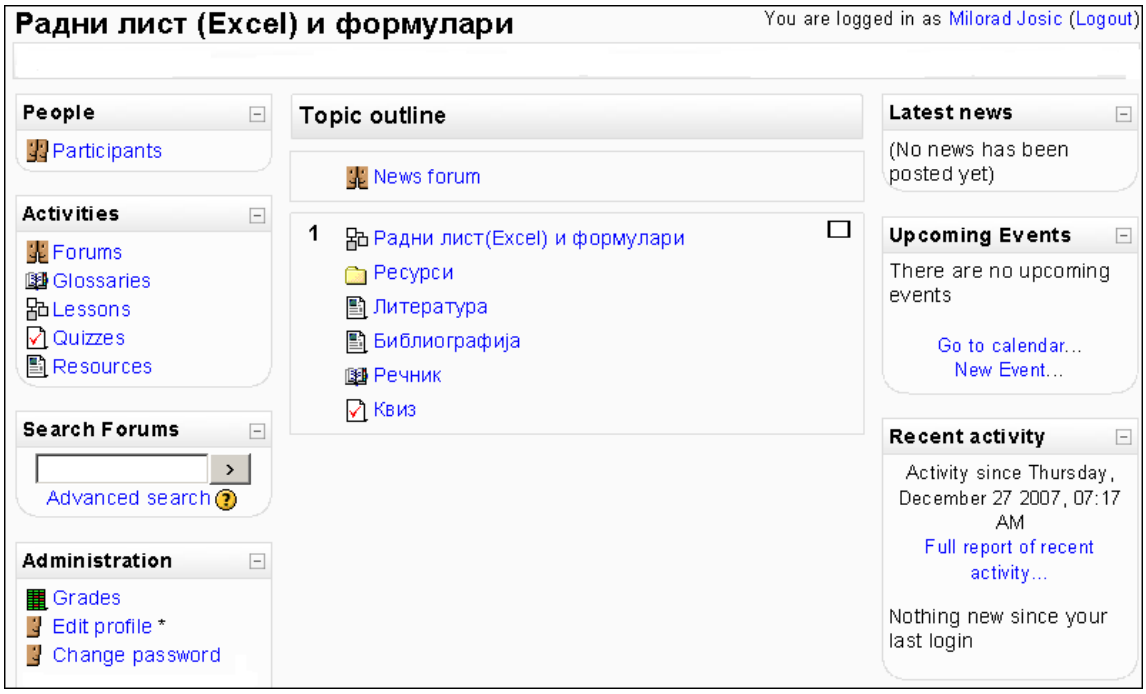

Figure 2. Front page themes "Worksheet (Excel) and forms" from Computer Science course

II. ADAPTATION OF LEARNING CONTENT USING STATIC LEARNING MATERIALS IN MOODLE

Static learning materials are resources that students read, but do not act on them, such as Web pages, pictures, Adobe Acrobat documents, etc..

A. *Files*

Images, MP3 files, Flash files, Adobe Acrobat documents and other file types that can be found on the web can be freely used as a file to add. Can add files that can not be opened using the browser. In this case, the file must be opened by another application on the user's computer. If such a file is added, must identify the link by which the file can be downloaded.

B. *Text pages*

The name "Text Page" means the unstructured page containing only text. Moodle the text pages can be formatted in several formats (forms). Each of these formats has its advantages and disadvantages. Formats that can be used to format the text are: Moodle auto-format, Plain (clean) text format, text format Markdown.

C. *Web pages*

Moodle allows you to create a web page, and copy and add the HTML code from other web pages that are in the Moodle system.Web pages offer more

features than any text document, including the possibility of including Java and other active code in the page.

It is not necessary to know HTML to create web pages in the Moodle environment. When you create a web page, Moodle displays a WYSIWYG (What You See Is What You Get) character processor to the screen. Character processor allows the use of icons for web page design.

D. *Links*

With the links the other content from the Internet can be displayed on the Moodle website. They can also create links to files within the course. The requested content using the link can be displayed on the same page or in a new window. When using content from other sites must take care of the legitimacy of the use of such content.

E. *Catalog*

Add catalogs is another way to display the files that we added to the course. It's easier to make a directory into which to place all the files that are used on the course, but making links to each file individually. If you need to download the files from the course, the simplest is to make a

directory from which to download the necessary materials.

F. Labels

Topics and courses are organized within chapters. Labels assist in organizing material within the chapters, contributing to a higher level of organization. Label may contain a larger amount of text, images or other content that can be placed on a web page.

Course creators use text labels to organize course content. Also, the label may contain graphics, which, adding to the beginning of each topic, leading to a greater interest in a particular course.

III. ADAPTATION OF LEARNING CONTENT USING INTERACTIVE LEARNING MATERIALS IN MOODLE

Interactive teaching material of the course allows students to interact with the teacher, with a system for teaching and other students. Moodle not categorize activities like on "static" or "interactive".

This is the teaching material with which students interact, entering text, answering specific questions, adding files. Tasks (files to be viewed by teachers and/or student choices (question), magazine/ newspaper (online magazine), lesson, test (test online), question (with results available to teachers and/or students) are interactive teaching material.

A. Tasks

This is an activity that is performed offline, outside of Moodle. When the student completes the assigned task, he informs the instructor that the assigned task is done, submitting a file for review. After reviewing the file the student receives a score for the task performed.

B. Choices

The choice is usually one or multiple choice question with which the instructor asks the class. The results can be known throughout the department or between students and teachers. Choices are a good way to get feedback from students about teaching. They can be added when needed or can be hidden until the appropriate moment.

Choice is an activity designed to be single or multiple choice question that is set to the class. Students can opt for one answer. It is used as a stimulus for thinking about the staged topic, to gain knowledge of how students see the direction that the course moves or to obtain a permit from the class for further action. Activity may be limited to a specific time period.

C. Lesson

The lesson is the most complex and most powerful type of activity. The lesson is essentially a series of web pages that present information and issues. Basically, every page in the lesson is short and ends with one or more questions about material that is processed on the lesson. Depending on the answer depends on whether the student will be able to move to the next page lessons. If the answer is correct, the student moves on to the next page. If not, he remains on the same page of lesson.

When you create a lesson all of its pages will be arranged in logical order. The logical order is the order of pages in the lesson that students will be able to see. If the student correctly answers every question he successfully completed the lesson. The lesson can be evaluated or not. The main role of lessons is to learn, not to test. Ratings lessons provide feedback on the effectiveness of each side, and allow students access to their own progress. When you create a lesson, perform the following settings: general settings, options related to evaluations, flow control, design lessons, access control (Figure 3.).

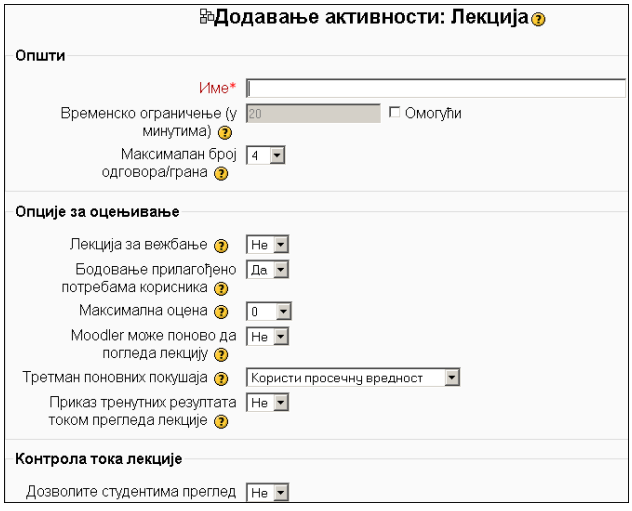

Figure 3. Creating a lesson

D. Test

Moodle offers a flexible test constructor. Each question is fully designed web pages that include any valid HTML code. This means that the issue

can include text, images, sound, film, or all of what the web page can contain.

On most courses, quiz or test is the final event. In the Moodle system, design and evaluation of tests is very fast. This means that the tests are free to use from the beginning to the end of the course.

Test can be used as:

- a short test after each reading assignment, to be sure that students are finished reading,
- a practical test, allow several attempts while students do not respond correctly, then a quiz becomes a practical and learning material,
- questionnaire, ask the students to assess their understanding, satisfaction with the course or instructor.

Questions that can be added to the test can be in form: mathematical issues, descriptive, essay, multiple choice, question with short answer, true / false, random questions matching with short answers.

In Figure 4. is an example of the test made in the Moodle environment with the theme "Worksheet (Excel) and forms" from the course Computer Science, shown with several types of questions.

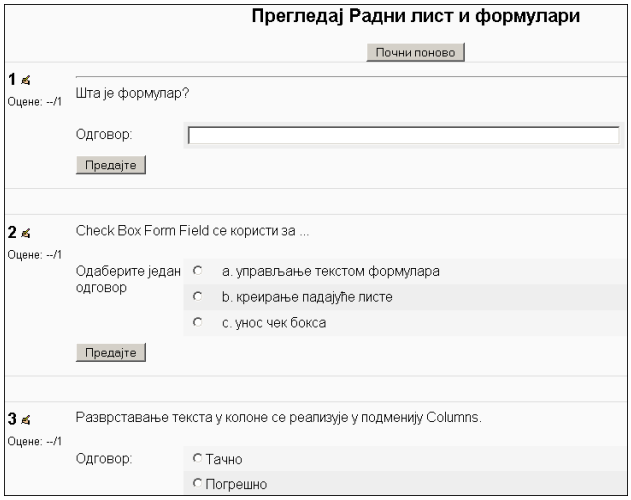

Figure 4. Test

E. Questionnaire

Questionnaire in Moodle consists of questions about the behavior of students during learning, and especially during the maintenance of the course, and the experience the students gained during the course.

Moodle allows you to create five different questionnaires. The questions in the questionnaire are designed to be helpful in assessing students. Issues and choices in the questionnaire are a whole and can not be corrected.

Some of the questionnaire are: COLLES (Constructivist On-Line Learning Environment Survey) actual, preferred, preferred and actual; ATTLS (Attitudes To Thinking and Learning Survey) The critical incident.

IV. CONCLUSION

Intensive development of human activity in all areas has led to advances in information technologies as well which resulted in altering educational and pedagogical processes. Methods of acquiring knowledge is changing and developing the introduction of modern information technology in teaching.

Teaching content is adapted in the Moodle system using static and interactive teaching materials available for the creation of electronic courses. This way of presenting teaching content will enable each student to progress according to their own abilities and interests, which leads to improving the quality of educational work, motivation and encourages interaction and creativity, both teachers and students.

It can be concluded that for the teaching of informatics, ie. for teaching and learning in general, the most important is application of diversity in teaching methods and forms of teaching, teaching aids, in order to increase effectiveness in achieving educational goals, improve the quality of teaching and perhaps most importantly maintain students motivation.

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STUDY OF E-LEARNING IMPLEMENTATION IN SERBIAN SECONDARY SCHOOLS

B. Marić*, B. Radulović **

*Hemijsko-prehrambena tehnološka škola, Belgrade, Serbia
**Technological Faculty „Mihajlo Pupin“ Zrenjanin, Serbia
biljanacmaric@hotmail.com,bradulov@tfzr.uns.ac.rs

Abstract – The development of information and communication technologies and computer systems has an impact on all fields of human activities. The students spend more and more time using information and communication technologies. For students, the school as an educational institution has become a black and white movie from the beginnings of cinematography, which stands in full contrast juxtaposed to the dynamic multi-coloured world of electronic media. Obviously, there is a huge gap between the school and the everyday surroundings of the students. The subject we shall pursue in this paper will try to give answers as to how and to what extent the teachers manage to get closer to their students using e-learning methods in order to achieve higher quality teaching.

I. INTRODUCTION

The last decades of the 20th century were characterised by a rapid development in the field of information and communication technologies as well as the computer systems used in various areas of social life: manufacturing, traffic, services, banking, education, etc. Accelerated technological development requires an increasing number of jobs and specialisations that have not existed before, as well as the need for constant education and professional training of the workforce. Hence, it is necessary to change and adapt the educational process too, not only by introducing a new syllabus, but also by changing the ways of the adoption thereof as well as the methods of implementation and assessment of educational work.

The class-subject-period based teaching system as the dominating teaching system in our country and some other European countries too, has been in full flight for more than three and a half centuries. As early as by the beginning of the 20th century the representatives of the reformist pedagogy pointed out at its weaknesses which they had been trying to overcome. The most criticised was the frontal teaching technique which was aimed to satisfy the needs of the mediocre students only, and provided knowledge “as is”, while also cherishing the excessive passivity of the students exposed to this educational pattern. Modern pedagogy tends to organise school where the students are going to be active participants in the knowledge acquiring process, which would develop their own judgement, particularly the critical and the creative aspects thereof, as well as promote cooperation and teamwork.

Information and communication technologies have the potential to remove the limits for students and teachers world-wide, to improve the accessibility of knowledge, while the innovative teaching and learning methods could transform classroom activities. The students no longer need teachers as lecturers, as much as they need the expertise in cooperation, communication and information management – the 21st century skills – as well as the access to tools that allow such skills to be adopted.

E-learning (i.e. electronic learning) is a very wide term comprising all learning methods and techniques using the computer and the Internet. Although it has been used since the beginnings of the 90s in the 20th century, a unique definition that describes it accurately has not yet been given. Therefore we shall use the definition given by Jenkins and Henson (2003) who say that e-learning is a type of learning supported by the information and communication technology. This loose definition allows understanding of e-learning as learning in various contexts (in school, at university, in the library, at home), however, it could also be connected with the informal as much as with the formal educational patterns. One of the simplest and perhaps the best interpretation of electronic learning is the explanation of the e-learning continuum.

Figure 1. The e-learning continuum

On the left, as the starting point of the continuum there is traditional education enriched with information and communication technologies (computer, video beam, Powerpoint presentations, educational material on CDs, etc.). Using information and communication technologies in the classroom is the first step towards e-learning. In the middle of the continuum there is hybrid (combined) education, which means that education partly takes place in the classroom, while it partly goes on online (on the Internet, most frequently using Web 2.0 tool). For educational purposes materials can be uploaded on the Internet (by either teachers or students alike), social networks can be used (blogs, wiki, forums, etc.), while more and more schools choose learning management systems as help and support for students in the process of learning. Online education finds its place in the right place of the continuum, and comprises education that fully takes place on the Internet. The precondition for such programme is that each student has to have a computer and a proper internet connection available at home. In Serbia, the law still does not allow for this possibility to be included in the state-managed education system when it comes to primary and secondary schooling, while there are several accredited online programmes for higher education.

II. RESEARCH OBJECTIVE

„Research has shown that the success of the students stands in positive correlation with high quality teachers and the professional development of the teachers has a great impact on the quality of education acquired by the children and the adolescents throughout the world.“ [1]

In order to take adequate measures for the professional development of teachers it is necessary to take into consideration and make an analysis of the current situation in the secondary schooling system of the Republic of Serbia in relation to the e-learning. We have done a survey that includes the following segments.

In order to reach the objective of the research we shall start with the following tasks:

- Examine the attitudes and opinions of the teachers as regards to:
  - knowing and understanding the term “e-learning”
  - knowing the e-learning continuum stages
- Examine to what extent the teachers apply:
  - information and communication technologies in the educational process
  - hybrid education in the educational process
  - online education in the educational process
- Determine the attitudes and opinions of the teachers as regards to:
  - the needs for an e-learning system
  - knowing any of the e-learning systems

III. SCIENTIFIC METHODS, TECHNIQUES AND INSTRUMENTS OF RESEARCH

The methods used in this research have been chosen in accordance with the characteristics of the problem, the subject, the objective and the requirements of the research. The methods chosen are the descriptive method (non-experimental empirical investigation) and the experimental method. [2]

In accordance with the methods mentioned, we have used the following techniques to gather information:

- Teacher questionnaires
- Teacher interviews
- Statistical technique (processing of the information gathered through teacher testing).

In the implementation of the following techniques, we have used the below given instruments:

- Questionnaires (surveys)
- Interview

IV. DESCRIPTION OF RESEARCH

Population and research sample.

The research has been made on the non-measurable sample of secondary school teachers in Belgrade.

The sample has been divided into groups according to the following categories:

1) years of service (up to 10, from 10 to 20 years, more than 20 years), 2) field of expertise (teaching subject: social sciences, natural sciences, and source subject – IT).

The population encompasses all teachers employed in the schools where the research has been done. The sample comprises two of the teachers from each category.

The research has been conducted in Hemijsko-prehrambena tehnološka škola, Belgrade (Chemical Engineering and Food Processing School) and The Sixth Belgrade Gymnasium in May in the school year of 2011/2012.

V. RESEARCH RESULTS

Question 1. Do the teachers know the meaning of the term "e-learning"

65% teachers know the meaning of the term, 29% know to some extent and 6% does not know.

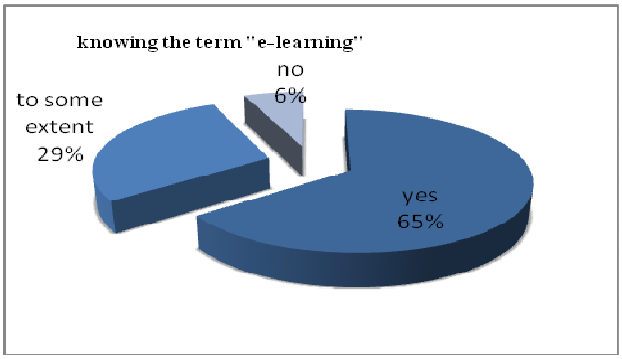

Figure 2. Knowing the meaning of the term "e-learning" by the teachers generally

The research showed that the given term was clear to 19% of teachers of social sciences, 37% of teachers of natural sciences and 44% of IT teachers.

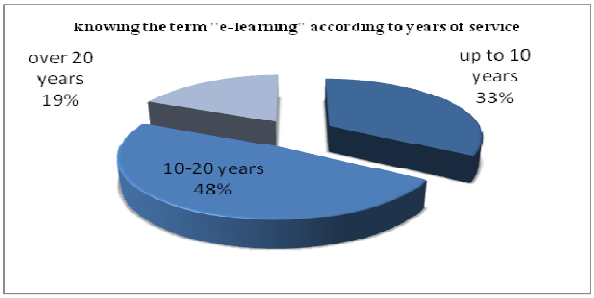

Figure 3. Knowing the meaning of the term "e-learning" by the teachers according to the subject they teach

If we look at this matter from a different aspect, namely, the years of service, the results would be as follows: 33% of teachers with less than 10 years of service understand the meaning of "e-learning", 48% of those from 10 to 20 years of service and 19% of those with more than 20 years of service.

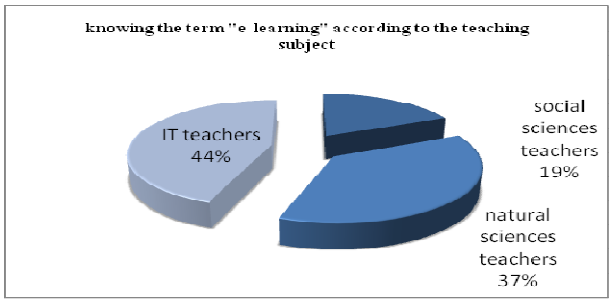

Figure 4. Knowing the meaning of the term "e-learning" depending on the years of service

Question 2. Are the teachers familiar with the e-learning continuum

39% of teachers are familiar with the e-learning continuum, 33% to some extent, while 28% are not.

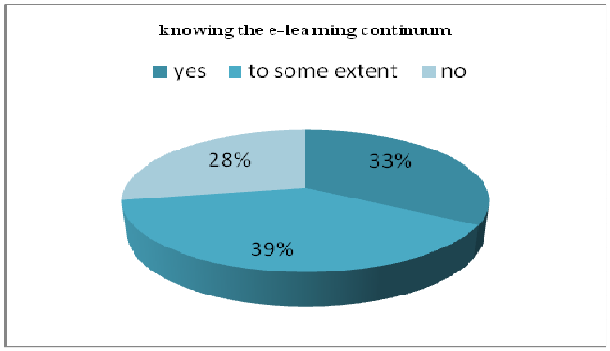

Figure 5. Being familiar with the e-learning continuum on the part of teachers generally

The investigation showed that among the teachers familiar with the above continuum there are 8% of those teaching social sciences, 42% of those teaching natural sciences and 50% of IT teachers.

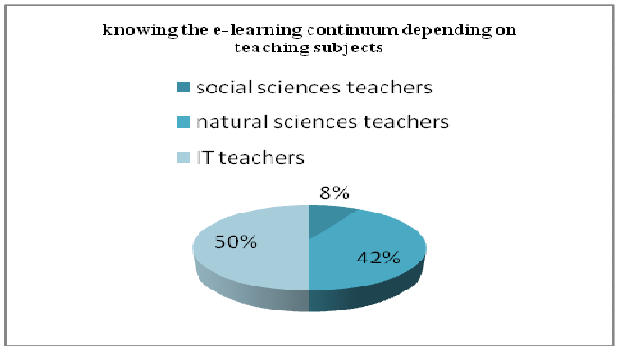

Figure 6. Being familiar with e-learning continuum in dependence with the teaching subject

If we consider years of service, the results are as follows: the given term is understood by 33% of teachers with less than 10 years of service, 48% of those with 10-20 years of service and 19% of those with over 20 years of service.

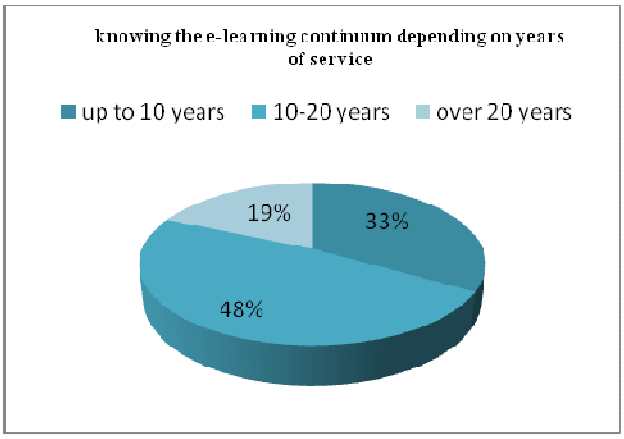

Figure 7. Being familiar with e-learning continuum in dependence with years of service

Question 3. To what extent are e-learning types used

67% of teachers use information and communication technologies in the educational process, 22% use hybrid education, while 11% use online education in the teaching process.

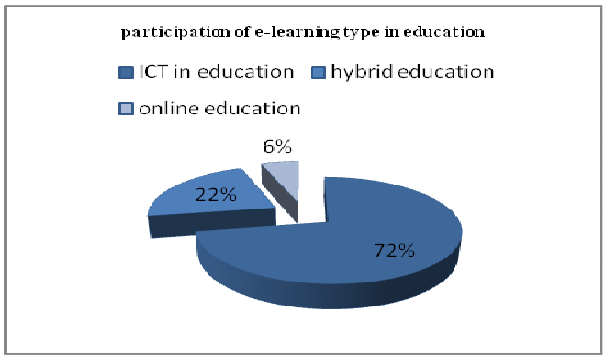

Figure 8. Participation of e-learning types in teaching

Question 4. Participation of e-learning per teaching subjects

Among teachers using e-learning 15% are social sciences teachers, 30% are natural sciences teachers and 55% are IT teachers.

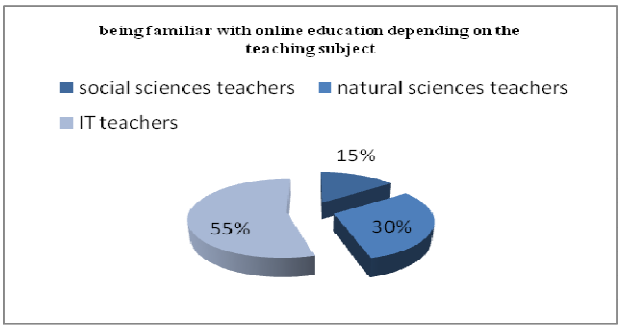

Figure 9. Participation of e-learning types in teaching process depending on the teaching subject

Question 5. Participation of e-learning types per teaching subjects.

Most frequently used e-learning type by social sciences teachers is the use of information and communication technologies reaching as high as 72%, then hybrid education at 22% and online education at 6%.

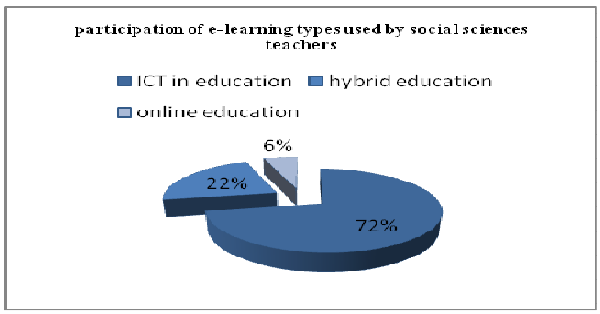

Figure 10. Participation of e-learning types used by social sciences teachers

As for the natural sciences teachers, the participation is as follows: information and communication technologies 22%, then hybrid education 50% and online education 28%.

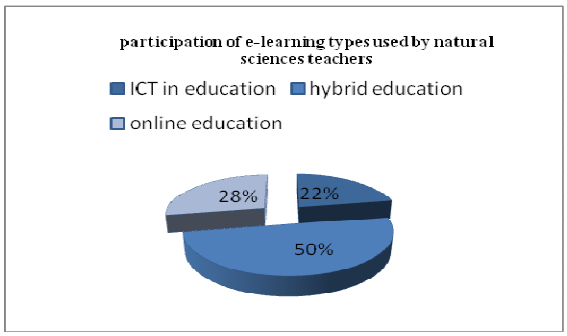

Figure 11. Participation of e-learning types used by natural sciences teachers

When it comes to IT teachers, the participation is as follows: 28% use information and communication technologies, 33% use hybrid education and 39% use online education.

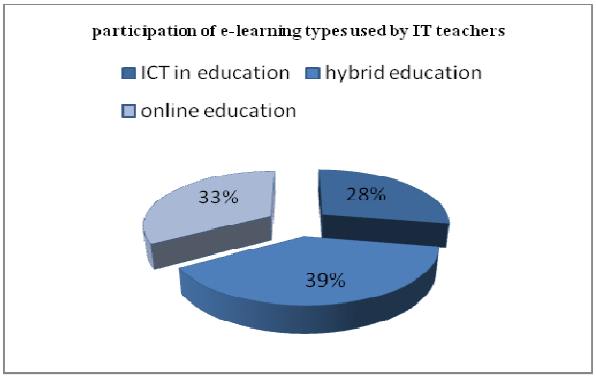

Figure 12. Participation of e-learning types used by IT teachers

Question 6. Is there a need for any of the online learning systems.

50% teachers said “no”, 28% said “to certain extent” and 22% teachers said “yes”.

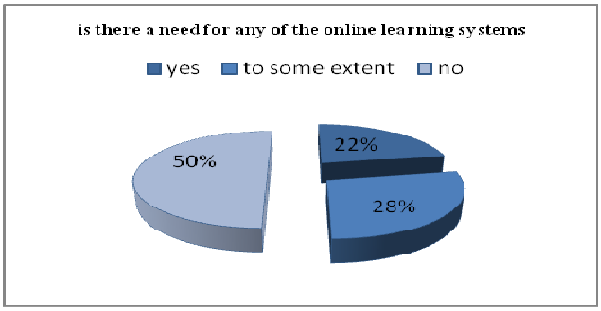

Figure 13. Is there a need for any of the online learning systems

Question 7. The need for introduction of online learning systems according to teaching subjects criterion

For the introduction of online education are 19% social sciences teachers, 37% of natural sciences teachers and 44% of IT teachers.

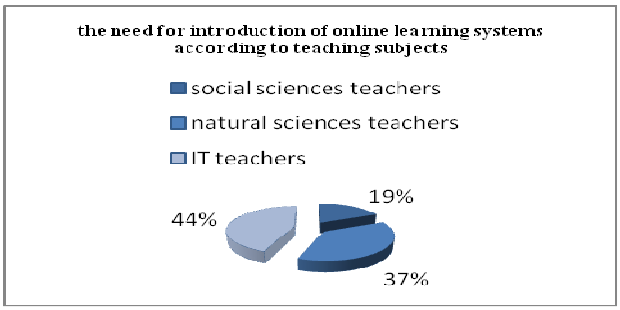

Figure 14. The need for introduction of online learning systems according to teaching subjects

Question 8. The inclination of teachers towards introduction and implementation of the online learning systems according to the years of service

For the introduction of online learning systems are 33% of teachers with less than 10 years of service, 48% of teachers with 10-20 years of service and 19% of teachers with more than 20 years of service.

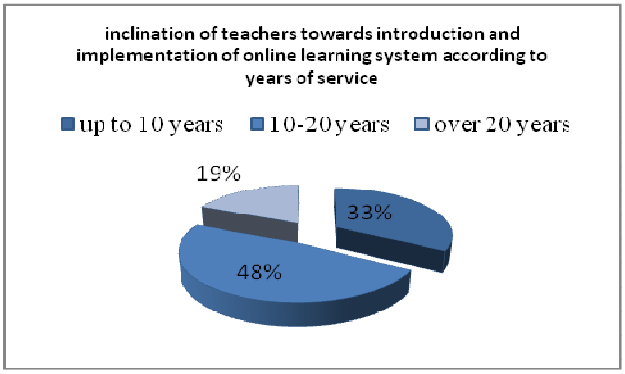

Figure 15. Inclination of teachers towards introduction and implementation of online learning systems according to years of service

Question 9. Do the teachers know and use any of the online learning systems

33% said “yes” and 67% said “no”.

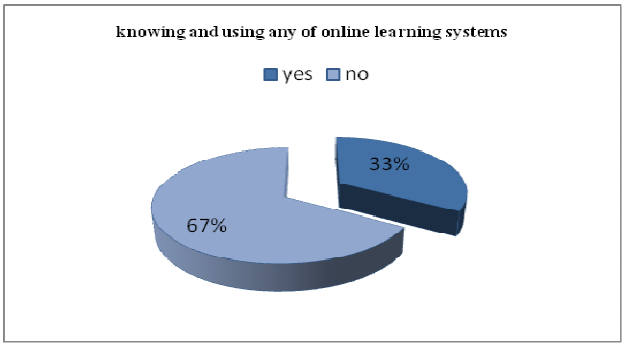

Figure 16. Knowing and using any of online learning systems

Question 10. The best informed as regards online education are IT teachers at 55%, then natural sciences teachers at 30% and social sciences teachers at 15%.

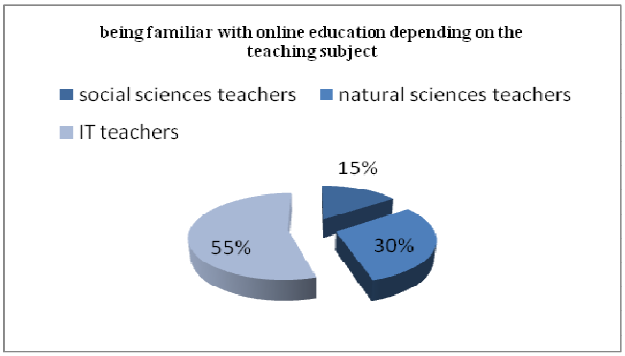

Figure 17. How informed teachers are regarding online education

VI. SUMMARY

Using the results obtained in this research, we have come to the conclusion that the first and the most widely accepted e-learning type is that which refers to a slight improvement of the traditional

education by using some of the technologies (mostly presentation software). Somewhat less spread is the use of learning management systems, while the types of e-learning requiring more radical changes of the educational process are accepted only by the innovators and technological leaders. Implementation of technologies into education does not go easily, since not all of us are ready to accept innovation in the same way and at the same pace, regardless of what area of life the innovations come from.

Through this study it has been concluded that it is necessary to:

- Inform teachers on ways and possibilities of e-learning
- Motivate teachers to apply e-learning in the educational process
- Train teachers to apply e-learning to everyday teaching.

A well and timely informed, motivated and trained teacher will contribute to the quality of the outcome of education.

The result of this study can be seen as a request to the responsible institutions to implement an obligatory online learning system, as the most competent electronic learning type, into the secondary schools in the Republic of Serbia. The e-learning system should be an essential part of each secondary school information system.

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VIDEO TUTORIALS AND FORUMS FOR EFFICIENT TEACHING THROUGH DISTANCE LEARNING

O. Popović, M. Pardanjac and I. Berković
Technical Faculty „Mihajlo Pupin“, Zrenjanin, Srbija
mroli@ptt.rs, marjana.pardanjac@tfzr.rs, berkovic@tfzr.uns.ac.rs

Abstract - In this paper we review video use and distance learning trends generally, providing some statistics and context. With the cost of implementing e-learning tools falling, more governments, businesses, and schools have added online courses and other forms of distance learning to their organizations.

I. INTRODUCTION

Media and video in particular, are in a period of profound transition, rivaling any we have ever seen. Technology has rendered many of the processes of media creation, distribution, and consumption faster and less costly than ever before. In an era dominated by technology, it's important to remember that in education technology is the starting point, not the end point.

Video production and consumption rates are exploding. Internet users watched 12.7 billion online videos per month and 136 million people watched professional video content online. Every minute, approximately thirteen hours of video are uploaded to YouTube.

Capture, editing, and archiving resources are now in the hands of millions, and the discussion has shifted from terms describing media literacy to "media fluency," in that people are newly conversant and becoming fluent in the vocabulary, philosophy, and technology of television, movies, and music.

Age is not a critical factor; everybody is partaking, but especially people of college age. Critical faculties—what some in the academy call the ability to closely read a text, or post-modern audiovisual sensibilities—are becoming better developed. In many of the disciplines we are surveying, the technological sophistication of the student outstrips that of the teacher—and the faculty know it.

At the same time, the portability of media assets—the mobility of access to the resources we are describing and to their distribution channels—is accelerating exponentially. Soon, more people will access the Internet through mobile devices than through desktop computers. Storage costs are dropping such that thousands of hours of video soon will be portable on individual iPod devices. Google scientists predict that in 10 years people will be able to carry around all the media ever created in the world on an iPod or a device its size. And in 2018 Internet video will represent 30 percent of total data transfers.

Conversations about this media now take place everywhere—on YouTube, Facebook, MySpace, and Hulu and beyond. On Wikipedia, every single episode of a television show and almost every frame of a movie will be scrutinized to the nth degree, and on YouTube text and video discussion rolls and now annotations of videos about the economy, politics, and culture unfurl seemingly endlessly.

Education has yet to see the proliferation of resources like Discovery's and NBC's servicing the K-12 market, and both taken together are but a drop in the bucket compared to what could be provided and faculty and librarians report that faculty are seeking (Figure 1.).

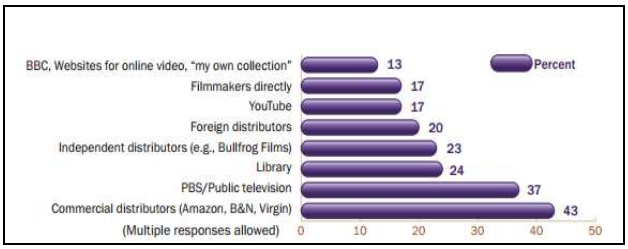

Figure 1. Faculty video sources

Despite the lack of video resources/services currently available for higher education, nearly half of the faculty anticipate that their video use will accelerate. New content access and delivery options are unknown or underutilized by faculty, and their consumption patterns are marked by a

lack of know-how, time, and tools to expand use. In the future, faculty expect to have more video available in digital form for streaming and download.

II. VIDEO TUTORIALS

A tutorial is a method of transferring knowledge and may be used as a part of a learning process. More interactive and specific than a book or a lecture; a tutorial seeks to teach by example and supply the information to complete a certain task.

Depending on the context a tutorial can take one of many forms, ranging from a set of instructions to complete a task to an interactive problem solving session.

Internet computer tutorials can take the form of a screen recording, a written document (either online or downloadable), or an audio file, where a person will give step-by-step instructions on how to do something.

Tutorials usually have the following characteristics:

- A presentation of content, usually with an example or examples, often broken up into discrete modules or sections.
- Some method of review that reinforces or tests understanding of the content in the related module or section.
- A transition to additional modules or sections that builds on the instructions already provided. Tutorials can be linear or branching.

In computer-based education, a tutorial is a computer program whose purpose it is to assist users in learning how to use (parts of) a software product such as an office suite or any other application, operating system interface, programming tool, or video game.

There are two kinds of software tutorials: movie tutorials that the user views; and interactive tutorials where the user follows on-screen instructions (and—in some cases—watches short instruction movies), whereupon he/she does the tutorial exercises and receives feedback depending on his/her actions. Some computer-based tutorials can also be put up on the Web.

III. DISTANCE LEARNING

The California Distance Learning Project (CDLP) defines distance learning as follows. "Distance Learning (DL) is an instructional delivery system that connects learners with educational resources. DL provides educational access to learners not enrolled in educational institutions and can augment the learning opportunities of current students. The implementation of DL is a process that uses available resources and will evolve to incorporate emerging technologies."

Several key features define distance learning. The importance of the teacher — learner communications cannot be overstated.

- The separation of teacher and learner during at least a majority of each instructional process
- Separation of teacher and learner in space and/or time
- The use of educational media to unite teacher and learner and carry course content
- The provision of two-way communication between teacher, tutor, or educational agency and learner, and
- Control of the learning pace by the student rather than the distance instructor.

These definitions apply equally to high tech and low tech approaches to distance learning.

There are two distance education delivery system categories - synchronous and asynchronous. Synchronous instruction requires the simultaneous participation of all students and instructors.

The advantage of synchronous instruction is that interaction is done in "real time" and has immediacy. Examples include interactive telecourses, teleconferencing and web conferencing, and Internet chats.

Asynchronous instruction does not require the simultaneous participation of all students and instructors. Students do not need to be gathered together in the same location at the same time. Rather, students may choose their own instructional time frame and interact with the learning materials and instructor according to their schedules.

Most online programs use learning management systems (LMS) or course management systems (CMS) that incorporate course management, content, hyperlinks, email and chat communications, and grading systems. A

learning management system (LMS) is a software application or Web–based technology used to plan, implement, and assess a specific learning process.

Typically, learning management systems provides an instructor with a way to create and deliver content, monitor student participation, and assesses student performance. A learning management system may also provide students with the ability to use interactive features such as threaded discussions, personal home pages, video conferencing, and discussion forums.

IV. EXAMPLES

With the cost of implementing e-learning tools falling, more governments, businesses, and schools have added online courses and other forms of distance learning to their organizations. In addition to the obvious business uses for e-learning, governments around the world have discovered that e-learning programs can dramatically improve the quality of life for citizens while reducing the financial burden on taxpayers.

Local schools in underserved rural areas or dangerous urban neighbourhoods can rely on e-learning to offset the lack of skilled teachers in their districts. State university systems can keep talented students from crossing borders by importing highly specialized programs from other schools. Governments in developing countries have invested heavily in e-learning programs to build eager, talented, work forces.

Lynda.com is an online learning company that helps anyone learn software, business, and design skills to achieve personal and professional goals. With a lynda.com subscription, members receive unlimited access to a vast library of high quality, current, and engaging video tutorials (Figure 2.).

New courses and topics are added every week at no extra cost. Lynda carefully select the world's top experts who are the best in their field, passionate about their subject matter, and know how to teach.

The company offers training in various subjects, such as 3D + animation, audio, business, design, developer, documentaries, home computing, photography, video, and Web + interactive; and software, including Adobe, Apple, Autodesk, Avid, Corel, Google, Microsoft, and Open Source. Its products include the lynda.com Online Training Library, a subscription-based learning service; lyndraPro, which helps in training five or more people; lyndaKiosk for corporate learning labs and libraries; lyndaCampus for staff, teachers, and students; and lyndaClassroom, which helps in training in the classroom.

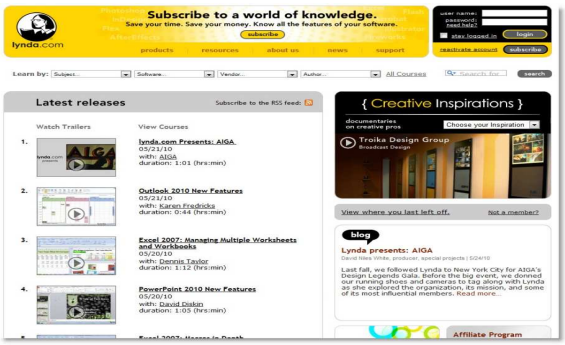

Figure 2. Lynda.com web page

Official Microsoft E-Learning makes it easy to take Microsoft online training courses, participate in virtual labs, and test your skills from the home, office or anywhere you take your computer and have an Internet connection (Figure 3.). Available in 25 countries and regions, online courses provide a flexible learning experience for people of all skill levels, from office workers to seasoned IT professionals and developers. To help you master complex material, we include hands-on virtual labs and interactive exercises in most e-learning courses.

Benefits include:

- Flexible schedule: Typically, one can access an e-learning course for up to one year after purchase.
- Self-pacing: one can open and review a course as many times as he/she
- Progress tracking: Gauge progress, save learning history, and assess knowledge before and after training.

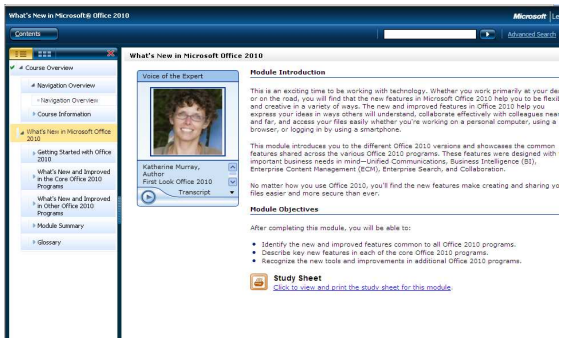

Figure 3. Microsoft online training interface

More than 1,000 online courses are available. They range from core training on Microsoft Office

Excel to Microsoft certification exam preparation clinics.

EliteSecurity is an online community that was created in order to assist and support people interested in IT subjects, it being understood everything related to computers and technology: programming, administration, network, software, hardware (Figure 4.). Users of the site can freely express their opinion and read others' experiences. Goal is to provide customers the knowledge that will lead them to more easily find solutions to problems, based on others' experiences and recommendations.

EliteSecurity support all enthusiasts, developers, administrators, students, scholars and others who have a desire to learn and thrive. ES support anyone interested in software and hardware, reverse engineering and any form of security research that aims at obtaining new knowledge.

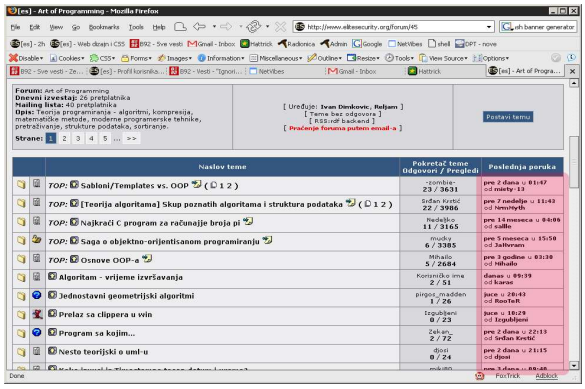

Figure 4. EliteSecurity forum

Although originally conceived as a bit elitist place, mainly intended to bring together former members of the "Missa" team, it was evident that the number of people interested in participating in the Forum with much higher quality content.

Up to March 2001 the number of unique daily visits reached a level of about 5000 per month. In May 2001 the site traffic is at the level of 11 000 unique visits per month, which exceeded the number of visits to the many forums that exist in this region for many years.

V. CONCLUSION

Workers in all kinds of industries once had to travel to specialized learning centers to discover the best practices in their field. Today, e-learning connects students in rural communities to urban experts, and vice versa.

We are only starting to see the effects that quality education is having on business and industry in developing countries. Likewise, small businesses can access the same calibre of high-level information and insight that was once only available to companies with large human resources budgets.

Many e-learning providers have discovered that they can use video game technology to develop fun, engaging, effective simulations. Industrial employers can train workers to handle sophisticated tasks without risking injury or production quality. Other types of teams can grow skills and learn best practices by participating in simulated quiz shows or treasure hunts.

Fun e-learning programs help boost staff morale while reducing the time it takes for team members to integrate new skills and ideas. Today's wireless technology allows educators and development specialists to reach even further into rural areas, farms, deserts, and rainforests. With radio, satellite, and Wi-Fi signals beaming two-way information from distant locales, people can participate in an almost endless array of learning opportunities.

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IMPROVING PERFORMANCE TESTS USING E-TEST

D. Glušac*, J. Gavrilov*, D. Ostojić*, S. Karanjac*, Lj. Knezević*, J.Kabok**
*Technical faculty »Mihajlo Pupin«, Zrenjanin, Serbia
**Provincial secretariat for education, administration and national communities, Serbia
djurovic_@live.com

Abstract - R.Tuler was first used the term to indicate the result of evaluation of teaching for individual students or groups of students. Today this term has a very broad meaning of the evaluation of student achievement in a series of tasks and includes knowledge tests, questionnaires and interviews to students and monitoring students over a long period [8]. In teaching, technical and IT education, e-test can be used when checking all the theoretical parts of the curriculum, and we will in this paper deal with them.

I. INTRODUCTION

The concept of primary education today is, [1]:

- completed primary school;
- Computer literacy;
- knowledge of English;
- driving license.

Three levels of computer education are, [1]:

- basic level - refers to the use of computers as a means of support,
- advanced level - refers to the use of computers and information technology as an asset in business and
- professional level - refers to the advanced use of computers and the development of new information technologies, tools and applications.

II. ASSESSMENT OF STUDENTS

Assessment of students is governed by regulations or rules on assessment of students in primary and in secondary schools. In making the overall assessment we evaluate the students' work. Rating in addition to giving a picture of how a student mastered a particular area, it has a special social, psychological and other implications. Evaluation, the student receives feedback on their work, effort and commitment, [10].

Depending on the subject and has different ways of grading. Most cases are evaluated numerically ranging from 1 to 5, while in several cases ocenjije descriptive ("stands out", "satisfies", "successful" and the like). Descriptively to assess students in grade school, and in later grades with descriptions of civic education, religion ...

Bloom six different hierarchical levels of learning within the cognitive categories, namely factual knowledge, comprehension, application, analysis, synthesis and evaluation, [2].

Standards and criteria for the evaluation of the:

- is sufficient to give a student can independently solve the task, the basic contents of the wedding party and responds with sub-questions;
- gives a good student who is self-sufficient for exposure, which handles only in solving similar tasks, but not persistent enough;
- is given to a student who understands the content and linking them with previously learned, but not sufficiently independent to acquire new knowledge;
- gives an excellent student who is an independent, recognizes and understands the contents, can connect them with other examples, which is persistent and interested in teaching and content, [2].

Ratings depend on examiners themselves and their criteria for testing. Several Research has been done on the evaluation criteria. Bossing the research done in 1944, gave the 114th assessors a mathematical task to evaluate and izboduju. The only criterion that is valid for all is that the mathematical problem must have 100 points. Estimates of accuracy depending on the assessors ranged from 28 points up to 92 points. Even the Hulton Grgin found that the same rater evaluated differently the same task in different periods of time, while Kaufman in his 1975 study found that the greatest differences for middle-grade or grades 2,3 and 4, a maximum matching in grades 1 and 5, [11]. Methods and techniques for testing the knowledge of oral, written, practical, combined, and monitoring student behavior during class and

outside micro-test, the tasks of object types and electronic testing.

III. E-TESTING

The word testing comes from the Latin verb Testor, which means Testar testify, prove, however, in our language it is taken from the English language which includes concepts of research, experiment.

A. The basic elements and principles for the development of test methods and evaluation

The very creation of the test is a very complex process that requires patience and attention. During the examination, it is important to keep the basic elements that are arranged chronologically and derive one from another, namely by Dr G.Gojkov:

- knowledge of the target to be achieved by applying the test of knowledge;
- determination of test;
- determining the length of the test;
- determining the length of test questions;
- choice of times questions or tasks;
- assignments;
- sorting task in a specific order, the determination of issues;
- prediction of treatment test;
- assessment tasks in the test;
- predict how the correction of incorrect answers;
- a pilot study;
- preparation of final test forms. [9]

The basic principles that the teacher must follow when making the test in order to achieve a higher quality of the test are:

- test tasks must be grammatically correct;
- ambiguous words can not be used;
- expressions from a textbook teba avoided because of the formalism in the knowledge of students;
- tasks must not be ambiguous;
- Tasks should not suggest the correct answer;
- the task should not be "traps";
- solution of one task should not affect the decision of another.

Based on the assessment tasks in the test score is determined. Based on the scoring has several ways of evaluation:

- total number of points can be divided into equal parts, where each part represent one grade, or for every 20% increase will be rated for one;
- higher score will be required for passing grade, or percentage of 40% - 50% will be sufficient for 2, while the remaining percentage is evenly distributed to other grades
- in overcoming certain materials, such as the example in the technical education of coping with the measure of measuring floating or micrometer, the student may be assessed or insufficient grade 1 or grade 5 excellent, as in this material or the student knew how to handle an instrument or measurement does not know.

B. The characteristics of electronic testing and types of questions

Depending on the teacher and his criteria depend on the assessment, as outlined in chapter three of this paper. To avoid the possibility of subjective assessment tests the students are the most suitable electronic means of a test. In these tests, the grading terms are equal for all and at the completion of the test are automatically calculates the number of points, and thus, gets the score on the scale shown on the test. The advantage of this method of testing is that it has reduced the possibility of cheating on tests, of course, if a suitable set of classrooms, so that the teacher has a list of all computers or computers that are placed in the "P", where students have no reason for turning and rustling under the pretext that they need eraser, pencil or the like.

Drawback of this test is that each student is not coping with the same computer. This can be regulated test before the final tests where you can see how any student be required to implement the test, and the ability of students to be limited in time and answer the question. Another disadvantage is that not all questions can be automatically evaluated, and it refers to the form of essay questions, when drawing algorithms, and similar tasks of this type.

When evaluating the most appropriate of knowledge Sponge or exercise testing and

perfecting, where the teacher can get the most realistic feedback on how students have mastered certain material and which parts of the material remained unclear.

Types of tasks include:

- question of alternative choices;
- multiple choice questions - one response;
- multiple choice questions - multiple response;
- insertion tasks expression;
- matching tasks and grouping;
- sequence of tasks;
- marking tasks and
- essay-type questions.

All these types can be combined, but it can also give a dull test, in the sense that it consists of only one type throughout the test. The most convenient during the examination, all these types combined.

E-tests are suitable for the theoretical parts of the curriculum, while the way of a test can check the practical parts. They are also suitable for making quizzes during the regeneration of material from previous classes, or the material associated with another object or when practicing more complex and students may be more difficult material. Such quizzes designed to motivate students, as practiced teaching area through competition and fun.

On the Internet you can find lots of programs to create quizzes, which is a free download, which are suitable for production tests. Some of these programs are Wondershare QuizCreator (http://www.sameshow.com/quiz-creator.html, 17.12.2011.), Hot Potatoes (http://hotpot.uvic.ca/ 17.12.2011.), Quiz.NET (http://download.cnet.com/Quiz-NET-Lite/3000-2051_4-10871789.html, 17.12.2011.), Qedoc Quiz Maker (http://www.qedoc.com/products.php?p=author, 17.12.2011.) and other [1].

IV. THE RESEARCH PROBLEM

The courses should be adapted to today's "digital" age, teaching students to be closer in their sphere of interest. The introduction of electronic tests in class, become dynamic tests, students can navigate through the issues and become closer to the students in them, you can add a multimedia add-on or sound, which on paper does not.

Unlike paper-based tests that have been used for years, there was a possibility of cheating in control tasks was longer data processing, and the introduction of electronic journals, this form of testing of knowledge will greatly speed up data processing and graphical presentation of the issues that students are most mistakes, or that part of the teacher to approach students.

Electronic tests can be applied to all cases, both in primary and in secondary schools, both at the theoretical parts of materials processing, and is the subject of the introduction of electronic tests to continue to improve the results of testing.

In teaching, technical and IT education, e-test can be used when checking all the theoretical parts of the curriculum. The main aim is to prove that electronic testing more efficient since they are closer to students and more dynamic, the application of these tests have a better outcome and greater motivation for this kind of testing, since these tests can be offered and students audio and visual approach to the issue.

V. THE AIM OF THE RESEARCH

The main aim is to prove that electronic testing more efficient since they are closer to students and more dynamic, the application of these tests have a better outcome and greater motivation for this kind of testing, since these tests can be offered and students audio and visual approach to the issue.

V. RESEARCH HYPOTHESES

The main hypothesis is:

- Better use of electronic test results of the test.
- The other hypothesis is:
- Electronic tests are more efficient, since they fit closer to the students (adapted to their interests and "digital" era);
- Motivation for this type of testing will increase. The main hypothesis will be confirmed or refuted on the basis of electronic test, while the secondary survey to prove.

VI. ORGANIZATION OF RESEARCH

The research will be done in primary school "Uros Predic" in Orlovat. Testing will be the case for the TIO to the theoretical parts of the fields, in fifth grade "Information technology" [3], the sixth form "Energy" [4], for the seventh grade "Energy" [5] for Class VIII "IT technology "[6]. Before beginning the research, will provide the necessary

conditions for research. Computers in the classroom will be sorted in the "P" to the interviewer had a view of all computers. Will be done before-testing to the examiner had access to the orientation of students working on the computer and subsequently make two to three groups of tests, time-adjusted for each group of students. On each computer will be set up tests. The research results will be obtained on the basis of electronic test established by the examiner and a survey that will also prepare an examiner. The study will use a model of experimental procedures - division. The basic model of pedagogical experiments are, by [7]:

- experiment with one group;
- experiment with parallel groups;
- experiment with the rotation factor.

This study will use an experiment with parallel groups, where there are two equal groups (by number of students and approximately the same average mark), which are, by [7]:

- control group (group null) - this group does not take a single factor experiment, the group will work in the traditional way (paper test);
- experimental group - in this group are introduced newer and more modern teaching methods, in this case the group will operate electronic test and survey.

Electronic test instrument that performs testing using a computer. This e-test is a test of knowledge. Such tests can determine whether and to what extent the respondent has adopted certain knowledge, skills and habits, by [7].

The survey procedure in which the respondents questions related to scientific interest, which correspond to respondents in writing. Instrument survey where the questions and answers written is called the interview, by [7].

This research survey is very important, because it is based on proven auxiliary hypotheses. In this survey will be asked 5 questions, with their sub-questions that will give students the answers.

The assumption in the research is that all students on research to be present and would be consistent control and experimental groups.

After completing the survey, we get a lot of data to sort and arrange. To make it less time and money invested in the arrangement of the data, we consider, by [7]:

- organization arranging,
- technique for sorting and
- stage arrangement.

Stages of arranging the:

- marking - tagging data using the code or code;
- grouping - the same data are grouped and counted, and thus makes review and arranged;
- tabulation - grouped and arranged to transmit data in the table, and thus become arable.

In this study, data will be entered after the grouping in Microsoft Excel, after which the tables are based on the results graphically, based on which will conclude the research results.

VII. THE TEST SHOWED THE FOLLOWING RESULTS:

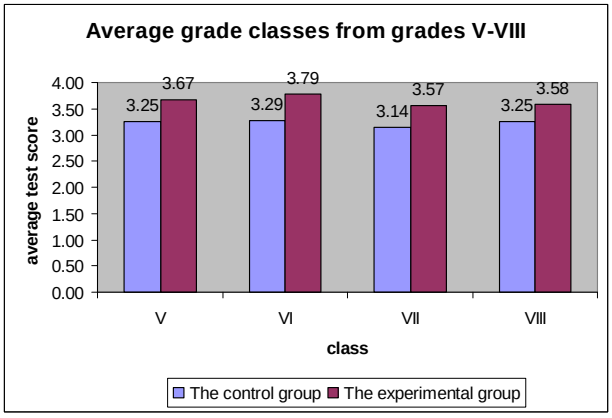
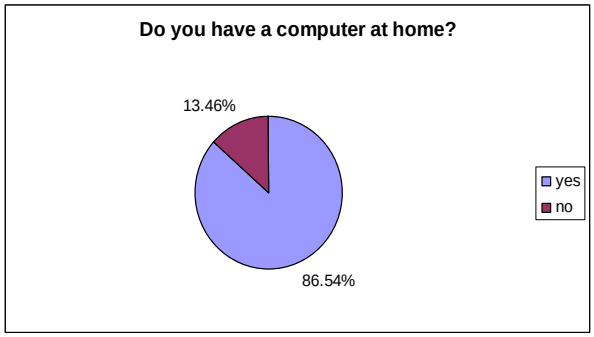
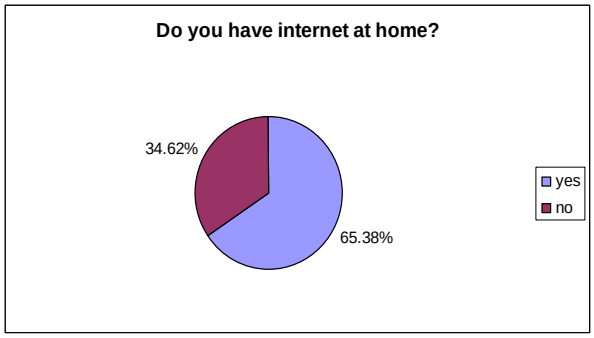


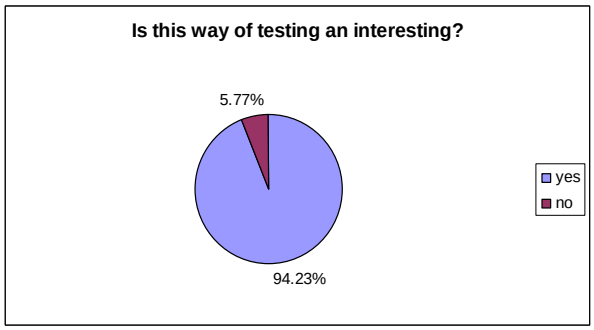
Figure 1. Graphical display of test results

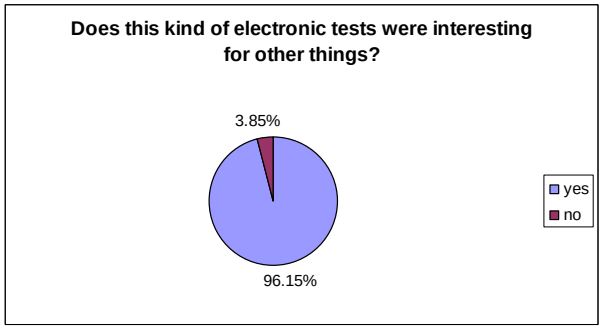
As can be seen in the graph, the test results were better in the experimental group compared to controls, in the fifth grade, the difference is an average of 0.42, an increase of 11.44% for the sixth grade difference is 0, 50, which is 13.21% higher than the control group, the seventh grade is the difference 0.43, which was a 12.00%, while in the eighth difference 0.33%, which is 9.30%, and an average increase of 11.49%.

The survey results urađenoj in the experimental group as follows:









According to the results, one can see that the students in experimental group had better results than the control group and the main hypothesis is confirmed, while the survey results confirmed the hypothesis that the extra students this form of the test is closer to having 50% of students spend on the computer more than 2 hours a day, and the motivation for this type of testing is increased based on the last chart, where as many as 96.15% of students responded to these e-tests were interesting for other items.

VIII. CONCLUSION

Based on the results of testing and surveys that are conducted in the experimental group, we can conclude that the electronic tests achieve better test results, that such tests are more effective since the majority of the students this type of testing. interesting and most of their time at the computer, and that motivation students for these tests increased. Such research could be conducted in the whole country, in order to obtain the whole picture of the efficiency of this method of testing. If the survey results were the same or a higher percentage could be introduced into teaching as a means of evaluating the theoretical parts of the curriculum of all subjects, which would increase the objectivity of the evaluation of students.

IX. SCIENTIFIC AND SOCIAL JUSTIFICATION

Students spend more time on the computer in your spare time. They are used in nonlinear dynamics and knowledge acquisition. Traditional teaching them becomes boring, because there is not dynamic and can actively participate. In schools, they should provide more opportunities for non-linear acquisition of knowledge using computers as a form of teaching, and therefore should be tested and adapted to their needs and habits.

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ADVANTAGES AND DISADVANTAGES OF E-LEARNING

J. Stanković, M. Pardanjac
Tehnički fakultet "Mihajlo Pupin", Zrenjanin, Srbija
jecka88@yahoo.com, marjana.pardanjac@tfzr.rs

Abstract - Today, it occupies our daily lives terms such as e - learning. E - learning become part of our everyday vocabulary. Because of the complexity of the environment e - learning is no way to come control e - learning as there was no way to control the arrival of the Internet. E - learning to be a new concept of work in time and space. Under the e-learning we mean the performance of the education process with help of information and communication technology (ICT).

I. INTRODUCTION

Distance learning is a term used to describe the learning process in which the knowledge source and recipient know the physical distance, and between them mediated by Information and communication technology. Forerunner of distance learning is actually using the postal system to overcome the physical distance of professors and students in order to transfer knowledge. This way of teaching and then showed a qualitative, economical, pragmatic, and certainly freer side of the application, as compared to traditional teaching methods. With the advent of new media, through which, among other things, broadcasting and education program, distance learning has gained a completely different dimension and has become an indispensable way of knowing. Internet commercialization process of distance learning a new dimension, he is relieved, alluring, enriched with greater range of specialist programs and higher degrees of freedom that users have the choice of programs and modes of attendance.

A. Learning styles

Learning styles are the simplest terms, different approaches or ways of learning. A notion learning is a wide term, it encompasses the entire process and all the knowledge and skills the person acquires during lifetime, from the early childhood to the end. If we talk about learning in narrower terms, we have in mind studying during the educational process. Today, contemporary trends in education introduce the transition from „knowledge reproduction" into the model of „active construction of knowledge" and a model of lifetime learning. This approach to learning demands that each person actively addresses the process of learning and transforms gathered information into applicable knowledge. By this, role of a teacher in the learning process also changes. Teacher is no longer there just to simply transfers knowledge, he or she is now a partner in learning , whose task is to help a student obtain the information and introduces him or her to the ways how that information can be used later on and transformed into useful knowledge.

Teacher's basic task is to teach students how to learn, to create in terms of information literate students. Literate person in terms of information understands the role of a computer as an associate in the process of seraching for and processing information, but is as well aware of the fact that the success of that process depends mostly on him or her, and not on the technology used [1].

By developing new information technologies,especially by the appearance of the Internet possibility arose to access easier larger number of information. This possibility created new type of learning, e – learning, that is learning throught the means of Internet and new technologies. Nowadays there are a lot of definitions of e – learning. The definitions of e – learning have been mainly changing and developing along with the development og electronic learning and the techologies that have been supporting it (Stanković and Bjekić and others). E – learning can be understood as a "process of knowledge and skills transfer throught the network and with the use of computer application and surrounding in the process of learning".

Development of e – learning influenced the development of scientific disciplines that deal with this specific type of learning. This is how psychology of e – learning developed in psychology, that is psychology of e – teaching, and as a part of pedagogy special place takes pedagogy of e – teaching. Psychology of e – learning is just being developed, and is mainly based on psychology of learning, upbringing, education and teaching

psychology. [2]. Disciplines in the area of information technologies deal with studying and promoting of e – learning, especially in the part of technological support to the process itself. From the aspect of psychology and learning, importand lore in the process of learning belongs to the way person learns, gathers data, processes and remember, transforming them into functional knowledge.

According to Tatjana Tubic [4], numerous theories answer the question why we learn, but they often do not give answer to how we learn. To get the answer to how we learn it is necessary to study certain factors that give us insight into the ways and methods of learning. One of these factors that is nowadays more and more studied and gains on its meaning is a style of learning. "Style of learning is a well – established and dominant way of accepting, processing and using stimuli/information in the process of learning and is the most recognizable in the course of organized learning in classes. That is the dominant way of mental representation and processing of contents of learning. Along with the cognitive component it encompasses physiological and affective aspects of learning process. These aspects are given different importance in various style models. " [2]

Many authors use terms cognitive style and learning style, while others differentiate between these two terms. According to Sternberg and Zang, cognitive style represents somebody's established ways of processing information, while learning and tutoring styles apply more to the behavioral aspect of person. Ginter and Liu say that "cognitive styles are more connected to theoretical and academic research, while learning styles connect to practical use" . Basic difference between styles of learning and cognitive style is that the cognitive style represents the way how person perceives, processes, remembers, thinks and solves problems.

On the other hand, learning style represents the way how person uses the cognitive style and learning strategy learn something. There is a large number if learning styles as well as a great inconsistency in choice of criteria based on which their classification is done. Researcher categorize, define, group and measure learning styles, so that today we can identify over 80 different models of learning styles [3]. Based on former researches and the frequency of use, we can single out following criteria based on which the classification of learning styles is done:

- Perceptual modalities, where the classification is done according to senses,
- The way of processing information and
- Personality characteristics.

B. E-learning

Information and communication technology has given a new dimension to the modern educational system and opened the possibilities for distance learning via the Internet or a computer without limits. Electronic education it is a current trend in a modern society.

E-learning is learning which takes place in an Internet environmaent. It is not bounded to a regular school and can take place in a variety of locations including home,school and other various locations e.g. libraries, cafes etc. The global network for this new Internet learning word has expanded the opportunities for teaching and learning in ways that we are only beginning to understand. E – learning teachers will work in an environment in which they have never been worked and will have the opportunity to be pioneers in their own right as they set course.

C. Advantages of e-learning

E – learning can give students much greater control over their own learning experience. Here are some of the benefits of the e – learning:

- Students can learn from a variety of locations,
- Students can attend multiple learning institions and/or their local school,
- Students can determine their own time dedicated for e – learning,
- Students can choose to work individually or collaboratively,
- Classes may be synchronous or asynchronous,
- Students may take classes from more than one e-learning school,
- Communication and teamwork on collaborative projects between students each other thus developing social and communication skills where there is fore the principle of constructivistic learning
- The use of interactive learning content and different media (text, images, sound, video, animation, simulation) for presenting the content and accessibility 24 hours of content
- E-teachers can work in more than one school, etc.

D. Disadvantages of e-learning

The biggest challenges or problems in e-learning are that it is difficult to motivate students to enroll in online course or program, actively participate in performing and successfully complete it and depending on the technology. Still there are those who do not accept e - learning. Many e-learning programs do not succeed, that is, many students give up and never program is completed by the end. T here are many reasons for this failure. One of the biggest problems is very nature of e-learning. Unlike traditional learning, It is very easy to give up because the participants are not expected to join the teaching of "classroom" that is, to a certain place where they can and fellow teacher, but to make mostly from work or home. Since the participants usually too busy and burdened numerous other duties, required a very high level of self-discipline and motivation to conscientiously carry out their e-learning tasks. Because of these deficiencies it is necessary for e-learning to pay special attention motivation to engage students and teachers or tutors who will monitor their progress, they always support and help in learning and encourage them to fulfill their tasks. Also, it is often e-learning content is actually an Internet version of the text manuals with only a slightly graphic. Such facilities are tiring for the students reading screen, and boring. It is therefore necessary to pay special attention to design and manufacture interactive and multimedia learning The difference between classical learning (learning) and electronic learning (e-learning) and in the perception of education. In the classical teachings have interaction between the student-content teacher, and in e-learning for this interaction is also involved in ICT.

II. TYPES OF E-LEARNING

E-learning involves many different technologies and ways to communicate student and teachers. We present three types of e-learning:

- E-learning is done in a classroom in which students are present and teacher. There are so-called developed programs. classroom aid, some of them used for the presentation of the material without interaction, interaction with others - eg. programmed tests, a third were able to include control of student computers.
- Independent use of prepared materials that are running on a another location. With this kind of e-learning materials are delivered to students on CD-ROM or similar medium or student using the Internet. This form of learning is a supplement to traditional learning is performed in the classroom and in the literature is called bleneded learning or mixed mode.
- The entire process of learning is designed to be performed over the Internet, and therefore e-learning becomes a form of distance education. It was decided it problems of communication between institutions and students and distribute materials in a comfortable manner. The solution to the institution and the students accepted as a solution the modern age.

E. E – learning systems

E – learning systems increases productivity in education and present a solution to improve training chalenges. Various media can be used to deliver learning information and to present education materials, including text, graphics, video and audio. Media components can provide:

- Subject information and the instructional process,
- Sound and vision to exsplain or demonstrate skills,
- Communication between teachers and students.

Good e- learning system should include elements of teaching and learning practice [5]:

- the actual teaching, including explanations, examples, illustrations, and learning support in the for of professional advice, comment and encouragement,
- the student's work, including reading, research, discussion groups and all courserequired practical activities,
- the assessment procedures, which will need review and may need to be changed to meet the needs of a distance education programme.

Interoperability among e – learning content and system components is a key to the successful implementation of an e – learning environment. In general, the purpose of e- learning interoperability standards is to provide standardized data structures and communications protocols for e – learning objects and cross – system workflows. Because of that the e – learning standards are needed in order to develop an e – learning system. These standards provide the interoperability between learning systems and tools from different vendors. Learning standards and specifications can be organized into five categories [6]:

- metadata,
- content packaging,
- learner profile,
- learner registration,
- content communication.

III. CONCLUISION

E – learning is the education system that is only in development. But, year to year more and more developed. With due to fact that based on the use of ICTs is not possible to predict the further development and expansion of the e – learning as it is not possible to predict the development and expansion of the ICTs. We can say certainty that the future of teaching and learning is in the e – learning.

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SOME ASPECTS OF THE USE OF MOBILE SERVICE IN THE DOMAIN MANAGEMENT OF MOBILE BUSINESS AND MOBILE ADMINISTRATION

B. Blagojević*, D. Soleša**
*High Chemical Technology School of Professional Studies, Krusevac, Serbia
**Faculty of Economics and Engineering Management , Novi Sad, Serbia
blagojevic.bratislav@gmail.com, solesadragan@gmail.com

Abstract - The Internet is becoming the backbone of all the trends in information -communication technologies. All that was done the last 50 years in electronics, IT and Telecommunications, today is on the Internet or transmitted through the internet channel. The requirement to anywhere communicate, see specific information, drawings and paintings, manages the processes is the dream of modern man as intelligent beings. Today's Internet, its distribution, and multi-speed facilities are close to that goal. This understanding defines the Internet as a multimedia, fast and portable system that in the new environment open the problem of broadband, vailability and mobility.Using mobile technology creates a new line called the mobile business (m-commerce or m-business) and mobile government (m-government) or mobile administration (m-administration). M-administration is strategy and implementation for using all forms of wireless and mobile technologies, services and equipment to improve efficiency in e-administration for all participants, citizens and economy. The paper is analyzed the concept of m-business and present example of a complex conceptual system in the field of mobile business.

I. INTRODUCTION

New digital information society builds its economy on broadband and mobile services and they will be available to every member of the community. With this approach, we come to term, mobile service, M-Adminictration, M-Government, M-business. So far, we are often met with the concept of e-government, e-services, E-commerce and the like. From the general set of e-services special place belongs to the E-Government.

E-administration present the electronic services of government and local government, available to citizens through electronic means such as Internet connected computers, phones, digital televisions and other electronics devices .

E-administration is intended to improve the fundamental functions of public service, using the latest forms of information technology. But e-administration tied to the computer and work or home space. Aiming to avoid the weak side of e-administration first began to use mobile phones to reach your computer (Laptop or NoteBook) outside the work premises. Later, with the new intelligent mobile phone/computer (iPod, PDA, HTC, etc.) mobile device could be used directly to connect to the network.

This model of M-government and M-commerce is platform for: enabling the participation of all government units, the use of the economy and thecitizenry, regardless of the work that IT, mobile and wireless technologiesare applied in the system work, work regardless of the applied design and search techniques.

Using mobile technology creates a new line called the mobile business (m-commerce or m-business) and mobile government (m-government) or mobile administration (m-administration). M-administration is strategy and implementation for using all forms of wirelessand mobile technologies, services and equipment to improve efficiency in e-government, for all its participants, citizens and businesses .

M-administration is in essence and structure part of e-government that allows users the unique opportunity through the freedom of mobile access, use public services on virtually any place and at any time. M-administration has become a reality and not some future technology. With the advent of 3G mobile technology and intelligent mobile phones with user-friendly operating systems (OS, Android,,) and the rapid emergence of broadband wireless networks, are set the foundation for m-government and m-commerce.

M-administration is not only an opportunity to obtain information through mobile phones MG2MC (M-Government to M-Cityzens) from

administration of public services to citizens. M-administration is a complex strategy of efficient use of wireless devices (mobile phones, PDAs - personal digital assistants, portable computers, etc.), with maximum efficiency for all parties involved. This efficiency means rapid return on investment and cost justification for the new information and mobile technology .

Mobile phones are considered the most common and most widely used communication medium in the world, but their limitations in terms of inability to transfer large amounts of data and information. Security of wireless transmissions in mobile communications system is particularly sensitive question on which must constantly be working. M-government or m-administration, and m-business or m-commerce, is a relatively new field within business and government as well as in whole life,which applies the discoveries of science and new wireless network technologies in everyday life. Most definitions of m-commerce and m-administration focus on the unfolding transaction through the wireless network and using wireless devices, with a view to their improvement in general.

Basic characteristics of m-commerce and m-administration are: mobility, efficiency of mobile network, the exclusive control and the mass.

The M-business special place belongs to M2M concept that is not just about the only communication between the two and / or more machines without any external effects of man. It is a much broader concept in which man still has a role, but at the sametime allows the reduction of human intervention to a minimum, and the finaleffect is the optimization of the management and easier control to manage remote and distributed systems.

II. THE CONCEPTUAL ASPECT MODEL OF M-COMMERCE AND M-ADMINISTRATION

M-commerce and m-administration with their services are the most important fragment of the market today, and olso in our system they become a vision of buisiness for many different market participants of goods and services. The main actors and participants in m-commerce and m-government are (Figure 1): Services, Technology, Communications, Regulations, Users.

The services are intended for customers who use them by using their mobile devices. The main factors of service are: content providers, inventors, application providers and billing agents.

Technology include major participants such as equipment manufacturers and renters of equipment. Equipment manufacturers (Ericsson, Nokia, Motorola, Siemens, etc.):supplied equipment to users, supplied network equipment to network providers and distribution channels, work development, design and marketing, working with manufacturers of components as its partners.

Communication means above all mobile network operators, wireless service providers. Mobile network operators passed through the physical connection all communication services to end users, giving users the flow to and through his and others' networks.

Regulation creates an environment in which all the other participants survive and flows in their interdependence and directs them to the actualreal and meaningful for the environment needs. Creators regulations are government agencies and regulatory bodies, groups for the standardization and consumer services.

Regulatory bodies (RRA, RATEL Ministry

MTID) define the legal framework and environment in which the m-commerce and m-administration services via mobile services survive and develop. They place the legal frameworks that guide the population and economy in the long summarized the applicable services.

Users are consumers, as well as private individuals and companies, andalso the most important factor in this business, because without their needs and desires there is no market and all buisiness referred to no purpose.

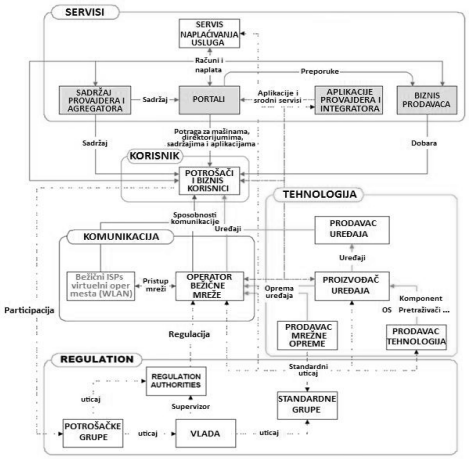


Figure 1. Cross correlation factor model of m-commerce

III. MOBILITY AND NETWORKING IN SERBIA

For conventional business, it is characteristic that one man must be on the "work place " while

working. New technologies have greatly influenced the change of a typical working environment for office staff. Computers allow our users to virtually anywhere at any time of working hours doing their work that would perform in their offices. Mobile phones enables work and exchange information important to work on the move, mobility of lifting restrictions related to place of work.

Although the worldwide e-business is widely accepted in Serbia can be sensed only in outline. Mobile business is in the beginning. The question is how to move forward? Preparations for the introduction of e-business at the moment is characterized by well trained professionals, the first positive experience of some companies, prepare a dozen companies to introduce e-business model by V2V.

Starts and the application of m-commerce and the first examples of m-administration modeled MV2MV or MV2MS. The laws were finally passed and is awaiting the prompt implementation of legislation on electronic commerce and electronic signatures, and establishment and recruitment Institute of Informatics and the Internet on the project of e-administration and m-administration.

It is considered that e-commerce and m-commerce, should be envisagedas one of the priorities in development strategy until 2020. year..

Participation of providing m-services and m-internet could be until 2020 years to reach to 5.2% of gross domestic product (GDP) of Serbia, and also to create about 100,000 new jobs and increase government revenues byaround 500 million euros. It shows the results of a study which was done for Telenor Serbia by Boston Consalting Group. It is noted that the potential of m-services and m-Internet in Serbia has not yet been exploited to the fullest extent possible, and if properly used, could be a powerful tool for solving many problems of m-administration and society in general. Ministry of Telecommunications announced the possibility of secure electronic payments over the Internet (engaging Pay-Pal firm) from 2011.

First applications of M2M (machine to machine) services in Serbia have been realized in 2003, when using GPRS networks introducing parking controls in Belgrade. The portable device has a SIM card that has a special tariff for data transfer. This was followed by a number of different implementations, so that nowthe network of Telekom Serbia has more than 240,000 different devices to communicate with other devices within the different M2M solutions. Telekom Serbia has some solutions appear only as a provider ofconnectivity (GPRS cash register, for example, banking, POS terminals, ATMs, etc.), Telekom Serbia is not a goal that is not only a bit-pipe, but to activelyparticipate in the implementation of M2M solutions in cooperation and partnership with service providers. Such models already have in different solutions: mobile money, mobile payments, vehicle tracking, employee records, etc

It is necessary to introduce the tax and duty exemptions users E & M business because they can stimulate a wider and faster application. The most important preparation is for the implementation of electronic signatures. Chambers of Commerce was recommended to organize meetings inwhich managers should be informed about the concept of e-commerce and m-business, effects and role of management and related issues. Does not have much time, and a company that successfully introduced e-commerce and m-commerce provides a competitive and quality services to its customers. That is why more and more often heard saying: "2B or not 2B. "

IV. THE CURRENT STATE OF THE MOBILE BUSINESS

The application of mobile electronic payment using a mobile terminal for financial transactions, this means payment of all forms electronically, somoney transfer payment between the current account and actions, whenshopping, are e-business applications.

There are several requirements that affect the development of mobile business applications : such as security, integration with banking systems, non-standard mobile infrastructure and standards of electronic payments. There are also questions about the appropriateness of using your mobile phone as an interface for mobile e-business applications. Emphasizes the use of mobile phones provides a potentially large number of users of this service so that there is a need for further improvement. It is expected that mobile e-business becomes expansion of electronic commerce over the Internet.

V. M-BANKING

Successful implementation of m-banking service depends on several factors such as private information services, WAP, and security. There are several technical limitations that affect the definition ofmobile-banking services. Any useful

information for the client may bedistributed in several ways. May be by invitation and requested. Information may be formed by the caseor if the user sends a request for information and to receive information in response to a specific request. Service can be made that the information is automatically generated after a certain time interval or after a important event. M-banking service can be run on all current mobile phone or to adjust for special telephones. Protocol such as WAP supported by several banks in the world.

VI. POSITIONING THE OBJECT

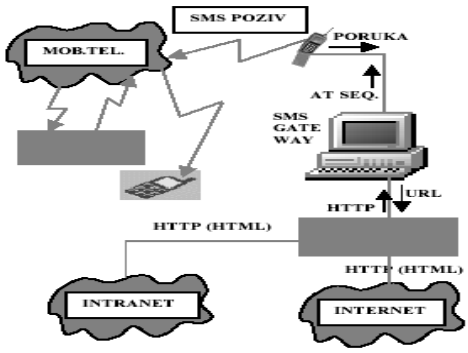
Positioning in the mobile context can mean several things: the position of vehicles, persons or mobile phone. Positioning applications related to the satellite system for positioning that shows people where are they at the moment, and through WAP that its position can pass on to others who is interested. GPS (Global Pozicioning System) is a global network of 24 satellites that were installed by the Ministry of Defense of US and is generally free to use. Anyone with a GPS receiver is able to receive the satellite signal in whichthe information contained on the current position of the receiver. SMS isthe ideal service to send GPS information such as longitude, latitude andaltitude. GPS information is typically composed of 60 characters, as in the equivalent WAP service allows space for additional information about a person, vehicle or a phone that is in that position.

A. SMS as the beginning of M-services

Start connecting the Internet and mobile telephony has been realized by opening sites on the Internet for transmitting SMS messages. Communication spaces GSM network and the Internet are completely different.

As is known, linking these areas will be implemented using gateway devices. In this case, this device must implement the following tasks: Internet protocol conversion in SMS protocols and opposite; ability required by the HTTP protocol (sending text messages), and the ability required by the HTTP protocol (the acceptance of text messages). Generally a gateway is a complex software. SMS Gateway hardware has been realized with: PC connected to the network with a Web server, special cables connected to COM port of PC and with mobile phone, mobile phone. Software, the gateway implements a relatively simple mapping. Type the message and the destination phone numbers of retrieved via HTTP port istransformed into a sequence of modem AT commands passed to the COM port, and then mobile phone, initiated by AT commands, it sends a standard SMS message. (Picture 2)

Figure 2. Structure of the SMS model



All companies and institutions that have employed of distributed locations or are mobile in the field have an interest in some of its functions realized by using mobile Internet with SMS messages. For example: The financial markets in general, postmen, forwarding agents, police, builders and the like.

B. WAP (Wireless Application Protocol)

WAP technology is based on WML (Wireless Markup Language). By its structure and properties it is similar to HTML and XML languages.WAP standard provides for the inclusion of a small micro reader (microbrowser) in mobile phone so that requests for resources is verylimited. Applications are on the WAP server and if is necessary they are send to mobile phone and show in microbrowser. The request with content WAP mobile phone send to his WAP gateway server (phone treats it as a proxy server) and then the request pass to regulatory HTTP web server. HTTP server returns the requested content to gateway server or as WML, or as HTML classic code, gateway server converted them to WML and then sends to WAP client, ie. mobile phone using SMS or any other available system for thetransmission of messages (Picture 3).

Suppose that every telecom provider will have its own WML portal through which its subscribers will have an Internet connection. The only question is what will be able to access. Does the approach will be limited to sites and services offered by the provider or the provider will allow access to the network while the user chooses the sites and services you want.

SIM application tool is another attempt to standardize the way that mobile phone providers communicate with mobile phones on its network in order to provide additional services and Internet

access. Approved and included in the GSM standard. SIM tool provides moreflexibility than the existing SIM card .

Special using GSM SIM card allows you to update the contents of the card in accordance with current customer requirements, ie. Providesgre-ater ability to change the existing service and adding new ones. He and the also WAP protocol is based on a client-server principle. Applications with potential services are on the server and if necessary sentto the client in the mobile phone. In November 1999 European Institute ETSI who created the GSMstandards, included the Sun Java Card technology in SIM tool, which will provide easier application development SIM tool with standard Java development tools.

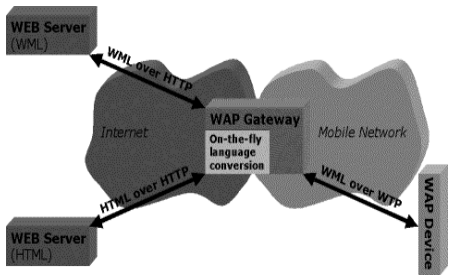


Figure 3. The principle of Gateway Server

WAP architecture provides a broad environment for developing applications for mobile communication devices. WAP layer architecture enables other services and applications use features WAP stack through a set of predefined interfaces. External applications can access the session, transaction, security andtransport layer directly. Wireless Application Environment (WAE), a general purpose applicationenvironment based on a combination of Web and Mobile technologies.The main objective of WAE is to provide a functional environment that will enable operators and service providers to build efficient and useful applications and services to be provided on a wide range of different wireless platforms. WSP is the WAP application layer and the main task is to provide an organized exchange of content between client and server. Provides both services, conection-oriented and unconfirmed conection-les service.

Telecommunication companies are investing very much in the so-called third generation (3G) mobile telephony, which provides wireless Internet access with packet switching for wide area access at speeds greater than1 Mb / s. One of the standards for wireless Internet access is HSDPA (High-Speed Downlink Packet Access) .

C. 3G-UMTS

Universal mobile telecommunications service is a European solution for mobile systems generation. It is based on the code multiplexing users. This realization is called WCDMA (Wideband Code Division Multiple Access). In GSM systems available spectrum is divided by the channel(frequency multiplex). Different channels were assigned to different base stations. On the other hand, users are connected to the same base station using the same radio channel at different times (time multiplex). With further upgrade the network, and the transition to HSDPA - the network of 3.5 generation, speed growth to more megabits per second (currently these terminals support 14 Mbps) With the advent of 3G mobile telephony has significantly accelerated the development of m-business and m-government.

*D. LTE (**Long** Term Evolution)*

LTE is a mobile technology that has no real competition, many is called the mobile phones fourth generation or 4G . Ericsson expects LTE to become the global standard, and believe it will be helped by the performance that may provide coverage, speed and capacity any where in the world. Given that the LTE supports only packet transmission, traditional services like voice will have to be transformed. Although it is expected that the parallel use of old and new networks to transfer different types of content. Even though the LTE is complementary to DSL andother fixed-line broadband technologies also can be used in places where cable is not profitable. Ericsson has already developed all the necessary equipment to set the LTE network. It includes the advanced architecture of radio nodes (RBS6000) that represents a new platform for LTE, but at the same time also for GSM and WCDMA technologies. On this basis, the operators allowed to use the same node for all the technology, which significantly reducing costs. This concept is based on many years of development, which also included demonstrations of LTE network speed 150 Mbps in early 2007, Ericsson in 2009. put into operation and commercial LTE node, and tested the first Samsung available LTE terminals (phones). In order to use the LTE network, you need a proper hardware, a company ST-Ericsson develops solutions for the installation of modems, PC Card expansion, and USB devices, while the massive

appearance of mobile phones is expected in the second half of next year .

Today, developed operating systems for mobile phones that allow high interactivity and adaptability to user preferences essence of quality activities in the m-business and m-administration One of them is Android MOS.

E. Android mobile operating system.

Initially it was developed by Google andlater the Open Handset Alliance. The whole system, written in the Java language, comes with ready-made libraries that other software vendors make it easy to write programs,because their primary action (sending an SMS, manage display and other standard action of mobile device) is always available. From October 2008. The Android available as open source, which means that anyone can download and modify for their own purposes. One of the significant advantages of Android operating system is its flexibility. This approach makes it easier to connect different applications to share among them selves incompa-tible or similar data content. Some of the standard features that support Android include: support for VGA displays, 2D and 3D graphics , SQL database, connections using GSM-EDGE, CDMA, UMTS, Bluetooth or WiFi, send and receive SMS and MMS messages, an integrated browser, support for Java, support for many multimedia formats .

VII. THE IMPLEMENTATION OF M-COMMERCE

To implement the M-strategy requires the support of state institutions which would be reflected in the creation of the Commission of Information and Communication Technology that will develop a strategy for the development of information society on the basis of the action plan of the Government of the Republic of Serbia from the strategy of social development. Also, the same commission will be create action plan for implementation. We note that it is extremely important that information systems and government ministries are not isolated islands off-base that connects them. All government institutions must use the local network and have shared Internet connection. It must build a network that connects all the institutions and systems that use to be mutually operable .

It is currently in use for several models of architecture m-administration. Most often applied are :

- Layered architecture model of m-administration
- The conceptual model architecture of m-administration

F. *Layered architecture model*

In a layered architecture consider designing model must be observed the use of open standards, which in future will not be a limiting factor in any expansion. It separates the three main sections (Picture 4):

- Devices for access to the services that citizens have (phone, PDA, etc.).
- Folder for service discovery.
- Agency services.

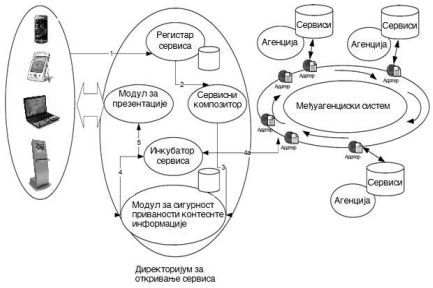


Figure 4. Layered architecture model of m-commerce.

Physical network consists of mobile and wireless technologies and equipment and Internet access services (phones, PDAs, tablet, laptop, kiosk).

Folder service discovery (FSD or in serbian DOS) consists of the presentation adapter that is responsible for transmission and a corresponding required data on the citizen's mobile device (client device). While we use the contextual information about the characteristics of client devices andapplications and the presentation is adjusted according to appropriate capabilities of the device . The network layer consists of transport protocols for data transfer and conceptual architecture on the physical network.

G. The conceptual model of architecture

M-administration is designed to provide access to mobile and wireless electronic public services. The main goal when designing this model is an open public platform mobile citizens. This platform supports (Picture 5):

- Usability
- Transparency
- Mutual functionality

- Expandability

It introduces the business model of of close cooperation between the owner services, government departments and citizens. The main innovation is to enable automatic search, finding and consuming services. This allows a greater percentage of utilization of electronic services.

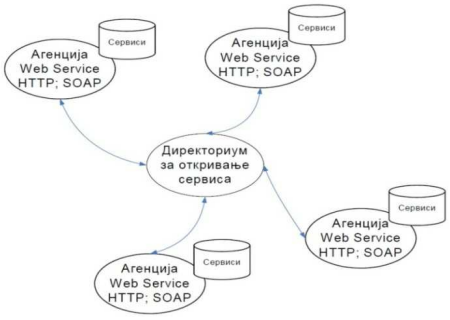


Figure 5. Conceptual model of architecture

Users can access electronic public services from anywhere, at any time, from any mobile device.

Folder service discovery includes components for service discovery, service composition, service selection and execution, and all with the sole purpose : creating and offering complex services. Service lookup and composition in m-administration is not unconnected functions.

This module is in its functioning associated with module security and personalization, and also with module of contextu-alization which allows to find and offer services according to current requirements and conditions in which the user is located. Lookup service is a mechanism in which the services are finding by a flexible criteria. The result of such searches are services that are appropriate for user-defined goals. If local registry did not found a service that meets or can meet the requirements ofthe user goal, then it activate the search procedure called ADAPTER. This procedure starts the search all registers for which the FSD has the information. Agencies are in an environment with its services to provide customer service.

VIII. SECURITY OF M-SISTEM

One of the most important problems in mobile communications system is security. If we look at the structure of the WAP security model we will see that there are twoparts in the model that require the application of security mechanisms: communication between the WAP gateway and web server requires an SSL (Secure Socket Layer) for secure communications, communication between the WAP gateway and WAP receivers require the use of WTLS security protocol that the messages encoded with SSL protocol on the web server securely transferred to the WAP receiver. Able to intercept the message and therefore its unauthorized use of this model are numerous. Places to intercept are communi-cations between the gateway and web server and the gateway and a WAP phone. Ways in which third persons can include in communication are:

- wiretapping (earesdropping). Data remains untouched, but the sender's or recipient privacy is violated. eg. one can find out someone else's credit card number.
- unauthorized changes (tampering). Data changes are partially or completely, and then sent to the provided recipient. eg. one can change someone's order goods or change the contents of electronic mail.
- imitation (impersonation). The data is redirect to the person who imitates provided recipient. Imitation may occur in two forms:
- Fraud (spoofing). A person can pretend to be someone else. eg. person can be identified like he has e-mail your favorite people.
- impersonation (misrepresentation). The person or organization can be presented assomeone or something that in reality are not. Eg. www.kupovina.co.yu may be present and appear to be online stores, and in factthe only thing that works is taking credit card numbers, and never delivered the goods.

Efficient, for now the standard of data protection on the Internet is the application of the composition of public key technology (Public Key Cryptography) that implements the following tasks: encryption and decryption allowsparticipants in communicate to hide the Content which you submit to one another:

- Sender encrypts the data before it sends, while the recipient decrypts after their receipt. While the data traveling through the network are incomprehensible to potentiallistener (the person who has access to the intermediary computer).
- Detect unauthorized access (tamper detection) allows the recipient to verify that the data during its journey through the

network were changed. Any attempt to change or replace the contents will be revealed.

- Authentication allows the recipient data to verify the authenticity of their sources or to confirm the identity of the sender.
- Prevention of non-recognition prevents the sender of data to later claim that this data did not sent.

IX. ARCHITECTURE MODEL OF M-COMMERCE

Mobile data collection means that the data be entered only once before becoming part of the company's database. This increases accuracy, as well as increased speed, reduced opportunities for errors that caused by copying data and completely eliminating redundant operations. For example, the seller may accept an order from a customer and immediately forward the server, companies that are not mobile orders must be entered into the computer oreven worse have to wait for fax or phone call and then another worker entered information about order in computer. Any of these other alternatives is further complicated by the ordering process, slowingit and reduced its accuracy.

In this paper we present an example of a complex conceptual system in the field of mobile business under the name "M-Health, a network (Picture 6).

M-Health Area, which showed up as a sub-segment of e-Health, use information and communi-cation technologies (ICTs) such as computers, mobilephones, communication systems, patient monitors and similar devices for providingmedical services and information. M-Health applications include the use of mobile devices in the collection of public and clinical health information, delivering information to the doctors, researchers and patients, monitoring vital functions of patients in real time and directly providing health care through mobile telemedicine.

So far, the concrete cooperation established with partners in delivering services Tele-assistance, to help customers who need continuous medical care, which includes monitoring, coordinating emergency response in crisis situations, monitoring of users after the emergency response and providing psychological support .

Parameters measured in the field of health care are realized by using a dequatedevices. The data is still transmitted over the cellular network (3G 3.5 G technology) to the server partner who collects this data, processes

Figure 6. M-health network them through

Web applicationsand provides insight into results through the Web Access application. M-Health benefits of service are:

- measurements can be performed from any place and at any time,
- personalization services (users have control over their own health),
- reducing costs (smaller number of doctor visits and perform the necessary analysis).

An important factor for the development m-Health area is the recent rapid increase in the number of mobile phones in our country, given that a potential m-Health lies in its ability to offer opportunities for direct voice communication, especially in areas with low literacy rates. Basic text functions and voice commu-nications in real time serve as the backbone of mobile telephony in developing the service facing the health sector. Although not yet widely applied, the expansion of smartphone technology opens the door to m-Health projects: technological support of diagnostics, remote diagnostics and telemedicine, Web browsing, GPS navigation, access patient information via the Webto decentralized health management information systems. Applications under development is initiated through Cooperation with partners who work on software development, can be divided into several categories of Application:

- Education and awareness
- Helpline, support the diagnosis and treatment,
- Remote monitoring and remote data collection.

Some of these applications from m-Health areas use potential to promote healthy lifestyles, improve decision making of health professionals and patients, and the like,and the basic objective of development of this segment is to improve the quality ofhealth care through improved access to medical and health information and facilitating communication in current areas where it was not possible. Increased use of technology reduces costs, improving efficiency in the health care and promoting prevention through communication. Also, m-Health completes the idea that there is a powerful potential to improve clinical care and public health service by relief health profe-ssional practice and communication using mobile technology.

Concrete application that was developed for a medical center in Serbia was made bya fully-defined scenario M-Commerce in cooperation with Telekom Serbia, as a carriernetwork access via the 3G service.

Medical Emergency Center (UC) is a networked system of mobile networks MTS. All the doctors, the head nurse, ambulance drivers and technical staff have networked mobile phones with built-in software identified and safely accessing the main server UC. UC master server is cross connected with mobile network with optical bringing with 144 Mb / s. Doctors have a little more complex communicators who provide video streaming and higher quality video frames 640 x 480 pixels. Hereafter we will present how this system works in a medical scenario of M-Commerce:

Emergency Services received a call from police that there was a traffic accident in which one person received a serious breach of the head. After taking the patient's doctor in a vehicle emergency *inform* duty team of doctors about the patient's condition by sending data (recorded in-vehicle devices*)* on the patient. The team at UC is preparing for emergency surgery of the head by prepareing the necessary equipment. After coming to UC take all the necessary information from the patient's blood and then they record human head using X-ray and tomograph. Data on the diagnostic status of the patient stored on the server of patients for ten minutes. Server patient contacts the master server of all patients from whom the region gets more information about the previous state of health of the patient. After accurate *identification* patient information is sent to the family via SMS that their member are injured and that is in the UC where he performed surgery of the head. After carrying out by intervention they record the current state of the patient and sent to UC server. On duty doctors and doctors who had to come to the intervention of the moment can monitor the patient's condition on their PDAs or mobile phones. In addition to monitoring doctors may issue specific instructions if they are included in the internal domain of decision making for the specific task or if they are connected to the team.

The patient was in the intensive care room is connected to devices to monitor his condition and that information is available at any moment to all doctors and nurses the main UC. Any changes that threaten the life of the patient provide the first level alarm which is forwarded to duty team *of doctors* no matter where it was in the building of UC. Others can get these information on request. Updating the data made connected devices or hief doctor on duty.

Information on the state of his cousin can occasionally get by the request to all those who indetificate and called at the time of injury and Positive Identification of injured patients.

This system of a wireless network is relatively easy and can be installed quickly in any emergency or hospital center.

In the plan is a new service of m-Health in telemedicine, which will be based on monitoring vital signs of health in real time (measuring heart rate, blood pressure, blood sugar, etc.) collecting and sending medical information via mobile and fixed networks.

X. CONCLUSION

Based on experience dot.com companies when uncontrolled spending lead to a very small or no return on investment, today managers must be able to think and study what will return the invested funds ROI (return of investment). Potential return of invested funds since the introduction of mobile working place is very promising. For example, Bringham and Women Hospital has a return of 98.9% on invested funds since replaced the surgery department papers with mobile workplace. The question is which the elements affect the ROI and how the ROI in general accounts.

The key to success of ROI is certainly to increase the functionality starting from data gathering, decision support and financial transactions. No doubt if employees obtain information via mobile devices will contribute to

their efficiency and effectiveness. For example, seller who information on orders received from your mobile device willincrease its efficiency resulting from the elimination of errors that would result fromcopying documents, this will of course increase the ROI. Also applications for decision support will enable the retailer to make the right decisionon the spot which will reduce the sales cycle and therefore the costs. Applications for decision support should be to deliver the right information from bad information, he willhave little benefit.

Mobile solution support systems in decision making delivers the right information to the right people. As a consequence, increase the value of information.

The first step in determining the ROI was identifying all the benefits that the company will be the mobile solution. Mobile solution leads to an increase in income that occurs as a result of increasing employee productivity. Mobile solution reduces costs in three ways: by reducing the time required for the execution of operations by eliminating redundant operations and by minimization of errors . The company also has to consider all the costs arising from the introduction of mobile business solutions. Buyers can share the costs for:

- Hardware includes mobile terminals (phones, PDAs ...), servers, WLAN.
- Software development and integration includes a license for the platform, development tools, deployment and integration with back-end systems and existingWeb applications.
- Training includes training of employees and temporary negative consequenceswhile the employee fails to get used to working with new technologies. You should alsopay attention to costs incurred as a result of maintenance and support.

Mobility of all forms of communication is a reality which we must adapt and we mustadapt to our increasingly dynamic demands of every sector of social events. Network of networks are more and more virtual and more complex but more importantly everything is accessible at any place of our planet.

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RISK AND RISK MANAGEMENT IN E-EDUCATION

Z. Đurić*, R. Đurić**
*Higher Technical School of Professional Studies, Zrenjanin, AP Vojvodina, Rep.Serbia
**NOVKABEL A.D., Novi Sad, AP Vojvodina, Rep.Serbia
zduric@Eunet.rs , rastko.djuric@novkabel.com

Abstract - In the last few years accidents and money loss attract more and more attention to experts and companies share holders. Starting from elementary knowledge about risk and risk management, in this article authors will make survey about risk management in E-education.

I. INTRODUCTION

Uncertainty, intesity and variety of damaging events, in money or asstes loss increase attention of experts, managers and company share holders for risks and risk management. Modern world is very dedicate in definement of risks and risk management. Comparing risk base knowledge and articles published on Internet with focus on risk management, authors want to ask on question: What is representation of risk management in modern E-education?[1]

II. MAIN DEFINITION OF E-EDUCATION

E-education is part of normally, permanent education in era of modern supranational business. E-education is also part of supranational education systems.[2] After three decades of invention of these kind of education it is still a chalenge for Universities and IT sector. In these conditiones they dont have much interest for some improvements in risk management in E-education.[3]

III. RISK DEFINITION

Risk is every unpleasant event which brings additional costs and problems in management. German laws define risk as problems in activities which bring losses. Most of the risks can be divide in strategic, operational and security risks. Strategic risks are development and investment risks of share holders and organisations. Operational risks are negative events which represents variations from standard way in ordinary working. Security risks are negative events which bring threat to assets, health and life of people.

IV. DEFINITION OF RISK MANAGEMENT

- Risk management is part of main management process and activities. Risk management contains four following steps [4]:
- Identifying roots of risks
- Possibility valuation of negative events and their influence on costs
- Projection of possible measures and activities to eliminate negative events and costs
- Evaluation of measures which were used in risk management

V. RESULTS OF INTERNET SURVEY OF RISKS AND RISK MANAGAMENT AS STUDY IN E-EDUCATION

First impression about Internet survey is that there are a lot of on-line courses and services mainly in management but also and risks management.

Second impression notice these:

- There much more articles about risks in government web pages(economy, health care, administration) than on E-education web pages
- NGO and other kind of organisations also have more pages about risks management than e-education pages
- There are more concern about risks management theory on web pages than real examples, on e-education web pages

VI. RISKS IN E-EDUCATION

E-education web pages promote risks management theory advantages then problems in implementing. Most of authors connect elementary risk management theory with operational risks in

E-education but only in theory, without real problems and risks index that were calculated on that problems.[5,6,7,8]

Nice example of "real life" have a GARTNER group with article about business model in e-education as a rim for good practice [9]. Author make lists of advantages and disadvantages in e-education. For them greatest risks in e-education are: reliability risks, development risks in IT sector. Also knowledge, informations and skills which have to be transfered from professors to students, in means of organisation and implementing.

VII. E-EDUCATION SYSTEM MANAGEMENT

In practice, risks management is always connected with system management, organisational and operational tools and also with future activities of system. When e-education system is made then system is support with standards and all kind of documents. Risk management is make a constant survey and look difference between what is planned and what is real situation. It also suggest actions to bring system on right course. A lot of authors define E-education as functional management system [10]. Management of that system is connect with *Learning Management System /LMS/* or IT system which can make transfer of knowledge and skills. Authors usually talk about transfer of knowledge between professors and students rather than inter organisation and risks that that organisation brings.[11,12,13]

VIII. RISK INVESTMENT IN E-EDUCATION

A lot of authors make surveys about investment risks in e-education. Methodology of risk evaluation for e-education projects are same as any other projects. Economic and financial analysis shows that the e-education projects are high risks projects with a lot of bankrupt investors [14,14b]. Competetiveness, reputation and economy perimeter risks are main investment risks in e-education [15]. In other parts of economy there is also big gap between financial appetite of stake holders and top management of e-education system on one side and real opportunities of system on other side. There are no surveys about that in e-education.

IX. STANDARDS AND NORMATIVES IN E-EDUCATION AS MAIN FUNDAMENT OF RISK MANAGEMENT

Although all risks cant be connect with negative deviate from incorporate standards (quiality and reliability)and norms(material and work spents), wider practice show that they represent valuable root for risk identification and their valuation. Usually quality managers also takes care about risks management. Fact is that there are not real standards in e-education. In last ten years there are a lot of activities connect with e-education:[16]

- definition and implementing NETS , which means national education tehnology standard with aims on students, teachers, administration workers and IT experts
- definition and implementing NCATE, national council which give permission on e-education system and their teaching programmes.

Nice example on e-education system give British standards:[17]

- BS 8246 - Tutorial for E-support and E-education system
- BS 8419 - Tutorial about necessary connection between both sides
- BS 8419-2 - Tutorial about necessary connection between
- BS 7988 - Tutorial about IT support in implementing e-education
- BS 8246 - Tutorial about IT support in e-education
- BS ISO/IEC 24703 - IT tehnologies
- BS 7888 - UK idea about long distant learning in three parts
- INACOL - International association for K-12 on-line learning brought in october 2011 second version of National standards for quality teaching in e-education systems.[18] It can be expect that the other standards will also secure quality in e-education system and avoid risks.

X. PLANNING AND MANAGE RISKS

Risk management practice shows that quality analysis and surveys in future plans have significant role in locating and control over hot-spots in implementing process. But in small number of articles about planning of e-education

authors dont have additional requests about locating hot-spots and specific measures to avoid and decrease risks.[19,19b, 20]

XI. HUMAN MISTAKES AND SECURE WORKING CONDITIONS

Practice analysis shows that human mistakes are one of the most common risks and for that reason human management have significant role. In last decade companies take care about competent and secure of their workers. In articles about e-education there are small numbers of authors which mention human mistakes of students, teachers and IT workers of e-educational system as decreasing factor for reliability of system. [21]

XII. ASSET RISK MANAGEMENT

One of the focus of surveys are about assets risk management and intelectual property risk management. Accent is on legal, physical and assurance protection. Intelectual property protection in electronic devices and business have impact on e-education . [22]

XIII. SOLVING PROJECTS IN E-EDUCATION RISK MANAGEMENT

During 2005 and 2006, Joint Information System Committe and Higher Education Funding Council for England [23] made projects about risks estimations and control in e-education system. Unfortunately, authors of these article don't have dates and conclusions of these projects. Authors assume that these projects had evaluations but conclusions don't get in public.

XIV. CONTRIBUTIONS OF IT TECHNOLOGIES IN RISK MANAGEMENT IN E-EDUCATION

Main risks in e-education came from IT technology and their hardver, software and communication errors and are connected with their reliability and maintenance. Articles about risks and reliability of IT technology usually have focus on three main topics: [24,25,26,27,28,29,30]

- software
- hardware
- telecommunicating system

Interested sides for technical and technological support in e-education mostly take care about security risks. Many authors about e-education connect their conclusions with OECD - Guidelines for the security of information systems and networks and ISO/IEC 27000 standards. [31,32]

XV. CONTRIBUTIONS OF RISK MANAGEMENT IN E-BUSINESS TO RISK MANAGEMENT IN E-EDUCATION

John Mitchell in his large study show similarity between e-education system and e-business [33]. In risk considering of this two systems, author focus on risks of right partner-righ goods choose and sicurity-frauds risks. In modern world fraud risk is very popular topic. Some authors mentione frauds in e-education [34]

In e-education risks analysis authors mention following standars/guidelines as decreasing factors [35]:

- standard AS/NZS 4360 - risk management standard in on-line shopping
- standard ISO 27001 - risk management standard about data security during on-line shopping.

Big contribution of e-education users bring OECD recommendation about consumer protection [36].

XVI. FINAL CONCLUSIONS

Every area of human work have its own task inside itself and bring new specific risks. Practice show that for identifying these risks is necessery to make new or improve old tools and tehniques of analysis. Quality analysis have long-time testing, comprehensive data bases supported with expert knowledge. In Great Britain, Australia and USA because of big educational organisations there are a lot of activities in e-education risk management. Risk management practice put quality diagnosis as main condition in successful risk management. It can be expect that through analysis of risks in e-education new anti-risk measures can be establish. Problem of new or small e-education systems is that the risk-management knowledge can not be get for free then through high cost additional education or consultant service.

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THE ASPECT OF BRINGING BATA IN SPATIAL RELATIONSHIP DURING THE PROCESS OF TEACHING THE SUBJECT "DISASTER RISK MANAGEMENT"

J. Simić*, S. Popov**, Đ. Ćosić***, D. Sakulski*, T. Novaković***, Lj. Popović***, A. Pavlović**** and A. Luhović*

*Faculty of technical sciences/ Department of Environmental Engineering and Occupational Safety, Novi Sad, Serbia

**Faculty of technical sciences/ Department of Computing and Automatics, Novi Sad, Republic of Serbia

***Faculty of technical sciences/Department of Industrial Engineering and Management, Novi Sad, Republic of Serbia

****Faculty of technical sciences/Department of Civil Engineering, Novi Sad, Republic of Serbia

jovanasimic@uns.ac.rs

Abstract - During the teaching process "Disaster risk management" subject, students should acquire knowledge of the existence of the risk in hazardous events, as well as the possibility of a hazardous event turning into a disaster. It is also necessary to show all the technical and technological aspects of risk management capabilities. During the study of the disaster risk management cycle, stress is put on vulnerability as a risk component, and on the aspect of bringing the data into a spatial relationship. The aim of the subject study is reducing vulnerability of hazard prone areas.

I. INTRODUCTION

A. Disaster risk management

Disaster is a sudden adverse or unfortunate extreme event which causes great damage to human beings as well as plants and animals. These extreme events either natural or man-induced exceed the tolerable magnitude within or beyond certain time limits, make adjustment difficult, result in catastrophic losses of property and income and life is paralyzed [1].

The term risk encompasses the probability and the amount of harmful consequences or expected losses resulting from interactions between natural or human induced hazards and vulnerable conditions [2].

Hazard is always prevalent, but the hazard becomes a disaster only when the frequency or likelihood of a hazard and the vulnerability of the community increases the risk of being severely affected [1].

There are two types of hazards: natural and man made. Natural hazards can be geological (earthquake, landslide, tsunami, volcanic eruption), water and climatic (floods, drought, tornado and hurricane, tropical cyclone, heat and cold wave), environmental and biological (environmental pollutions, deforestation, desertification, human/animal epidemics). Manmade hazards are chemical, industrial and nuclear accidents. Landslides, floods, drought and fires are socio-natural hazards since their causes are both natural and manmade [1].

International Strategy for Disaster Reduction defines vulnerability as a human condition or process resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard [3].

Exposure represents people, property, systems, or functions at risk of loss exposed to hazards [4].

B. Disaster risk management cycle

Disaster Risk Management (DRM) accumulate all activities, programmes and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses [1].

The three key stages of activities that are taken up within disaster risk management are as follows [1]:

- Before a disaster (pre-disaster)
- During a disaster (disaster occurrence)
- After a disaster (post-disaster)

The Disaster risk management cycle diagram represents activities during all of three stages of DRM as it is shown in the Figure 1.

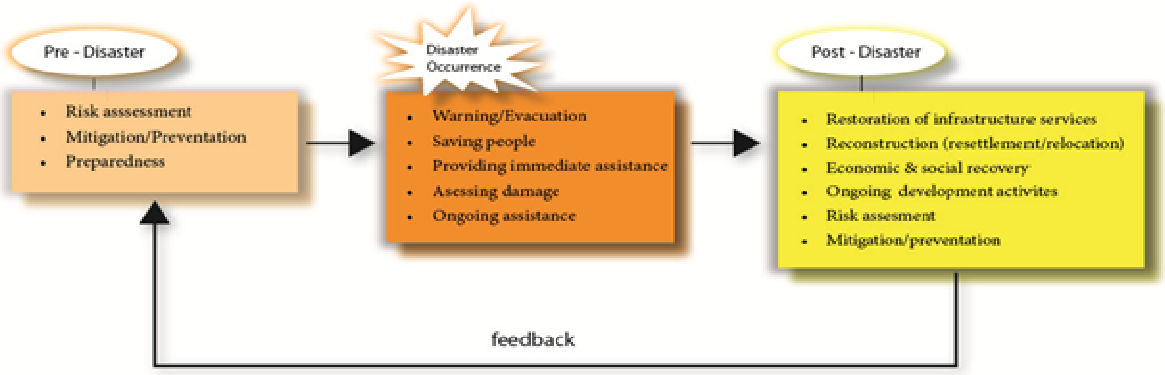

Figure 1. Disaster risk management cycle

The disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure [5].

II. TECHNOLOGICAL FRAMEWORK - INFORMATION TECHNOLOGY APPROACH

A. *Types of data*

For vulnerability study of an certain area, we need specific data, such as location, altitude coordinates, density of population (current, historical), occurrence frequency and intensity of a hazardous event in a given area, the base mapping, a cartographic key, meteorological conditions (air temperature, humidity, precipitation, wind intensity, wind direction, air pressure), climate conditions, water regime of certain area, water levels of rivers, satellite images of the terrain, GDP, the average income of the population, unemployment rate, industrial production index, the political situation etc.

B. *Data sources*

Data sources can be formal and informal.

A formal data sources are institutions on national (government organizations and enterprises) and international level such as: Republic Hydro-meteorological Service of Serbia, Public water management company "Vode Vojvodine", Water-management Company “Šajkaška”, Public Enterprise for City Construction and Development, The Military Geographical Institute, Republic Geodetic Authority (Service for Real Estate Cadastre, Line Infrastructure Cadastre), Statistical Office of the Republic of Serbia (Census of population), Electro-distribution of Vojvodina, an accredited laboratories (measurements), scientific and research organizations (universities, institutes), scientific papers, insurance companies, United Nations, EM-DAT database, WHO (World Health Organization), surveys, laws (Emergency Act, Water, Waste and Environmental protection legislation), National Spatial Data Infrastructure etc.

Informal data sources can be: NGOs, social networks, media (newspapers - daily news).

During data acquisition is very important to note what kind of information is given by certain data sources and what kind of image it forms about current condition. For each data, it is also important to know accuracy, precision and reliability of the source.

Informal data sources have great availability. The media can fast, easy and very powerful place data and information. Based on that information, opinion about certain events is often formed "a priori". Planed or not, a media could have a suggestive influence on public opinion. For

example, when hazard is realized and disaster occurs, the media almost always emphasis "natural" component of disaster. If it's a flood, the media focuses stories about snow melting, delayed spring, the long and cold winter with the highest percentage of rainfall in recent years. The conditions of certain populations or certain area before disaster are often put in background. Facts that embankment on banks of the river was not built on time, that area where flood strike are mostly inhabited by socially vulnerable population and what could be done in order to avoid a large number of affected or killed people, media usually hides or not even mentions.

Informal sources are available, and they are quick way of finding data. But, the question remains about reliability and quality of the obtained data. Conclusions about a particular event formed on informal data sources should be verified by additional research and corroborated with valid arguments.

On the other hand, the formal sources of data give us a clearer picture of the true state before and/or after a hazardous event occurs. Data obtained from formal sources are complex, meaningful, reliable, verifiable and therefore are better than the informal sources of data. However, in practice it is found that formal sources can often be inaccessible to the public. Communication between state institutions and the public, in most cases is difficult or even impossible. Also, unavailability to formal sources is reflected in the high cost of finding specific types of data (such as services of analytical measurements in laboratories, field imaging by satellite).

C. The context of data

In the process of disaster risk management, data are collected in accordance with the needs of each phase of the disaster management cycle, as well as in accordance with a specific hazard. For example, for the phase before a disaster such as flooding, it is necessary to collect hydrological data, information about the altitudes of potential flood areas, the structure of the population inhabiting the area near the water surface, percentage of men, women and children, percentage of old people, percentage of highly educated/illiterate people, which activities of inhibitants are prevelant), the precipitation regime and climatic conditions. It is useful to get information through informal sources of information about the habits of the population in a given area, for example the proportion of the population that uses the internet as a tool of communication. The collected data should be analyzed with the causal aspects, processed, and it should provide us the necessary conclusions in the context of risk management.

III. AN EXAMPLE OF BRINGING DATA INTO THE SPATIAL RELATIONSHIP DURING THE PROCESS OF TEACHING THE SUBJECT "DISASTER RISK MANAGEMENT"

The collected necessery data for disaster risk management should be put into a spatial relationship. In order to achieve that the following were used: GeoServer, Web services (WMS - Web Map Service, WFS - Web Feature Service, WCS - Web Coverage Service), Google Earth Plugin and Quantum GIS software. With these tools the data can be displayed visually in the form of maps (static view) and interactive layers.

To assess the vulnerability of certain areas in case of hazardous events (for example floods), first terrain was modeled. Data processing of a real system gives an abstract model which can be analyzed further. By changing variables, predictions may be made about the behaviour of the system [6].

A creation of the model was divided into several steps.

- It is needed to gather maps (topographic, because they contain information about the terrain - contour lines, altitude) of the area desired for the vulnerability study.
- Maps are entered into GIS software (Quantum GIS) for georeferencing. Maps present data in raster format with their own coordinate system. By georeferencing coordinates are assigned to the maps. Georeferencing sets maps in relation to the reference coordinate system (in Vojvodina it is Gauss Kruger/Zone 7). In this way we obtain geospatial information.
- Maps of one region are divided into smaller segments that can be processed individually. They are combined altogether with the help of a carthographic key. For teaching purposes, maps are used at a scale of 1:5000 with a layout that is defined by a carthographic key.
- Raster data (maps) are located on GeoServer. GeoServer contains rasters in the Web Map Service format, vectors in the Web Feature Service format, and 3D

modeled data in the Web Coverage Services.

- Vectorization - Data on altitude coordinates (in the form of points with associated values of altitude) are assigned to georeferenced maps which form a cloud of irregularly distributed points.
- Irregularly distributed clouds of points are interpolated at the nodes of the matrix which form grid - matrix of points regulary distributed. Thus, data in the form of irregularly distributed cloud of points by rasterization become a digital elevation model (DEM). DEM gives us an opportunity to see each point of the study area in three dimensions, i.e. latitude, longitude and altitude [7].

DEM is used as one of the required layers in GIS software, and it is overlapped with the layer of the flood vector that is formed based on the terrain model and on the historical data of flood levels.

Based on analytical data processing in GIS software (spatial relationship and database) and on the obtained terrain model, information about exposure to hazard of the specific area is provided. Data about the frequency of flooding in the area of interest was gathered from informal sources (newspaper articles, chronicles, informal interviews of local inhabitants). Bringing data into spatial relationship provides a conclusion about the zone in the area of interest that will be more exposed if flood occurs. That conclusion represents a step towards an assessment of vulnerability of the studied community. The obtained information enables making decisions during disaster risk management and planning preventative measures i.e. understanding necessary and possible measures in order to minimize damage from potential hazardous event.

IV. CONCLUSION

The importance of bringing data into the spatial relationship during process of teaching the subject "Disaster risk management" is reflected in the development of "spatial thinking" skills among students and training students to use IT as a tool in this field.

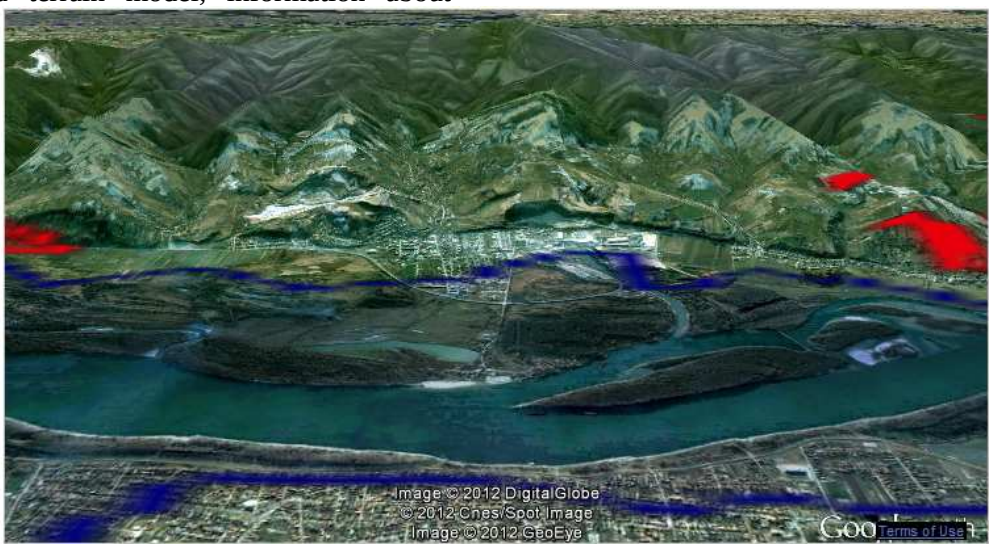

Figure 2. Digital Elevation Model with a flood layer

GIS software is used in the sphere of industry, agriculture and urban planning (spatial planning of settlements). Therefore, it is essential for students to use the tools for displaying spatial data. Knowledge in the sphere of GIS will increase their opportunities for the future employment. This kind of teaching is a necessary practical training. Because of lack of practical teaching in education system in Serbia it is important to implement practice during the lessons.

The interactive component of bringing data into the spatial relationship by using GIS software and the use of visualization, specially 3D scene, in the process of decision making in disaster risk management is developing students' abilities according the engineering way of thinking i.e. directs them to detection and resolving problems.

Training students to use IT in the field of disaster risk management is also important from the point of overcoming the global unavailability

of data and developing awareness of the importance of data communications at all levels. It directs a new generation of students towards a humanistic thinking.

V. ACKNOWLEDGEMENTS

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MANAGEMENT OF IT SERVICES IN EDUCATION

M. Miladinovic*, D. Radosav**

*Mining and geological faculty, Belgrade, Republic of Serbia,

**Technical faculty „Mihajlo Pupin“, Zrenjanin, Republic of Serbia
milena.gojkovic@rgf.bg.ac.rs, radosav@tfzr.uns.ac.rs

Abstract - The main goal of this paper is that through familiarization with IT services in education and standards for their management and use, as well as models and the process for the management of IT services in education, for example information system in education EIS (Education Information System), show how integration standard solutions for the management of IT services are given in the international standards ISO/IES 20000 and ISO 9001:2001 with EIS, can facilitate, to improve and improve organization and management in education, communication with all sectors of education, as well as more efficient process of bringing continue.

A single information system in the education of Republic of Serbia, is scheduled as the basis for more efficient planning resources, resource management, and monitoring the activities in the education system at all levels of management education, and education.

I. INTRODUCTION

The education system of the Republic of Serbia is in the reform school striving to create a 21st century, quality education for all and education in the function European integration. The goal is to increase accessibility, fairness, quality and effectiveness of education. Changes harder to decentralisation, democratization, modernisation, professionalisation and standardization education.

The process of modernisation includes repairing of spatial and technical conditions of labor school, the new teaching and learning models and ICT integration with educational programs. Massive destruction students in the 21st century to a great extent determined by computer, the media, the internet, and mobile telefon. The Serbian education to promote quality teaching with multimedia application, with implementation of the new teaching and educational technology, respectful school documents on a computer and specialized software, thus making communication with parents through contemporary media. The Ministry of Education of Republic of Serbia in order to Serbian education implemented remodelling is a unique information system in education - EIS, which is one of IT services in education [16].

Educational institutions more and more attention to services in information technologies. Chain IT Services, the process of use and the quality it services, have become the new borders on which to perform comparison and evaluation success of every educational organization. The nature IT Services, their role in the society, the strategy of providing IT services and their development, are the main routes further development and application of information technology today. **IT Service Management - ITSM** (http://www.itsm.info) It is based on best practice unifying people, process and technology, in order to ensure high quality IT services. Way standardization and management of processes which are in practice **ITIL - IT Infrastructure Library** (http://www.itil-officialsite.com) British government-up guidelines developed for the needs of the OGC. Today, the ITIL de facto global standard form in the area of managing IT services. It contains a comprehensive and public shall prescribe an advanced ballistic documentation for planning, insurance and support for the IT services.

II. DEFINITION INFORMATION TECHNOLOGY SERVICES

Information Technology services are services that are incurred as well as power output value to use information systems or information technology. Among synonymous information systems and information technology there is a considerable difference, and should be a prominent to the information services area is one of the counts of their ratio [7].

Information Technology services are a series of interrelated activities in a coordinated way, and most often by commercial principles, provide information systems. These services are often

related to the functioning of certain parts of information systems that are being implemented business processes, and allow for efficient and economic achievement their goals to time acceptable manner. Most often related to supply one or more components information system (hardware, software) for business use (printing services, internet access services, e-mail services, data transmission services, services permanent access to resource management, data storage services, electronic banking services).

Information Technologies are, primarily, the shall prescribe and functional technological infrastructure which is used in business and private svrhe. Wireless data transmission technology, navigation devices, the identification products, an ATM, of different devices, from personal computers, servers, and mobile phones and portable devices, security protocol.

Information systems are systems by which the collect, record and store information necessary for the implementation of business process and carry out important business activities, such as planning, organization and control. Through information systems business processes are implemented, and the results of their work allow for monitoring and sorting out business transactions, their storage and information support in the form of creating follow-up documentation.

III. IT SERVICE MANAGEMENT (ITSM)

IT Service Management is the methods and techniques through which the management information systems and in particular the relevant services arising from output results of their work. In contrast to the often advocate present technological look at the information systems, the concept of managing IT services refers primarily to users participation in the quality and services, or level of satisfaction provided service.

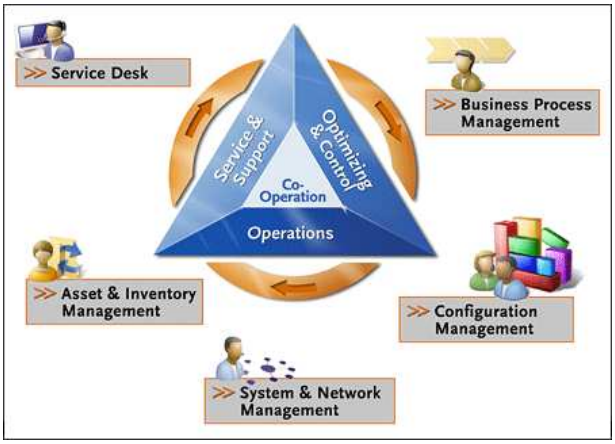
The basic meaning informatics services and their service providers is not focus on technology, but also to offer the best possible quality business service and thus affect the development of good relations with the end users. Management of IT services therefore is a precisely-oriented concept that is a very close usual methods gradual improvement of Business (*TQM, Six Sigma, Business Process Management*). [6]

Today each organization must have information system, which is supported by computers, networks, software and other modern elements system e-business. All of this falls in the infrastructure (JUS ISO 9001: 2001, Chapter 6 - Quality Management System)[17]. Infrastructure should be maintained and harmonized with the business needs organization, laws and regulations [5].

Starting point is to familiarize with the standards and models that are related to the subject area, a given in BS 15000[18], ITIL and standard for folder for file management engineering - Software - processes life cycle - Maintenance ISO/IEC 14764[19].

IV. STANDARDS FOR THE MANAGEMENT IT SERVICES

Starting point is of the organizational regulations and procedures defined in any particular organization. This system allows you to be applied in defining the way of work in certain areas. Experience gained in this way is the basis of examples best practice ITIL who was basis for the development standards which defines requirements for the system for the management of IT Services - ISO 20000 [20] where the defines what to do [2].



Picture 1: Management of IT Services

Standards ITIL and ISO/IEC 20000 are not competitive with one another, but complement one another. While ISO/IEC 20000 is determined by the needs for the management of IT Services, ITIL documents best practices are determined by each individual process management of IT services. Replacement process allows you to best practice management of IT services does not depend on the existing organizational structure some organization.

A. Information Technology Infrastructure Library (ITIL) [10]

Information **T**echnology **I**nfrastructure **L**ibrary (ITIL) Is the assembly concepts and policies for the management infrastructure IT, their development and functioning. ITIL is published as part of a series book, each of which covers appropriate chapter IT management. ITIL provides a detailed description important IT practice with extensive requirements, tasks and procedures that can be applied to any IT organization. [4]

ISO/IEC 20000 IT provides a formal and universal standard for organizations that are looking for opportunities to their management processes be published and certified. ITIL provides wealth of knowledge which is intended for those who want to reach *ISO/IEC 20000*.

Within the ITIL-and reportedly there is the following concepts:

- **ITIL core** - The Guide with the best practice applicable to all types organizations which provide services business. [1]
- **ITIL additional guide** - fill the publication guidelines for specific sectors, the types organizations, operational models and architecture technology. [15]

Management of IT services is an element of IT and business. Management services is composed of [7]:

- **Service Delivery** related to ensure supply IT services,
- **Service Support** describes the way in which the user can to join the relevant services that provide support for his business.

B. The life cycle IT Services

The Last revision ITIL-and has led to his re-design of reluctance to access to access life cycle services. This end-to-end look how it should be integrated with the business strategy is based on ITIL third versions and its five books [12]:

Picture 2: ITIL the life cycle IT Services

As can be see image 2, basically ITIL life cycle is the **Service Strategy** [14] which defines the way in which goals and expectations should be set according to customer services and the labor market and how to identify, select and order priority business opportunity. Organizations provides position in which I can the elections to the costs in risks related to portfolio of services in which the all the designated services.

Service Design [11] Is the level life cycle services, strategy services turns in the draft of the business goals. Design services provides instruction for the design and development services covering basic principles design and ways to transform strategic objectives in portfolio of services.

Service Transition [9] provides instruction for the development and promotion opportunities for new and modified transition services in the "alive" use.

Service Operation [13] collect practice in the daily delivery of services. Provides instructions for the efficiency and effectiveness supply and maintenance of services in order to achieve values and for the users and for service providers.

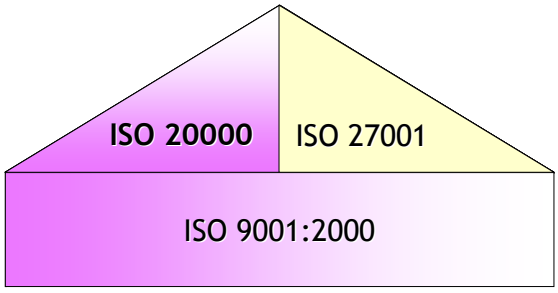
Continual Service Improvement - CSI [8] provides instructions for the creation and maintenance of services for its customers through better design, change and provide services.

C. ISO/IEC 20000 standard for the management of IT Services

ITIL formally is not standard, and therefore, it is not possible certification check established

opportunities and the ability IT organization in delivery services. Respecting mounting needs and market demands for formal good faith BSI [21] the published standards BS 15000-1:2002 and BS 15000-2:2003. Standards are accepted of market, but the broader application of the conditional on international requirements. These two standards are fast-tracked, without significant changes, was adopted and published as well as standards ISO 20000-1 [9] and ISO 20000-2:2005 [10]. Standards ISO 20000-1 the structure and content procedural-oriented, fully compatible with ISO 9001:2000 specification and contains requirements for the system management of IT services. Another part of the specification standards best practice in delivery IT services at a high level, independent of available technological solutions and in the whole is based on ITIL.

ISO/IEC 20000 [22] it is standard for the management of IT services and combines all the aspects of managing IT services that are valid in all IT organizations. On the following picture featured a place standards ISO 20000 in relation to standards ISO 9001 and ISO 27001. Sartifikat for ISO 9001:2000 is the basic requirement that organizations possess where Outbuilding as well as a certificate for Standards ISO 20000 and ISO 27001.



Picture 3: Place ISO/IEC 20000 standards for the management of IT Services

ISO/IEC 20000 consists of two parts: ISO/IEC 20000 - 1 and ISO 20000 - 2.

ISO/IEC 20000 - 1 consists of ten section[2]:

1. The subject and area of application,
2. Terms and definitions,
3. Requirements for the management system,
4. Planning and implementation of management services,
5. Planning and implementing new or amended services,
6. The process supplies Services,
7. Links between the process,
8. Processes for resolving problems,
9. Control processes and
10. Processes release Services.

ISO 20000-2 [3] with titled: codes practice management services has the same content as well as part 1 standards. For each request in addition goal that must be achieved, given to the more detailed recommendations what organizations can/should be done to realize specified goal. Both standards, as well as other standards on systems of management, limited to „what must be done“, while the answers to the questions „How to's“ can be identified in ITIL and many publications on the topic IT services.

V. CONCLUSION

The objective standards ISO/IEC 20000 is to provide general recommendations for IT organizations, that supply internal or external services to our customers. [1]

The ultimate goal ISO/IEC 20000 is to:

- reduce operational exposure risk,
- meet contractual requirements and to demonstrate,
- quality of services.

The main goal and benefits of implementing ISO/IEC 20000 certificate continuous improvement of quality management of IT services. This standard promotes adoption reluctance integrated access to effective delivery IT Services and is appointed by the main line for the quality in ITSM.

If companies decide to seek ISO/IEC 20000 certification, they must consider that it services are essential for business success. Organizations that accept certification ISO/IEC 20000 allow their users to get high quality IT Service. [2]

Implementing ISO/IEC 20000 brings with it many advantages and benefita. The following list is a good example general results: [1] [2]

- alignment business and strategy services information technology,
- making general framework for existing projects improved services,
- provides type by comparison with the best practice,
- real advantage by comparison through promoting existing services,
- demanding possession and responsibility a real progressive culture,
- supports internal change service providers, and staff through advantage of creating internal operational process, reducing the risk and cost,
- external a recipient of services, through the creation of access,
- existing standards, imposes major organizational changes,
- is stepping up its reputation and perception,
- fundamantalna changes on a precautionary approach before reagent process,
- improved ties between the different department through better definition and clearer terms responsibilities and goals,
- making a stable framework and for training and resources for automatic management Services.

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SOLVING UNIVERSITY TIMETABLE DEFRAGMENTATION PROBLEM USING BEST FIT ALGORITHM – SOFTWARE SOLUTION

Z. Vejzović*, A. Brkan-Vejzović **

* Teachers Training Faculty of University "Džemal Bijedić", Mostar, B&H

** Faculty of Economy of University "Džemal Bijedić", Mostar, B&H

zanin.vejzovic@unmo.ba, aida.brkan@unmo.ba

Abstract – This paper presents software solution for defragmentation problem of classroom scheduling in higher education, as one of the education management problem. It deals with usage of best fit heuristic algorithm for solving general bin packing problem. According to the best fit procedure it is necessary to form database of the teaching schedule for each university classroom on a weekly basis, as much as database of all coded university courses. They are basis for formulation of university temporal-spatial matrix. This matrix is input data for software solution whose main parts are calculation of daily occupation parameter for each classroom at the university level, and defragmentation which consists of repositioning period fragments following best fit approximation algorithm procedure. The program written in C^{++} were tested at the University "Džemal Bijedić" of Mostar, B&H (56 classrooms, 12 periods and 5 working days per week).

I. INTRODUCTION

The resolution of spatial-temporal dynamics of classroom scheduling in higher education is a concrete problem suitable for mathematical modelling. School time is generally analysed on a daily and weekly basis, where the main unit is a *period*. Temporal dynamics in the higher education teaching process are related to the spatial schedule of different teaching activities. Referring to this, the following questions emerge:

- Is there any possibility of increasing flexibility, i.e.: is it possible to arrange a school schedule so that all available spaces can be used efficiently?
- Does such a model have practical value and can it be applied to a temporal-spatial problem at a given university creating computer software for this?

In order to answer these questions, a mathematical model already presented in [1] modified by best fit bin packing approximation algorithms is used in this paper. It is upgraded solution presented in [2]. Applying it led to reaching the objective through the development of software and its application at the University "Džemal Bijedić" of Mostar.

II. INPUT DATA

In order to study temporal-spatial interaction it is necessary to define a subset of a basic period set on a daily basis for higher education H_d [3]. In a concrete case this subset for University "Džemal Bijedić" of Mostar has been defined as follows:
H_d = {08.15 – 09.00; 09.15 – 10.00; 10.15 – 11.00; 11.15 – 12.00; 12.15 – 13.00; 13.15 – 14.00; 14.15 – 15.00; 15.15 – 16.00; 16.15 – 17.00; 17.15 – 18.00; 18.15 – 19.00; 19.15 – 20.00}

Temporal-spatial interactions are presented through daily schedules of teaching activities. For University it is represented by daily temporal-spatial matrix *M(I,J)*. One dimension of this matrix (*columns*) consists of the elements of subset H_d ($n(H_d)=b_d$), while another dimension (*rows*) consists of the classrooms at the University. So, the dimension of university spatial-temporal matrix is 56x12 (56 classrooms in which the teaching is performed, 12 elements of H_d subset – b_d). The elements of university matrix $f_{r_i h_j}$, where: i=1, 2, …, 56; j=1, 2, …, 12, are the course codes with a specific teaching activity performed in a given classroom in a given period. The above course code consists of six figures. The first digit refers to a department. The following three figures refer to the course of the given department. The fifth figure of the code refers to the type of teaching activity. The last figure indicates the presence of different groups of students having the same type of teaching activity in a given course, but in different

time periods. For example, code 800422 indicates the exercises for the second group of students attending the course Roman Law studied at the Department of Law, as shown in Figure 1.

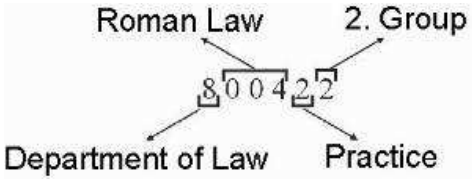

Figure 1. Course code

It is important to notice that one part of the code – its first digit – refers to a given department (element of the basic set: *departments*), while the following – second, third and fourth figures – refer to a concrete course (element of the basic set: *courses*), for which a specific teaching activity is performed [3].

So, the university matrix is not two-dimensional, but four-dimensional, because its elements represent the interaction among elements of the basic sets: classrooms, periods, departments and courses.

Introducing teachers (elements of the basic set: *professors*) and students (elements of the basic set: *students*), in a given model (course code), it could even be observed as a six-dimensional mathematical space.

A daily university spatial-temporal matrix, defined in this way, represents the input data for a software solution of its defragmentation (see Figure 2). As far as the proposed mathematical model is concerned, the difference is that the values of its elements are not binary. The values of its elements are 0 if there is no teaching activity in a given period in a given classroom, or they have the value defined by a code if there is a determined teaching activity performed.

			08.15-09.	09.15-10.	10.15-11.	11.15-12.	12.15-13.	13.15-14.	14.15-15.	15.15-16.	16.15-17.	17.15-18.	18.15-19.	19.15-20.
1		kino sala	703210	703210	100810	100810	501910	501910	101122	101122		0	0	0
2	UN	Inf.uč.1	0	0	0	0	0	0	601223	601223	601223	601223	0	0
3		Inf.uč.2	604510	604510	604520	604520	604710	604710	604710	604710	0	0	0	0
4	AF	mala sala	0	0	0	104220	104220	104220	0	0	0	0	0	0
5		velika sala	104210	104210	104210	100922	100922	100922	100923	0	0	0	0	0
6		Kab.hist.	220410	220410	220410	220510	220610	222920	222920	222920	223020	0	0	0
7		FHN5	0	0	201310	201310	201120	201120	209520	209520	0	0	0	0
8		FHN4	205510	205510	0	0	0	0	0	0	0	0	0	0
9	FHN	Tantawi	0	0	209420	209420	210420	210420	0	0	0	0	0	0
10		Fono-kab.	0	0	218720	218720	202820	202820	0	0	0	0	0	0
11		Amfiteatar	0	0	209220	209220	209410	209410	215510	215510	215510	215510	0	0
12		FHN2	0	0	0	0	218510	218510	0	0	0	0	0	0
13		FHN1	210520	210520	218520	218520	219120	219120	214220	214220	0	0	0	0
14		PA2	207920	207920	201510	201510	0	0	0	0	0	0	0	0
15		mult.uč.	0	0	0	0	0	0	0	0	0	0	0	0
16		Inf.uč.1	300922	300922	301921	301921	301922	301922	300622	300622	0	0	0	0
17		Inf.uč.2	0	0	0	0	302131	302131	300831	300831	302132	302132	0	0
18		Inf.uč.3	0	0	0	0	0	0	0	0	0	0	0	0
19	FIT	Inf.uč.4	0	0	0	0	0	0	0	0	0	0	0	0
20		Inf.uč.5	0	0	0	0	302922	302922	0	0	0	0	0	0
21		Inf.uč.6	0	0	0	0	303021	303821	0	0	0	0	0	0
22		Amfiteatar	0	0	200610	200610	0	0	0	0	0	0	0	0
23		Apf.novi	200110	200110	202210	202210	0	0	0	0	0	0	0	0
24		Uč.1/1	402010	402010	402010	402010	400624	400624	400624	402122	402122	402122	0	0
25	FPN	Uč.2/1	0	0	401210	401310	401310	401210	0	0	402210	402310	402310	402310
26		Uč.3/1	0	0	402020	402020	402620	402620	401421	401421	401421	401421	0	0
27		Uč.4/11	0	0	403420	403420	400721	400721	400721	0	0	0	0	0
28		Inf.sala	402510	402510	402510	402510	404210	404210	404210	404210	0	0	0	0
29	GF	Sala GF	502610	502610	502610	0	504110	504110	504110	504110	0	0	0	0
30		Sala II/3	502410	502410	502210	502210	501620	501620	501310	501310	501310	0	0	0
31		Sala inf.	0	0	0	502710	502710	502710	0	0	0	0	0	0
32	MF	Uč.1g.	0	600910	600910	601110	601110	0	601222	601222	0	0	0	0
33		Uč.11g.	0	0	601820	601820	0	0	0	0	0	0	0	0
34		Uč.111g.	0	0	602410	602410	602420	602420	602610	602620	602620	602620	0	0
35		Uč.1	503920	503920	503920	503920	0	705020	501810	501810	0	0	0	0
36		St.Sk.1	0	0	0	0	0	0	0	0	0	0	0	0
37		St.Sk.2	0	725910	725910	725910	0	0	0	0	0	0	0	0
38		St.Sk.3	0	0	0	0	0	0	0	0	0	0	0	0
39		Uč.201	0	0	701010	701010	718110	718110	718110	0	0	0	0	0
40		Uč.202	0	0	0	708110	0	0	730320	730320	0	0	0	0
41		Uč.204	723520	723520	709210	709210	709220	709220	0	0	0	0	0	0
42	NF	Uč.205	0	0	708720	708720	721710	721710	0	705120	705120	0	0	0
43		Uč.206	0	0	714810	714810	730310	730310	0	0	0	0	0	0
44		Uč.207	716721	716721	716722	716722	0	0	0	0	0	0	0	0
45		Prakt.bot.	702721	702721	702722	702722	0	0	0	0	0	0	0	0
46		Prakt.zool.	702521	702521	702522	702522	704020	704020	0	0	0	0	0	0
47		Uč.Mosp.1	0	0	719210	719210	720710	720710	0	0	0	0	0	0
48		Uč.Mosp.2	0	715721	715721	715722	715722	0	0	0	0	0	0	0
49		Uč.Mosp.3	0	0	717920	717920	0	0	0	0	0	0	0	0
50		Uč.Mosp.4	0	0	722310	722310	724810	724810	0	0	0	0	0	0
51		Uč.103	0	712820	712820	713010	713010	713020	0	712810	712810	0	0	0
52		sala 1g.	0	0	801110	801110	801110	0	0	0	0	0	0	0
53		sala 11g.	0	802610	802610	802610	802621	802622	0	0	803010	0	0	0
54	PF	sala 111g.	0	804110	804110	804110	802910	802910	804510	804510	0	0	0	0
55		sala IVg.	805221	805221	805222	805222	805410	805410	805410	0	0	0	0	0
56		sala post.	805522	805522	805521	805521	802522	802521	0	0	0	0	0	0

Figure 2. University matrix for Monday before defragmentation

After loading the university spatial-temporal matrix it is necessary to calculate number of periods q_{r_i} for which classroom r_j is occupied and then to form the sequence *QR(I)*; $I = 1,2,\ldots 56$; where the q_{r_i} elements refer to occupation of each single classroom for the working day under consideration.

Additionally, it is necessary to form resulting matrix of daily students' number *SA(I,J)* (56x12) whose each element *sa(i,j)* refers to how many students attend lecture given by $f_{r_i h_j}$.

Further more, it is important to form following sequences: *TU(I)*; $I = 1,2,\ldots 56$; where the t_i elements refer to type of each single considered classroom (general or special usage, laboratory, etc.), and *RM(I)*; $I = 1,2,\ldots 56$; whose elements represent number of seats in each of considered classrooms.

III. BEST FIT DEFRAGMENTATION CONCEPT

Usually, the university (school) calendar is used as a base for the time-school problem analysis. First of all, this calendar with opening and closing data, allows comparing educational systems and their capacity and flexibility to meet the needs of students, as well as the other sectors of society. In this context, school time flexibility means a better use of available time, rather than asking for more time. Spatial dynamics of teaching is basically related to the distribution in space of different teaching activities. The greater the variety of these activities exists, the more specialized spaces are required.

Temporal and spatial coordination of different academic activities could be expressed as

interactions among the elements of periods and classrooms sets on one side with the elements of the departments, courses, professors and students sets on the other side. Classes, in any given classroom, are scheduled in the course's fragments consisting of one, two, three or more periods. This means that every classroom is occupied during certain fragments of course periods, while in the others it is empty. Therefore, each classroom's daily occupation consists of occupied and empty fragments distributed in a determined way. In general, this distribution is different for each of the classrooms considered.

It is now reasonable to develop the defragmentation (re-optimization) procedure for the occupied fragments that will enable better usage of the classrooms available while maintaining the current time schedule. In order to do this, after identifying the status of all periods (occupied or empty) as well as the occupied fragments (clusters of periods), it is useful to calculate the q_{r_i} of each single classroom for the working day under consideration. When q_{r_i} are calculated for all the classrooms, the defragmentation procedure or fragments repositioning may start. The course fragments of the classroom with minor values of the q_{r_i} should be moved from their original position to the corresponding empty fragments of the classroom with major values of the q_{r_i} . When moving fragments from one classroom to another, additional conditions such are: classroom size (number of seats) must meet number of students who attend certain class(es), and teaching facilities installed (classroom type) must be respected. In addition, if there are more alternatives (classrooms) satisfying the above conditions, additional criteria, such as location vicinity, curricular similarity, etc. may be introduced.

Now, after main concept of defragmentation is shown, it is reasonable to introduce best fit (BF) procedure. It was proved that BF approximation algorithm never differ from optimal by significantly more than 70 percent and it can on occasion be essentially this bad [4]. The classroom's course fragments should be moved from their original position to the corresponding empty fragments of the classroom with major values of the q_{r_i} , considered as objects of bin packing (BP). This means that object size represents fragment of course periods size which we are trying to move to the corresponding empty fragments of the classroom with major values of the q_{r_i} . Meanwhile, other classrooms are considered as bins whose size is equal to number of elements of H_d subset (for University "Džemal Bijedić" it is equal to 12). After these transformations it is reasonable to use approximation algorithm BF defragmentation of spatial-temporal dynamics at university.

BF strategy goes as follows: always place next item (course fragment) in that bin (classroom) which has current content closest to full (respecting additional conditions), in a way that if placement is occurred bin is not overloaded. That's why, before usage of BF algorithm, it is necessary to sort sequence *QR(I)*. For the purpose of this paper increase sorting was used. In this way, BF algorithm is provided to start relocation process from the fullest classroom. Its q_{r_j} is actually $q_{\max}$ for classroom set under consideration, and it is the last element of sorted sequence *QR(I)*.

So, after sorting *QR(I)* one can get sequence *QRS(I); I=1, 2, …, 56*. In the same time, it is necessary to relate original location (sequence reference) of sequence *QR(I)* element with its position (location) in sequence *QRS(I)*. Result is sequence *QRI(I); I=1, 2, …, 56*. It is formed as follows: element locations (references) in sequence *QRI(I)* match element locations in sequence *QRS(I)* while sequence *QRI(I)* elements are locations (references) of sequence *QRS(I)* elements in sequence *QR(I)*. For example, let sequence *QR(I)* has following five elements: *QR(1)=57; QR(2)=22; QR(3)=12; QR(4)=63; QR(5)=48*. Its sorted sequence is: *QRS(1)=12; QRS(2)=22; QRS(3)=48; QRS(4)=57; QRS(5)=63*, while sequence *QRI(I)*, formed respecting above explained procedure, is: *QRI(1)=3; QRI(2)=2; QRI(3)=5; QRI(4)=1; QRI(5)=4* (Figure 3). Figure 4 shows C^{++} code for this procedure.

BF algorithm starts with classroom r_1 (first row of daily temporal-spatial matrix). First step is to determine first classroom's course fragment size. If it is one-period fragment, then:

$$f_{r_1h_j} \neq 0 \wedge f_{r_1h_{j-1}} \neq f_{r_1h_j} \neq f_{r_1h_{j+1}} .$$

For two-period fragment:

$$f_{r_1h_j} \neq 0 \wedge f_{r_1h_{j-1}} \neq f_{r_1h_j} = f_{r_1h_{j+1}} \neq f_{r_1h_{j+2}} ,$$

and for n-period fragment:

$$f_{r_i h_j} \neq 0 \wedge f_{r_i h_{j-1}} \neq f_{r_i h_j} = f_{r_i h_{j+1}} =$$
$$= f_{r_i h_{j+2}} = \ldots = f_{r_i h_{j+n-1}} \neq f_{r_i h_{j+n}};\ j+n < b_d + 1$$

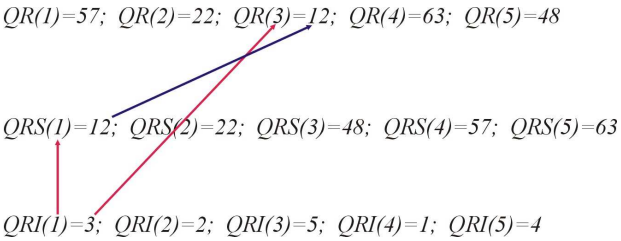

Figure 3. Relation between *QR(I)*, *QRS(I)*, and *QRI(I)*

```
void sortiranje_qr(){
int index;
int min;
for(int k = 1; k <= BROJ_UCIONICA; k++){
min = 100;
for(int n=1; n<=BROJ_UCIONICA;n++){
if(qr[n] < min){
index = n;
min = qr[n];}}
qrs[k] = min;
qri[k] = index;
qr[index] = qr[index] + 1000;}
for(int k=1; k <= BROJ_UCIONICA; k++){
qr[k] = qr[k] - 1000;}}
```

Figure 4. C^{++} code for relation between *QR(I)*, *QRS(I)*, and *QRI(I)*

In general case, for any classroom r_i and any n-period, fragment relation must be satisfied:

$$f_{r_i h_j} \neq 0 \wedge f_{r_i h_{j-1}} \neq f_{r_i h_j} = f_{r_i h_{j+1}} =$$
$$= f_{r_i h_{j+2}} = \ldots = f_{r_i h_{j+n-1}} \neq f_{r_i h_{j+n}};\ j+n < b_d + 1 \quad (1)$$

When relation (1) is satisfied, next step is seeking for "suitable classroom" r_i $i \neq 1$, starting with r_2, in which classroom's r_1 n-period fragment can be allocated. Classroom r_i is suitable if it has $q_{\max}$, classroom type and number of seats are matched with same parameters for classroom r_1, r_i must have corresponding empty fragments where classroom r_1 n-period fragment can be allocated, and q_{r_i} is greater than or equal to q_{r_1}. So, suitable classroom r_i must meet:

$$tu_1 = tu_i \wedge q_{r_1} \leq q_{r_{i=\max}} \wedge sa_{1j} \leq rm_i \wedge$$
$$f_{r_i h_j} = f_{r_i h_{j+1}} = f_{r_i h_{j+2}} = \ldots = f_{r_i h_{j+n-1}} = 0;\ i \neq 1$$

In general, above conditions are:

$$tu_p = tu_i \wedge q_{r_p} \leq q_{r_{i=\max}} \wedge sa_{pj} \leq rm_i \wedge$$
$$f_{r_i h_j} = f_{r_i h_{j+1}} = f_{r_i h_{j+2}} = \ldots = f_{r_i h_{j+n-1}} = 0;$$
$$i \neq p \wedge j+n < b_d + 1 \quad (2)$$

Index p in relation (2) refers to classroom whose period fragments are trying to be allocated to the classroom r_i that meets relation (2). In case when relation (2) is not satisfied, next classroom that has less $q_{\max}$ is investigated, and so on. If there is no suitable classroom, same procedure is repeated for next classroom's r_1 occupied period fragment. After classroom r_1, algorithm shifts to r_2, then r_3, and so on to the last classroom r_k, repeating above described procedure.

Of course, if classroom r_i is empty ($q_{r_i} = 0$) or its all periods are occupied ($q_{r_i} = b_d$), algorithm is avoiding it. But, if relation (2) is matched, algorithm allocates classroom's r_1 n-period fragment to r_i, q_{r_i} is increasing for n, while q_{r_1} is decreasing for n. After relocation, BF defragmentation is repeated for all period fragments of observed classroom, and for all remaining university classrooms.

IV. SOFTWARE SOLUTION

Figure 5 shows flow chart diagram for BF algorithm. So, after sorting sequence *QR(I)*, routine investigating classroom r_1. If it is empty or occupied all day then it has to be excluded ("*if QRI=0*" or "*if QRI=12*").

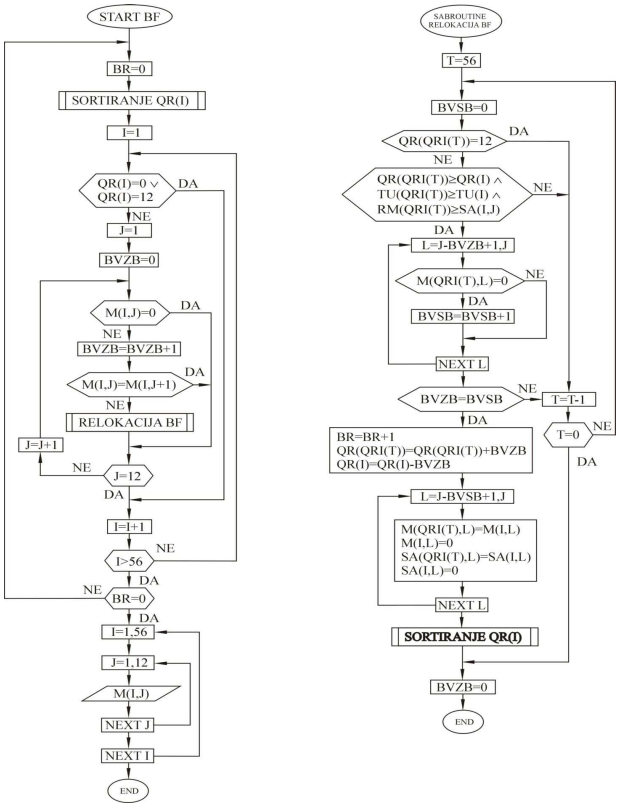

Figure 5. Flow chard diagram for BF algorithm

Counter *BVZB* follows classroom's occupied period fragment size which is trying to be

allocated. It is increased by one when element of matrix *M* for observed classroom is not equal to zero, and when two contiguous elements are opposite to zero and equal (they have same course codes).

When occupied period fragment is found (*BVZB≠0*), relation (1), subroutine "relokacija BF" (rBF) is seeking for "suitable classroom" r_i $i \neq 1$ where observed period fragment can be relocated. This means that relation (2) must be matched (*QR(QRI(T)) ≥ QR(1), TU(QRI(T)) ≥ TU(1)*[1], and *RM(QRI(T)) ≥ SA(1,J)*). If these inequalities are satisfied, then time terms compatibility is investigated using variable *L*. This means that, if *BVZB=BVSB* is met, relocation counter *BR* is increased by one, subroutine rBF decreases classroom's q_i whose period fragment is relocated by period fragment size. In the same time, rBF increases occupation of classroom where observed period fragment is relocated for the same value. But, if only one of above conditions is not met, rBF is seeking for suitable free time terms in other classrooms respecting there sequence *QRI* order. After finishing rBF, above procedure is repeated for other period fragments of observed classroom. When these relocations are finished, routine BF is applied for other university classrooms respecting there *QRI* order.

In the end, it is necessary to investigate if any relocation was made (*BR=0*). If this is met, BF routine ends, but if it is not, routine goes to beginning and repeats procedure. This is necessary because of the following simplified case: let's take three contiguous classrooms *r-1*, *r*, *r+1* (generally, they don't need to be contiguous) which meet these conditions: *QR(r-1) ≤ QR(r)-1 < QR(r+1)*, *TU(r-1) = TU(r) = TU(r+1)*, *SA(r-1) ≤ RM(r)* and *SA(r) ≤ RM(r+1)*. Figure 6 shows that in first step relocation of classroom's r_{i-1} period fragment at position t_{j-1}, t_j, t_{j+1} is not possible. But, in second step, after relocating t_{j+1} period from classroom r_i to r_{i+1}, it is obvious that procedure must be repeated, because period fragment relocation at position t_{j-1}, t_j,t_{j+1} in r_{i-1} classroom is possible to r_i. This is reason why it is necessary to repeat routine rBF until *BR=0*.

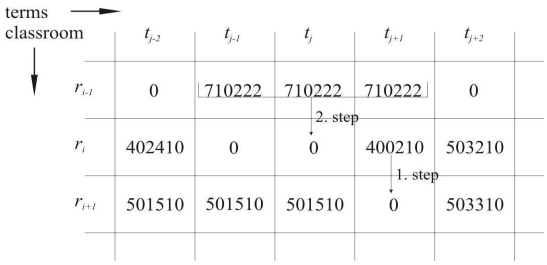

Figure 6. Repeating defragmentation procedure until *RB=0*

Figure 7 shows matrix M after applying BF routine.

		08.15-09.	09.15-10.	10.15-11.	11.15-12.	12.15-13.	13.15-14.	14.15-15.	15.15-16.	16.15-17.	17.15-18.	18.15-19.	19.15-20.
1		0	0	100810	100810	501910	501910	0	0	0	0	0	0
2	UN	104210	104210	104210	104220	104220	104220	601323	601323	601323	601323	0	0
3		604510	604510	604520	604520	604710	604710	604710	604710	604710	0	0	0
4	AF	0	0	0	0	0	0	0	0	0	0	0	0
5		0	0	0	100922	100922	0	0	0	0	0	0	0
6		220410	220410	220410	220610	220610	222920	222920	223020	223020	0	0	0
7		0	0	0	0	0	0	0	0	0	0	0	0
8		0	0	0	0	0	0	0	0	0	0	0	0
9		0	0	209420	209420	0	0	0	0	0	0	0	0
10	FRN	0	0	0	0	0	0	0	0	0	0	0	0
11		703210	703210	209220	209220	209410	209410	215510	215510	215510	215510	0	0
12		0	0	0	0	0	0	0	0	0	0	0	0
13		0	0	218520	218520	219120	219120	0	0	0	0	0	0
14		0	0	201510	201510	218510	218510	0	0	0	0	0	0
15		0	0	0	0	0	0	0	0	0	0	0	0
16		300923	300923	301921	301921	301922	301922	300622	300622	0	0	0	0
17		207820	207820	201310	201310	302131	302131	300831	300831	302132	302132	0	0
18		0	0	0	0	0	0	0	0	0	0	0	0
19	FEI	0	0	0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	303922	303922	0	0	0	0	0	0
21		0	0	218720	218720	303821	303821	0	0	0	0	0	0
22		0	0	300610	300610	0	0	0	0	0	0	0	0
23		300110	300110	303210	303210	202820	202820	0	0	0	0	0	0
24		402010	402010	402010	402010	400624	400624	400624	402123	402123	402123	0	0
25		205510	205510	401310	401310	401310	401310	401310	101122	402310	402310	402310	402310
26	FPM	210520	210520	403020	403020	403620	403620	401421	401421	401421	401421	0	0
27		0	0	403420	403420	400721	400721	400721	0	0	0	0	0
28		403110	403310	403110	403310	404210	404210	404210	404210	404210	0	0	0
29		502610	502610	502610	708110	504110	504110	504110	504110	0	0	0	0
30	GF	502410	502410	502210	502210	501620	501620	501310	501310	501310	0	0	0
31		0	0	0	302710	302710	302710	0	0	0	0	0	0
32		0	600910	600910	601110	601110	802622	0	0	0	0	0	0
33	MF	0	0	601820	601820	0	0	0	0	0	0	0	0
34		0	0	603410	603410	603420	603420	0	0	0	0	0	0
35		503920	503920	503920	503920	802621	705020	501810	501810	0	0	0	0
36		0	0	0	0	0	0	0	0	0	0	0	0
37		0	725910	725910	725910	0	0	0	0	0	0	0	0
38		0	0	0	0	0	0	0	0	0	0	0	0
39		0	0	701010	701010	718110	718110	718110	0	0	0	0	0
40		0	0	0	0	0	0	0	0	0	0	0	0
41		0	0	709210	709210	709220	709220	0	0	0	0	0	0
42		723520	723520	708720	708720	721710	721710	602610	705120	705120	0	0	0
43		0	0	714810	714810	730310	730310	0	0	0	0	0	0
44		716721	716721	716722	716722	210420	210420	214320	214320	0	0	0	0
45		702721	702721	702722	702722	201120	201120	730320	730320	0	0	0	0
46		702521	702521	702522	702522	704020	704020	601322	601322	0	0	0	0
47		0	0	719210	719210	720710	720710	720710	0	0	0	0	0
48		0	715721	715721	715722	715722	100923	100923	0	0	0	0	0
49		0	0	717920	717920	0	0	0	0	0	0	0	0
50		0	0	723310	723310	724810	724810	0	0	0	0	0	0
51		0	712820	712820	713010	713010	713020	0	712810	712810	0	0	0
52		0	0	801110	801110	801110	0	0	0	0	0	0	0
53		0	802610	802610	802610	0	0	0	0	0	0	0	0
54	PF	0	804110	804110	804110	803910	803910	804510	804510	0	0	0	0
55		805321	805321	805322	805322	805410	805410	805410	602620	602620	0	0	0
56		805322	805322	805321	805321	802522	802521	209520	209520	803010	0	0	0

Figure 7. Matrix M after applying BF routine

Code written in C^{++} for BF strategy, is shown by Figure 8:

[1] General practice at University is that lecture which needs general purpose classroom can take place in computer classroom, but opposite does not worth.

```
while(br==1){
br=0; i=1; j=1; k=0;
sortiranje_qr();
while(pronadi_blok(i, j, k)){
if(relokacija_bf(i, j, k)){
j=j+k;
k=0;
br=1;}
else{
j=j+k;}}}
bool pronadi_blok(int &ucionica, int &sat, int &duzina){
int brojac = 1;
bool repeat_flag = true;
while (repeat_flag){
repeat_flag = false;
while((qr[ucionica] == 0 || qr[ucionica] == BROJ_TERMINA) && ucionica <=
BROJ_UCIONICA){
ucionica++;
sat=1;}
if (ucionica > BROJ_UCIONICA){
return false;}
while (m[ucionica][sat] == 0 && sat <= BROJ_TERMINA){
sat++;}
if(sat > BROJ_TERMINA){
ucionica++;
sat = 1;
repeat_flag = true;}}
if (sat == BROJ_TERMINA){
duzina = 1;
return true;}
while(m[ucionica][sat] == m[ucionica][sat+1]){
brojac++;
sat++;}
sat = sat - brojac + 1;
duzina = brojac;
return true;}
bool relokacija_bf(int ucionica, int pocetak, int duzina){
for(int t = BROJ_UCIONICA; t >= 1 ; t--){
int brojac = 0;
if(qr[qri[t]] != 0 && qr[qri[t]] != BROJ_TERMINA && qri[t] != ucionica &&
qr[qri[t]] >= qr[ucionica] && tu[qri[t]] >= tu[ucionica] && rm[qri[t]] >=
sa[ucionica][pocetak]){
for(int j = pocetak; j < pocetak + duzina; j++){
if(m[qri[t]][j] ==0){
brojac++;}}
if(brojac == duzina){
for(int j = pocetak; j < pocetak + duzina;j++){
m[qri[t]][j] = m[ucionica][j];
m[ucionica][j] = 0;
sa[qri[t]][j] = sa[ucionica][j];
sa[ucionica][j] = 0;}
qr[qri[t]] = qr[qri[t]] + duzina;
qr[ucionica] = qr[ucionica] - duzina;
system("PAUSE");
sortiranje_qr();
return true;}}}
return false;}
```

Figure 8. C++ code for BF algorithm

V. CONCLUSION

At the end, it is reasonable to make comparison between input and output matrix *M* (Figures 2 and 7). As a result of school timetable reoptimization the number of empty classrooms is increased: from 5 in input matrix *M* to 11 for BF solution. Reduction of the number of used classrooms means less cost to their maintenance as well as maintenance of equipment in them, while on the other hand opens up the possibility of their lease (additional revenue). So, University gets more effective management of available space. Another objective could be better planning for future investments in physical capacity.

Very interesting comparison of classrooms with maximum of six occupied periods, where empty classrooms are not taken into account, can be done. In that case, 33 of those classrooms were reduced to 24 for BF. Similar situation is for all other working days, which can be seen in Table 1.

Further analysis could be done comparing mornings' and afternoons' periods, where solution is not helpful due to human factor, because general tendency at University is to complete all teachings to 14.00.

Table 1. Comparing input and output matrix M for other working days

State		Tue.	Wed.	Thu.	Fri.
Input	≤6	**30**	**30**	**28**	**37**
	=0	**5**	**10**	**8**	**8**
BF output	≤6	**17**	**13**	**17**	**24**
	=0	**12**	**19**	**16**	**16**

However, it is important to take into account that adjusting phases could not be done without solving problem of conditions. As it is seen in this paper, problem of these conditions was successfully solved: classroom type, classroom size, and number of students who attend course.

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CASE STUDIES ON QUALITY ASPECTS OF HIGHER EDUCATION IN TECHNICAL SCIENCES

Lj. Kazi*, D. Glušac*, D.Đorđević*, D.Ćoćkalo*, B. Egić*, B. Radulović*, Z.Kazi*, N.Chotaliya**
*University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
** H&H.B. Kotak Institute, Science College, Rajkot, India
leremic@tfzr.uns.ac.rs

Abstract - Basic factors of quality in education are students, teachers, educational content, educational equipment and educational process. This paper presents research results of several case studies conducted in aim to explore quality aspects of these factors related to higher education in technical sciences. Case studies were conducted with future students, i.e. high school pupils and educational factors at the University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia. Correlation regarding impact of teaching staff's work and educational contents to quality impressions on higher education institution has been shown.

I. INTRODUCTION

Quality of education is a practical and research area that expolore characteristics of elements of educational process. Basic elements of educational process are defined in well-known "educational triangle", where axis are student, teacher, educational content and inner area of a triangle consist of equipment, study material and educational process. In the field of technical sciences, the "educational triangle" is presented at Figure 1.

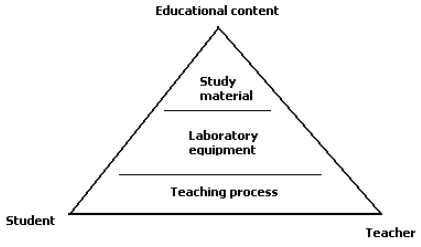

Figure 1. Educational triangle for higher education in technical sciences (adapted from [1])

This paper presents research results, made within M.Sc. thesis [2], that are related to quality characteristics of each element of educational process. Namely, it is related to elements of higher education in technical sciences at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. For each of these elements, separate case study has been conducted. Finally, correlation of impact of elements to quality impression of higher education institution is described. It has been shown that teaching staff's work and educational content is in high correlation with students' impression on higher education institution quality.

II. THEORETICAL BACKGROUND

"According to official ISO standards' definition, quality presents characteristics set level to which they fulfill requirements" [3]. According to programme for quality improvement (proposed by the Government of Serbia in 1992.) [4], "quality is not only traditional control of products and services characteristics, but it is primarily new philosophy directed towards integral business thinking and doing".

Quality certification according to standards is one of priorities for enterprises. Special interest on international standards organization certification (ISO) raised after 1993. when European union promoted that business contract mandatory requirement with European union's enterprises is having ISO 9000 certificate [5]. Quality certification includes not only production enterprises, but also services and public administration, healthcare, education [6] etc.

Historical development of quality management started at 1940. with "measurement/testing" approach directed to product, 1955. "quality control" directed to process, 1965. as "quality enabling" directed to system, 1980. "quality management" directed to system and human role and finally as "total quality management" directed to human role [3] .

Quality management is multidimensional and requires systematic approach to effects toward market, business and society. All interest groups (society, consumers/clients, partners and other stakeholders) define their requirements that need to be fulfilled at appropriate level of characteristics of outcomes and processes. Total quality approach includes every business function, organizational part and person involved and they all are responsible for quality of their activities, processes and outcomes [3].

III. TEACHERS' CHARACTERISTICS

In this section we present results of analysis of teachers' formal education in the field of teaching methodology.

A. Research methodology

In February 2005, an analysis has been performed upon data regarding teaching staff's level of formal education in the field of teaching methodology (psychology, methodic, didactics). Analysis is performed upon data about formal education of teaching staff of University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. Each teaching staff member was qualified with Yes/No characteristics regarding teaching methodology formal education.

B. Results

Results of questionnaire are presented at Table1.

TABLE I. LEVEL OF TEACHING METHODOLOGY FORMAL EDUCATION OF TEACHING STAFF

Academic position	Num.	Yes %	No %
Full professor	8	50	**50**
Associate professor	12	25	**75**
Docent (Assistant professor)	8	37.5	**62.5**
Lecturer	2	**100**	0
Teaching assistant	10	**60**	40
Teaching assistant trainee	16	**68.75**	31.25
Associate	4	**50**	50
TOTAL:	60	51.67	48.33

IV. FUTURE STUDENTS' CHARACTERISTICS

In this section, we present results of questionnaire results directed to future students, i.e. high school pupils.

A. Research methodology

In may 2005 a questionnaire has been given to 30 final year high school pupils from 2 schools: chemical school and gymnasium at Kikinda, Serbia. Pupils had to answer to questions (giving estimation of influence of factors ranking from 1-most important to 10-least important) regarding preconditions for successful learning, motivation for continuation of education at university level and their expectations of possible problems that could occur during studies at university.

B. Results

Analysis of conducted research questionnaire data shows preconditions for successful study:

- PERSONAL: 63% of pupils own personal computer, 27% of pupils by self evaluation estimate that they could organize their own activities well enough, 63% of pupils estimate that they don't have personal problems that could affect study.
- MOTIVATION and GOALS (Fig. 2): Motivators for study in the questionnaire were given as: knowledge (70%), diploma (47%), friendship, challenge, creativity, research, prestige, competition, help to others.

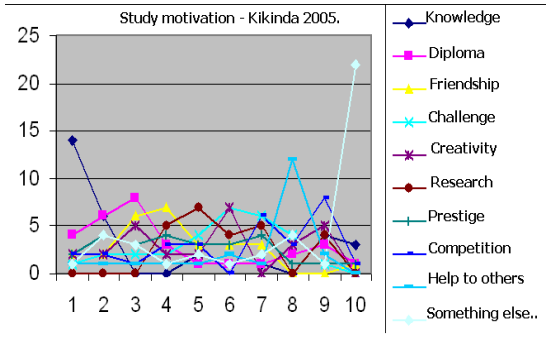

Figure 2. Study motivation of pupils in Kikinda may 2005.

- CREATIVITY - divergent thinking abilities (37% self estimated pupils), previously engaged at competitions (23%), created computer programs completely without any help from others (27%).

Estimation of possible problems during study is ranked with marks from 1-most significant to 10-least significant (Fig. 3.):

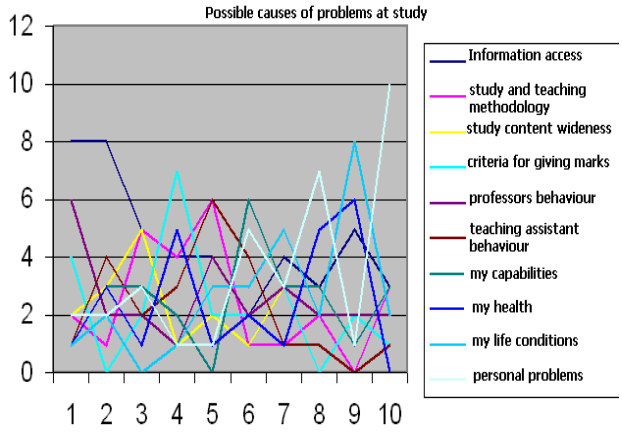

Figure 3. Possible problems at study

V. TEACHING PROCESS FROM TEACHERS' PERSPECTIVE

In this section we give results of questionnaire given to teaching staff regarding their impressions about certain aspects of their teaching process.

A. Research methodology

A questionnaire is given on 3rd February 2005 to teaching staff at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. This questionnaire aim is to represent teaching staff impressions regarding quality of their work and work of students.

B. Results

Among many questions, one of most important is comparison of work of teaching staff comparing to activities of students during classes (Figure 4.).

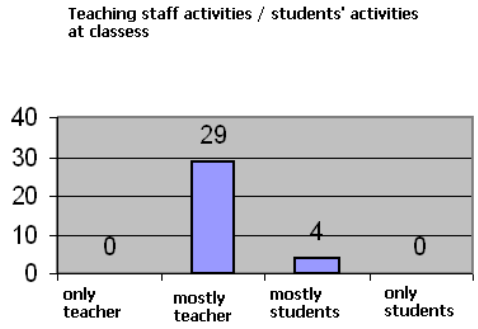

Figure 4. Activities of teaching staff and students at classes

Students' activities at classes are presented at Figure 5.

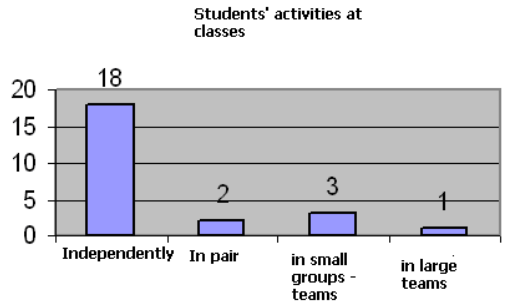

Figure 5. Organization and work of students at classes

In their work teachers use different methods and laboratory equipment (Fig. 6).

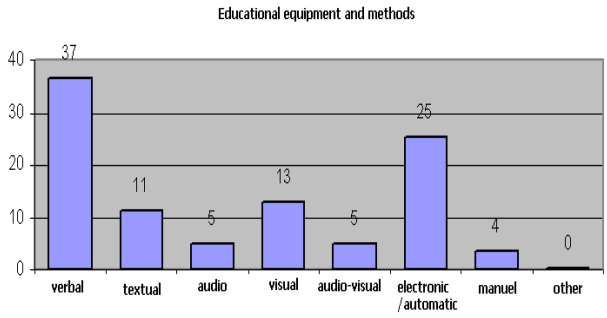

Figure 6. Class and laboratory educational equipment

Methods for testing students' knowledge and skills (Figure 7.):

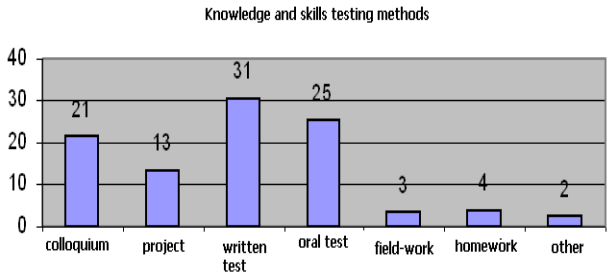

Figure 7. Knowledge and skills testing methods

VI. QUALITY IMPRESSIONS ON EDUCATIONAL CONTENT, STUDY MATERIAL AND TECHING STAFF'S BEHAVIOUR FROM IT STUDENTS' PERSPECTIVE

A. Research methodology

In February 2005 questionnaires are given to 76 students of University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. Most of these students are final year students of informatics. Questionnaire is organized as a set of questions regarding quality impressions on certain aspects of educational process. It is evaluated with marks 1-worst to 10 - best.

B. Results

Some of results of students study conditions are:

- Professional working experiences in programming had 17 students
- 75 students have personal computer, 57 students is satisfied with performances of personal computer,
- 67 students could have Internet connection from home, while 6 students don't have Internet access from home.

Classes' educational methods are characterized as:

- Regularly attend to classes 47 students
- 34 students prefer learning at home, while 38 students prefer to learn at classes

Study material is evaluated as presented at Fig.8.

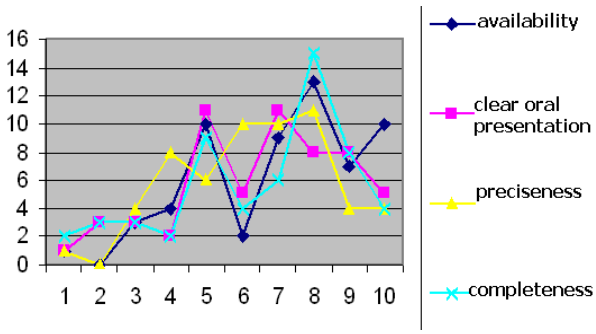

Figure 8. Study material evaluation

Results of educational content evaluation is presented at Figure 9.:

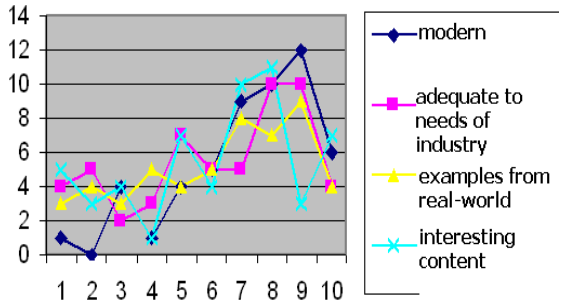

Figure 9. Education content evaluation

Students impressions on teaching staff behavior is presented (Figure 10):

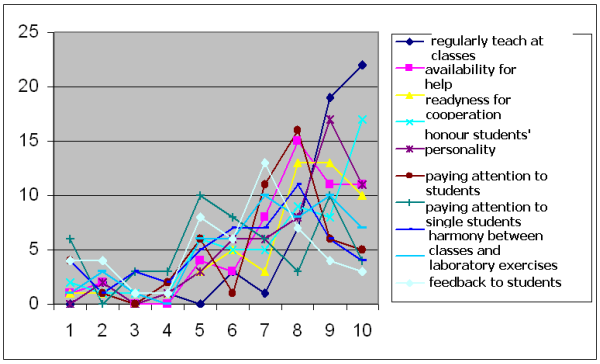

Figure 10. Students' impressions on teaching staff behavior

Students' impressions on teaching staff quality of talking (Figure 11):

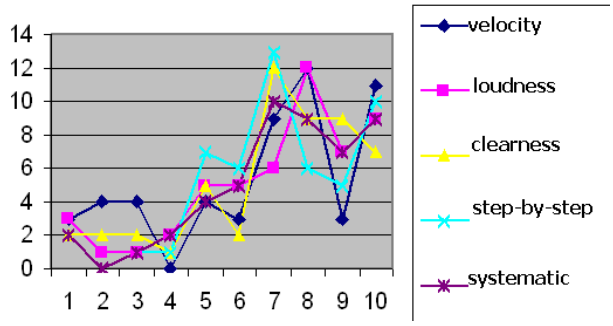

Figure 11. Students' impressions on teachers' talk quality

VII. CORRELATION OF QUALITY FACTORS TO INSTITUTION QUALITY

In this section we present analysis results regarding questionnaire that was directed to quality of educational institution and factors that influence impression of graduate students regarding quality of educational institution as an organization. This questionnaire [7] was used within regular ISO 9000 internal audit processes with students "educational service users" at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin.

A. *Research methodology*

Sample of this research presents 155 graduate students of bachelor degree at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. They filled their questionnaires at graduation day (i.e. at final exam date) in period of 6th February 2003 to 17th December 2003. These questionnaires are given to students since year 2002, within efforts regarding ISO 9000 standards. Number of 155 students consist of students that graduated at: Mechanical Engineering (58 students), Engineering Management (31 students), Informatics teacher (48 students), other technical sciences students (18 students). These graduates evaluated quality of teachers' work, laboratory equipment, educational contents, administration office work and institution as an organization by estimating their quality impressions by giving marks ranked from 1 (best quality) to 5 (worst quality).

B. *Results*

Results of questionnaire are presented at Table2.

TABLE II. RESULTS OF EDUCATIONAL FACTORS QUALITY IMPRESSIONS QUESTIONAIRE

Mark	T	TA	CL	FL	EQ	ED	IN
1	67	56	40	9	25	49	50
2	72	73	40	16	41	77	80
3	14	21	39	11	36	25	9
4	1	3	5	5	2	1	0
5	0	0	2	1	2	0	0
N/A	1	2	29	112	49	3	16

- T – Teacher, lecturer (PhD degree)
- TA – Teaching assistant, practical laboratory work (MSc degree)
- CL – computer lab
- FL – Physics lab
- EQ – equipment
- ED – educational contents at syllabus/curriculum
- IN – educational institution
- N/A – not available (graduates did not answer)

Graphical representation of results is given at figure below:

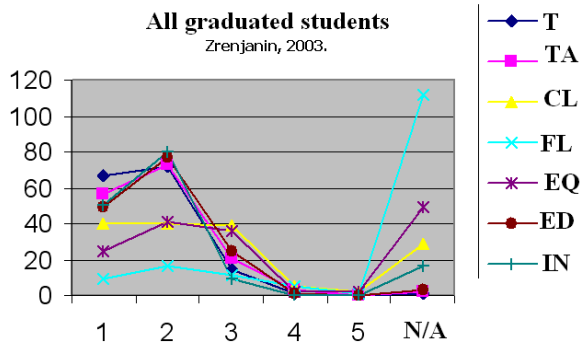

Figure 12. Graphical representation of results on graduate students educational institution quality impressions

Graphical representation as well as statistically proved correlation factor ($r \approx 1$ (0.99) shows high correlation between:

- Quality impressions on teacher staff's work (lecturer and teaching assistant) in correlation to quality impressions on educational institution as organization
- Educational content quality impressions in correlation to quality impressions on educational institution as organization.

VIII. DISCUSSION AND CONCLUSIONS

In this paper a set of case studies was presented regarding different aspects of higher education at University, particularly at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin.

Limitations of this research are related to data that are collected among small population of future students, students, graduated students and teaching staff at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin. Other limitations are related to time period of data collection - in year 2003 and 2005.

Still, there are many conclusions that could be made and that could be useful for future research and practical activities in education quality improvement.

First case study is related to teachers' characteristics. It could be concluded that lecturers of higher academic ranks mostly don't have teaching methodology formal education, while lecturers associates that are engaged in practical and laboratory work mostly have appropriate teaching methodology education. This situation is widely present at technical sciences higher education institutions [8]. This conclusion could lead to directions for improvement of this situation by additional education to teaching staff that didn't have teaching methodology formal education.

Second case study is related to future students, i.e. high school pupils. It has been shown that they are well equipped with personal computers. They show that knowledge is main motivator for learning. Problems that are described are: lack of self-organizational skills regarding activities time planning, insufficient divergent thinking abilities and creativity, insufficient engagement in competitions. They estimate that at next educational level (i.e. higher education at university) possible causes of problems could be information access and accuracy, professors' behavior, criteria for giving marks and teaching methodology. These conclusions lead to possible activities regarding improvement of future students skills needed for successful study and also improvement of information systems of higher educational institution and teaching staff's teaching methodology skills.

Third case study presents research on teaching process evaluation made by teachers. It has been shown that teaching staff is mostly engaged at classes, students' engagement at classes is mostly independent, methods and equipment at classes are mostly verbal and electronic (computers) and knowledge testing is mostly in the form of written tests. Possible improvements could lead to directions toward more engagement of students at classes, students' teamwork improvements and e-learning and knowledge testing.

Fourth case study is related to students' evaluation of study material, educational content and teaching staff behavior. All these aspects are positively evaluated with 8/10 average marks. Still, constant quality improvement is always needed.

Finally, fifth case study is conducted among graduate students where their impressions on overall educational institution quality is related to certain aspects of educational factors. In this research it has been shown high correlation between educational contents in syllabus/curriculum and impression of overall educational institution quality as well as between teaching staff work quality and overall educational institution quality. These two factors in this research were shown that are most important, i.e. they mostly affect overall impression of quality of institution. Directions regarding these conclusions could lead to strategic management of an educational institution to pay special attention to these two most important quality aspects.

Future directions to research in this field are related to using or creating complete quality evaluation methodology and application at higher education institutions, with special care to criteria adjusted to specific institutions, such as technical sciences higher institutions.

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THE USE OF TELECONFERENCING IN EDUCATION MANAGEMENT

M. S. Stanković
Higher School of Professional Business Studies, Novi Sad, Serbia
milica.stankovic.vps@gmail.com

Abstract - Teleconferencing is used increasingly as a form of communication in the modern world. It uses electronic communications between two or more participants who are in separate locations. The main functions of teleconferencing in education and training are to: upgrade skills, deliver full couses and lessons, share experiences, facilitate problem solving, guide project work, impart informations, offer counseling. Teleconferencing has a long history in Australia at the tertiary education. Following the establishment of The Open University in Britain, the Universities Commission held an enquiry into whether an open university in Australia would be feasible. Institutions that were early pioneers in use of the teleconferencing included the Darling Downs Institute of Advanced Education DDIAE, (now University of Southern Queens land), Central Queens land University, Deakin University, the University of South Australia, Mitchell College of Advanced Education (now Charles Stuart University), Adelaide College of TAFE, Curtin University of Technology, Australia. There are four different ways in which teleconferencing in education management has been used in Australia: mainstream distance education, use of teleconferencing for indigenous education, use of teleconferencing to support collaborative learning, use of teleconferencing in continuing education.

I. INTRODUCTION

Teleconferencing is used increasingly as a form of communication in the modern world. Through teleconferencing, two or more people, displaced from one another, are connected so that they can hear and see each other. Interaction takes place in real time. This means that two people in different locations can communicate with each other at the time. Teleconferences are widely used in education management, training and development, business communication, professional courses and medical services. There are different types of telecon - ferencing: videoconference, audioconference and audio-graphics conference.

Australia is a pioneer in the application of distance learning at all levels of education management. Teleconferences were first used in the tertiary distance learning in Australia in the early eighties. The paper will discuss the development and use of teleconferencing in the field of distance learning in Australia.

II. THE CONCEPT OF TELECONFERENCING

Technology continues to advance at breakneck speed, taking with it transformation of thinking about how we learn and how we teach. In the 1980s we had our first experience of real-time group interaction at a distance, in audio and video teleconference courses delivered by telephone, satelite, cable and computer networks.[1] The word ‘tele’ means distance, and the word ‘conference’ means consultations, discussions. Through teleconferencing two or more locations situated at a distance are connected so that they can hear or both see and hear each other. The interactions between them occur in real time.

Teleconferencig uses electronic communications between two or more participants who are in separate locations. Teleconferencing enables teachers to present, on television screens in remote locations, information that is uplinked and downlinked, sometimes via satellite, and it allows one or two-way audio or audiovisual communication between students and teachers. [2] Teleconferencing allows a group of people to simultaneously negotiate over the telephone or electronic mail-group communication software. Meaningful interaction in real time is the strength of teleconferencing, and this sets it apart from other technologies used in education. The three main elements of teleconferencing are delivery technology, building and maintaining relationships with receiving organizations, and content development. Teleconferencing could have different technical configurations and applications.

It includes use of telephone for audio conferencing, graphics in addition to audio for audio-graphic conferencing, television and/or computer for video conferencing. Teleconferencing has broad applications in education, training and development, business/corporate communication, professional and medical courses/services.

Teleconferencing can be defined by the interactions and trade-offs between three key principles: access, independance and interaction [3]:

- Access: Teleconferencing extended the reach of education and training opportunities to individuals and groups who did not have effective access to education.
- Independence: Teleconferencing allowed the student the freedom to determine when and where to study. On that way, students could study at a great distance from a education center and integrate learning into their work and family lives.
- Interaction: Teleconferencing allowed students the opportunity for spontaneous, real- time interaction with their instructor and with each other.

Advances in information and telecommunications technology are rapidly expanding learning opportunities and access to educational resources beyond those immediately or traditionally available. Todays technologies are faster, more powerful, and more flexible than comparable technologies of only a few years ago. [4]

The functions of teleconferencing in education and training are to: upgrade skills, deliver full couses and lessons, share experiences, facilitate problem solving, guide project work, impart informations, offer counseling. The basic concepts for increasing the efficiency of the learning process are[5]:

- The learner has to be an active and not a passive recipient of learning material.
- The learning material can be taught in small successive steps
- Presentation of subsequent steps depends on the learners response
- It is important to supply the learner with immediate evaluation of his progress.
- An efficient learning environment should recognize students individual differences
- The learning environment should lead the students to the mastery of the material
- Since education is a life-long process, the learning environment must foster the development of the learners ability for self-learning
- An ideal learning environment should allow for some time for the teachers to guide the students.

There are many strengths of teleconferencing in education management:

- It provides learning to large groups, which are geographically dispersed.
- It makes the best use of the available resources by expanding the learning opportunity
- Training is of high quality and consistent.
- There is greater motivation for learning.
- Delivery costs are reduced for organizations
- It can be designed to meet local specific requirements of training in terms of content, language and conditions.
- The element of interactivity in teleconferencing is encouraged through dialogue between learners and teachers. The opportunity of dialogue allows the learners to discuss, question, and challenge issues.

III. THE CLASSIFICATION OF TELECONFERENCING

Today, teleconferencing takes three forms: audioconferencing, audiographic conferencing and videoconferencing.

A. Audioconferencing

Standard telephone technologies have been in use since the 1940s to provide educational opportunities to people who are separated by distance. Audio teleconferencing is noted for its simplicity, its adaptability to a variety of situations, and its relatively low cost [6].

The most basic way of using telecommunications to hold a virtual class is audioconferencing. The intention is that teachers and learners in two or more sites can all talk to and hear one another. It uses existing analogue telephone technology. The telephone systems was designed to link two telephones for two people to talk. To link more than two sites requires a „bridge“. Conference calls, which bridge several telephones are standard telecommunications services and inexpensive bridges can be installed at teleconferencing sites that link five or six telephones.

Basically, there are two different ways in which the audio conferencing takes place: **'**dial-up' mode and 'meet-me' mode. Countries like Australia, New Zealand, Canada and India where populations are widely dispersed have successfully used audio conferencing in education management.

B. Audiographic conferencing

An audiographic conferencing centre uses two telephone lines, one for sound and one for graphics, or rather for transmitting data between computers. The data appear on the computer screen as text or graphics. In other words, audiographic conferencing is audio conferencing with the addition of a computer link that provides a virtual whiteboard.

Audiographic teleconferencing includes the exchange of still images along with telephone communications. In audio-graphic conferencing, static visuals like graphics, charts, pictures, photographs, etc can also be exchanged through the same communication links, in addition to audio. The addition of graphics to an audio conference allows the exchange of spontaneously drawn sketches or illustrations.

C. Videoconferencing

Although the people in videoconferencing are in different places, the following communications should be possible [7]:

- Everybody should be able to hear and talk to one another
- Everybody should be able to see the person who is talking
- Everybody should be able to see what is on a whiteboard and be able to draw and write on it so that everyone else can see.
- Everybody should be able to see any audiovisual materials used such as video or slides or multimedia presentations
- Everybody should be able to handle and interact with any object, machine or equipment that relates to the class.
- Everybody should be able to take away a copy or record of what was studied in the class.

Videoconferences are teleconferences in which participants see each other via video screens. These forms of electronic conferencing are increasingly popular because it saves time for travel and significantly reduce the cost of communication. Videoconferencing usually require a special video conference rooms and video cameras, microphones, monitors etc [8].

Videoconferencing allows one or two way audio or audiovisual communication between students and teachers. It requires videoconferencing capability, including computers and software for sending and receiving multimedia information, and connection to a local area network (LAN) or a wide area network (WAN).

Teleconferences and videoconferences are widely used forms of distance learning. Teleconferences and videoconferences require students to see demonstrations, participate in discussions, listen to lectures, view presentations and work in groups.

IV. USE OF TELECONFERENCING IN EDUCATION MANAGEMENT IN AUSTRALIA

Teleconferencing has a long history in Australia at the tertiary education. Following the establishment of The Open University in Britain, the Universities Commission held an enquiry into whether an open university in Australia would be feasible.

Teleconferencing first came into widespread use in tertiary distance education in Australia in the early 1980s. Institutions that were early pioneers in use of the teleconferencing included the Darling Downs Institute of Advanced Education DDIAE, (now University of Southern Queens land), Central Queens land University, Deakin University, the University of South Australia, Mitchell College of Advanced Education (now Charles Stuart University), Adelaide College of TAFE, Curtin University of Technology, Australia [9].

Early adopters of teleconferencing had many technical problems in using it effectively. At first, loudspeaker telephones were used for teleconferencing because of reasonable cost. The problem was in telephone lines that which were more than thirty years old. Consequently, the quality of telephone signals varied considerably and this affected the performance on the loudspeaker telephones. Many of technical problems were solved with improving the technology of teleconferencing.

Today, the main difficulty that teachers experience in participating in teleconferencing is learning to modulate their voice appropriately. There was a period during which many institutions

in Australia experimented with the use of satellite communications.

The main reason why tertiary institutions were interested in satellite communications was to reduce cost. There was a problem because the national telephone network had a monopoly and the line charges for teleconferencing were very high. The introduction of competition and improvements in technology lowered the costs of teleconferencing. Video conferencing is used in tertiary teaching at the present time. It is mainly for teaching between different campuses of multi-campus institutions.

There are four different ways in which teleconferencing in education management has been used in Australia: mainstream distance education, use of teleconferencing for indigenous education, use of teleconferencing to support collaborative learning, use of teleconferencing in continuing education.

A. Mainstream distance education

The University of Southern Queens land (USQ) is one of the most active users of the Open Learning Network for teleconferencing. Teleconferences were scheduled to run for an hour, in the early evening. Distance education students studying through USQ are able to request an audiotape copy of the discussion in any teleconferences that they were unable to participate in. More recently, teleconferences have also been placed on a streaming server so that students can listen in to the teleconference at their convenience. Teleconferencing plays an important role in education management. It enables students to interact with each other and with their tutors. Teleconferencing was introduced into tertiary distance education in Queens land in the late 1970s. The establishment of the Queens land Open Learning network enable the delivery of distance education programs. Distance education providers in Australia have used teleconferencing in two main ways:

- Teleconferences were used at the beginning of the semester to help students to get a complete set of study materials.
- Teleconferences were used throughout the semester to support students learning by enabling them to ask questions, discuss issues and be guided to additional learning resources.

B. Use of teleconferencing for indigenous education

Teleconferencing has been found to be a particularly suitable medium for delivering educational programs to aboriginal communities that are located in remote areas. The Adelaide College of Technical and Further Education was one institution that has over the years been active in this particular use of teleconferencing. Like the DDIAE, the Adelaide College of TAFE used teleconferencing to link to groups of learners in study centres.

C. Use of teleconferencing to support collaborative learning

Teleconferencing can be used to support collaborative learning groups involving students learning at a distance. The project had shown that students were much more open in their communication when teachers were not present. The main value of the teleconferences was seen to be in helping to break down the sense of isolation. Students thought that the teleconferences will be more useful if the lecturer participate. Many students said that they found the lack of structure of the teleconferences diminished their value.

D. Use of teleconferencing in continuing education

Many Australian universities are involved in programs of continuing education. Teleconferencing supports such programs. Charles Stuart University was involved in programme funded by the NSW Department of Health to provide a continuing education programme to new and experienced graduates. The programme comprised 46 teleconferences involving 500 nurses. Teleconference connects many participants in their workplaces and in several different locations. An evaluation of the programme found that the use of teleconferencing in continuing education is cost-effective.

V. CONCLUSION

The use of teleconferencing in all spheres of modern society provides many advantages. Many global companies that want to achieve competitive value take advantage of modern information technology, or invest millions of dollars in teleconferencing systems. Distance learning has a long history in Australia. The largest number of universities in Australia is actively working on developing the use of World Wide Web for learning and education management.

There are many benefits that are realized by using teleconferencing and online learning as a form of distance learning. Australia is only one of the countries in which there is a high level of use of modern technology. Today, there are many countries which tend to include all aspects of the use of teleconferencing and other forms of modern information and communication technologies, especially in the field of education management.

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UNIQUE E-GOVERNMENT ACCESS POINT BASED ON SOA

S. Arsovski*, B. Markoski **, D. Radosav **, P. Pecev***and Z. Ivanković**

* Guarantee Fund of the Autonomous Province of Vojvodina
** University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, Republic of Serbia
*** University of Novi Sad, Faculty of Sciences / Department of Mathematics and Informatics, Novi Sad, Republic of Serbia
garfondapv@neobee.net, markoni@uns.ac.rs, dolores023@open.telekom.rs, predrag.pecev@gmail.com, ivankovic.zdravko@gmail.com

Abstract - This paper presents the model for the governmental information resources integration based on SOA. The design of the service interface allows machine – machine communication, which enables an automated access to and use of the government administration public services. The creation a unique web location eases the user's search for a service. The solutions are implemented by the combination of Microsoft WCF technologies improved by W3C standards and recommendations.

I. INTRODUCTION

A large number of documents accompanying the activities of governmental administrative bodies, in the form of public calls in order to implement development strategies through the placement of budget funds for the allocation of incentive funds aimed at the development of economy, agriculture, tourism, educational activities and other types of economic activities, are daily published on the websites of governmental, regional and local administrative bodies.

Problem identification: Starting from the fact that websites are made by different technologies and that information on activities are to be found on different websites, defined by different terms and in different formats, duly and relevant information on current activities is of great importance for potential applicants in the calls, i.e. incentive fund beneficiaries.

The above described issues define the need for a unique information web portal on which the activities of all bodies of province administration and local self-governments will be published. The advantage of such a portal can also be seen in the way of G2G communication, i.e. possible redundant types of calls and fields of activities of local and provincial administrative bodies are neutralised.

The paper suggests a solution to the above defined problems and formation of an arranged information system, which on the one hand, relies on semantic technologies and W3C recommendations, and on the other hand, on Microsoft technologies and SOA.

II. RELATED WORK

The search for and access to different governmental administrative services (fill-in of tax returns, renewal of personal documents, etc.) present a large problem in automating the work of governmental administration. The implementation of efficient online services and application of innovative IC technologies is a solution to the problem.

The [11] project combines several innovative technologies such as:

SOA, Context Management, Web Principles, Web 2.0, Semantic Web. The extension of standard WSDL with semantic descriptions allows automatic detection, ranking and application of such described services. Formalised semantic descriptions of services allow limited half-automated service access and use for the time being.

In the [12] project, individual (atomic) processes are integrated at semantic level, forming a scenario of problem solution which is presented to the end-user.

In the [13] project, a semantic portal of governmental administration is developed allowing the users the following: detection of wanted governmental administrative services, information on available services, detailed and structured information on offered services and use of public services which are available online. Several tools

have been developed for that purpose. Ontology mapping tool (mapping of conceptually different ontologies) and WSMO – PA Service Editor (a tool for semantic description of existing services).

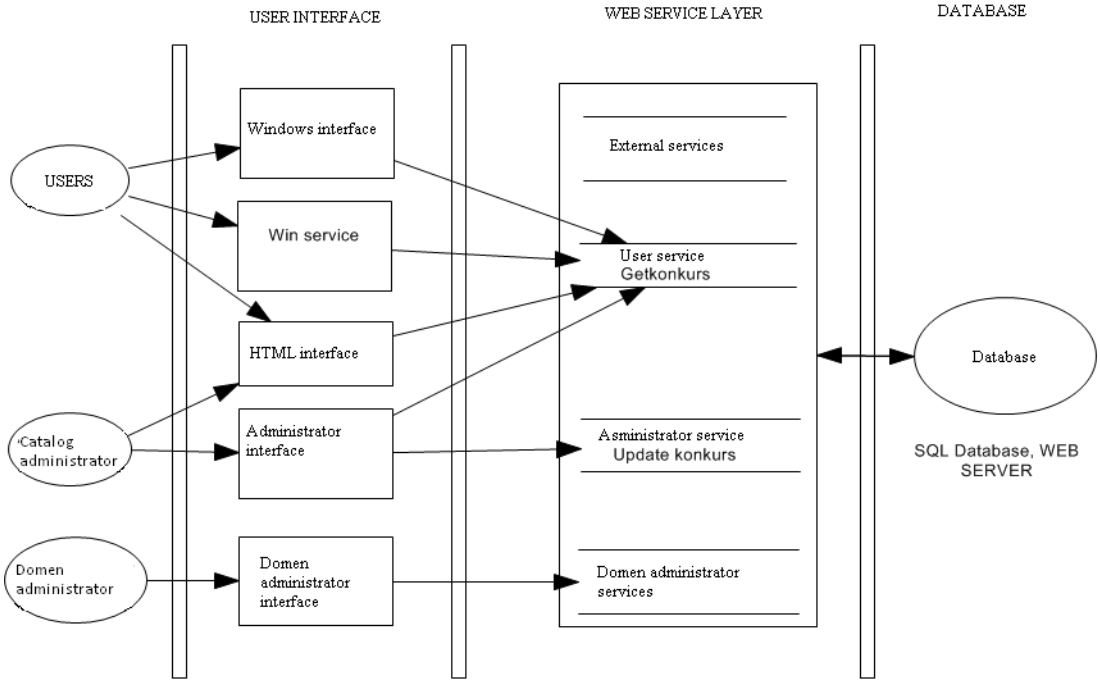

Figure 1. A proposed model of web portal of governmental administrative body

III. MODEL OF A WEB PORTAL OF AN ADMINISTRATIVE BODY

RSS feed formats are used for publishing and constant update of different information on the Web. The RSS document itself contains a brief description of content, title, as well as metadata, such as date of publication and author's text. The advantage of such a way of data publishing is the aggregation of different information with several different websites.

The user can access published information via a RSS reader programme, which can be used from the Web, desktop or by mobile interface. The standardised XML format in RSS feed allows the interoperability of access to published information. [14]

The paper suggests a system that uses DOUBLIN CORE standards in displaying the number of pieces of information, which governmental administrative bodies launch. The proposed model is composed of three layers.

The first layer is a layer of data management. This layer is represented by the database that contains the catalogs of published content (links and semantic annotation of the content). The database also contains a user registers and registers of a external web services.

The second layer is the service layer (contains external services, user service and administrator services). User services provide information about published content that meet user requirements.

The third layer represents the user interfaces that communicate with Web services. User interfaces can be divided into two group. The first group of user interfaces are client applications that are downloaded from the site and shall be executed on the local computer (user or administrator). The second group of user interfaces is WebDesktop - HTML interface that can be accessed via web browser.

Fig. 1. presents a model of web portal of governmental administrative body.

The two base services can be identified on the proposed model of web portal of governmental administrative body.

Web services

GetKonkurs web service - returns data on current calls

The user side of the service is modelled in several ways.

The user can install Windows application on a local computer. The application calls the

GetKonkurs service and presents the current state of published calls.

a) The user installs Windows application – i.e. Windows service, which communicates with the GetKonkurs service and if the query parameters are met, the information is presented to the user in the form of a table.

1.1.1. UpdateKonkurs web service – enters data on initiated activities

Local system administrators of provincial and local self-governmental bodies install a user interface of UpdateKonkurs service on local computers. Using the installed application administrators publish the information about the new competition, modify or delete published data.

A. Web service for publishing information

Service UpdatetKonkurs

Web service UpdateKonkurs – publish information. Administrators of the system of provincial authorities and local governments using the installed application for publishing information about the new competition and modifying or deleting the published data.

The input data are written into database using Update Konkurs service. Windows application user interface is shown on the Fig. 2.

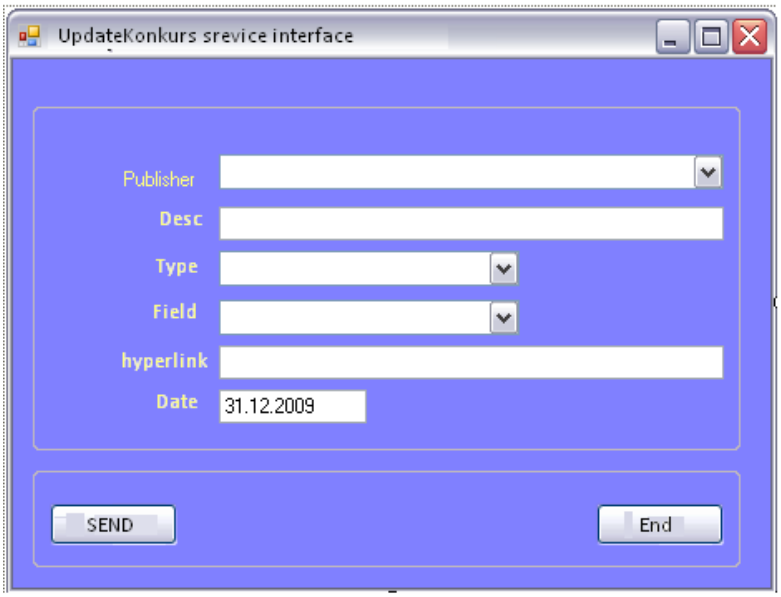

Figure 2. Update Konkurs service user interface

By selecting the option, and entering the necessary parameters administrators publish information to be entered into the database on the Web site. It is planned to enter the following information.

Publisher: The authority or local government that has announced a competition

Brief Description: Specification of the most important parameters kokursa

Type: Describes the type of action and can have the following values: competition, donations, education, employment

Field: A field that includes registered shares (Economy, Agriculture, Education, etc.)

Link: Web address where the text of the competition

Date of validity: Represents the closing date of the contest

By completing all the required fields the system administrators by selecting the Send data Button entered data into the database.

B. Web service for reading published information

Service *GetKonkurs* - This service is created using Microsoft WCF technology. With the database is connected via LinqToSql service references. GetKonkurs service provides the user the following information: List of active competition and filtered by type of activity and web address at which vacancies are announced. Based on the query parameters defined by the user, application executes the service GetKonkurs, query the database and show the records that match query criteria.The result of the query is an XML

document to be forwarded to the client that initiated calling service.

Web service using the GetKonkurs-user application displays information about the active contests. User side of this service is available to the client in the form of a desktop application that users can download from the site and install on local computer. The application call GetKonkurs service and displays the current status of the published information.

The user installs a Windows application or Windows service, which based on preset search parameters,communicates with the service GetKonkurs and if the parameters are fullfilled user receives a information about the contests that meet predefined requirements.

GetKonkurs service users are able to read service results in several ways. In this paper we presents developed desktop application (data reader).

This Windows application that is downloaded from the portal is automatically installed in the program files group of the local computer. Automation of machine-machine communication is performed by designing a application as a local service running on the local client machine. Fig. 3. shows the form of desktop users.

Choosing the link to the document, i.e. text of the call, which is in the indicated table, the user directly opens the document with the original text of the call from the current URI.

Only those calls are indicated in the table which duration date is later or equal to the current system date of the user computer.

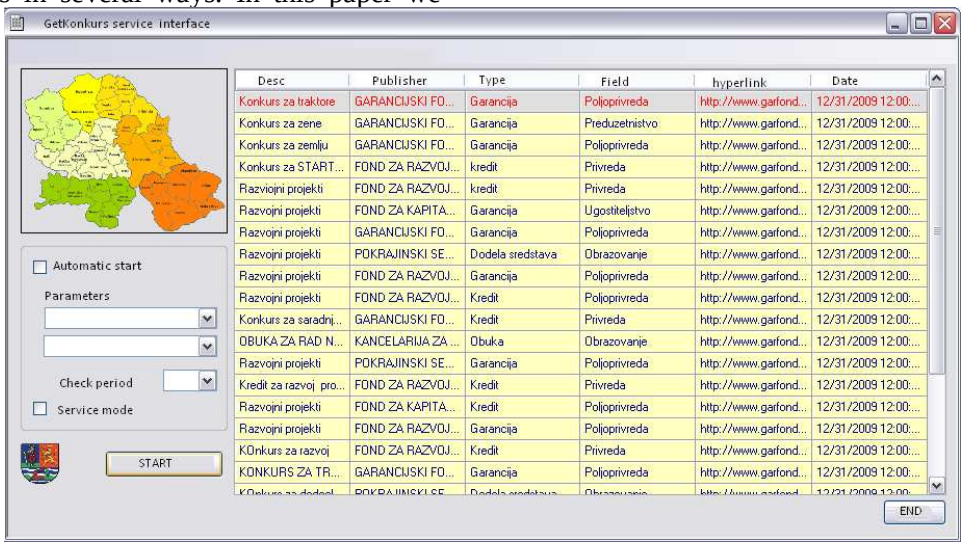

Figure 3. User interface for desktop users

IV. CONCLUSION

The paper presents a solution to the communication between web services of a governmental administrative body and service on the client's local computer. Thus, machine-machine communication has been achieved and on the basis of defined criteria by the client, the services automatically communicate without any user activity. The service user receives the requested information at the moment when the defined criteria are met. Using the mobile device technology, it is possible to improve the web portal in such a way that the results of a defined query are obtained via SMS messages. Such a portal model can be applied in all entities in the property of governmental administration, which are budgetary users, and their main activity is providing service to citizens and legal entities (Employment Bureau, Business Registers Agency, Republic Agency for SME Development, etc). Such a way of servicing citizens enables faster, more qualitative and transparent work of administrative bodies and indicates redundant activities, wrong assessments and weak responses to actions or insufficient amounts of allocated funds for specific calls.

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DEVELOPMENT OF WEB APPLICATION FOR STUDENTS' ADMINISTRATION INFORMATION SYSTEM IMPROVEMENT

Lj.Kazi, B. Radulovic and Z. Kazi
University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia
leremic@tfzr.uns.ac.rs

Abstract – This paper presents the main results of an internal project at the University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia. This project deals with the problem of efficiently of students' administration office work at Faculty and impact of information system to quality of work at that office. It also deals with the quality of services to students and possible ways of improvement. A prototype of web application is developed with the aim to enable improvement of quality of communication with students, as part of information system of students' administration office.

I. INTRODUCTION

One of internal projects for improvement of quality of work at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia is conducted in year 2010. Name of project was "Improvement of information system of students' administration office".

There are many motives that influenced starting this project. Generally speaking improvement of quality brings stability of work and enhancements to new working areas, within so called "chain reaction" (Edward Deming, [1])

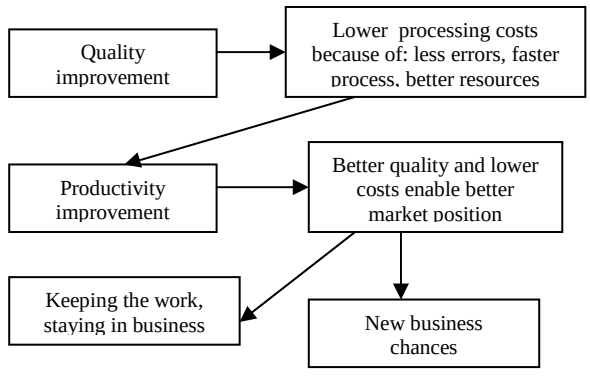

Figure 1. Deming's chain reaction of quality improvement [1]

In this paper we present detailed analysis of state of quality of information system of students' administration office at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin. This analysis presents a background for motives for starting previously mentioned internal project. We also present project elements and results. One of results is prototype of web application that could improve students' administration office information system.

II. MOTIVES FOR STARTING PROJECT

Motives for project starting are based on previous detailed analysis of certain quality aspects of students' administration office services.

A. Information accessibility as estimated study problem

Within study [2] an analysis is performed upon results of questionnaire conducted with future students, i.e. high school pupils. This study shows that possible causes of problems at higher education at university could be estimated by future students:

- Most significant: professors behavior and criteria for giving marks to students' knowledge
- Second most significant: information accessibility level.

B. Number of students living in other cities

According to sample of data from students' administration office database [3] (sample is taken for several years of students registration), there is approximately twice as much students' whose home city is other city than Zrenjanin (72%, i.e. 3718 students from sample data), comparing to those that live in Zrenjanin (28%, i.e. 1421 students from sample data; Figure 2). This analysis shows the need for remote access to daily information regarding study process events, results etc.

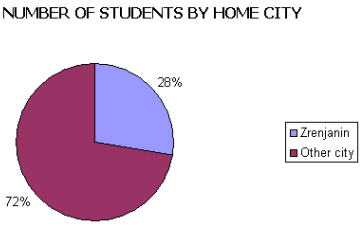

Figure 2. Diagram of number of students by home city

C. Graduate students' satistfaction with students' administration office services

Graduate students at University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin at the day of final exam, i.e. graduation day had to fill a questionnaire regarding their impressions of quality of overall educational institution services and regarding specific segments, such as quality of students' administration office services. Figure 3. presents two diagrams showing statistics of overall satisfaction with quality of overall educational institution services (F) and with students' administration office (SO). These data were collected in school years 2001/2002 and 2002/2003. During these years, questionnaires were given to students in aim to conduct continual quality checking within ISO standards requirements [4].

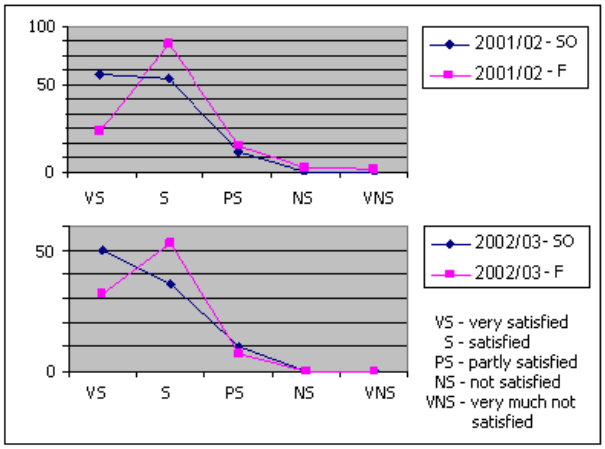

Figure 3. Diagram of overall educational institution services and students' office services quality satifaction

According to Bologna process, starting with school year 2007/08 regular quality checking is performed regarding all aspects of study process and educational institution services. Questionnaires are given to all students that are included in accredited courses. Results of statistic analysis regarding students quality satisfaction regarding students' administration office show that in school year 2007/2008 average mark was 8.45 (maximum possible is 10.00), while for school year 2008/09 was 8.50.

Even the average mark for quality satisfaction of students' administration office services is very high, still there are many students' free-form textual comments regarding issues and suggestions for improvements. These comments could be categorized as [3]:

1. Both positive and negative comments
2. Suggestions for improvements

Both positive and negative comments were given regarding behavior of employees at students' office [3]: professionalism, polite behavior, helpfulness, initiative, communication skills, patience, empathy, etc.

Suggestions for improvements of students' office quality of services include solving issues regarding: better availability and accuracy of information to students, organization of payments, working speed and correctness of employees at office, answering phone regarding information, better organization of work, errors in work, short period of working hours with students,

Students suggested that they find causes of issues in too high workload of students' administration office employees and the need for better information system, i.e. software support to speed up their work and increase availability of information directly to students (without the need for students' administration office employees work - for example - by personalized internet applications at official web site of this educational institution, where they could have access to list of passed exams and payments records).

III. PROJECT PROBLEMS AND GOALS

A. Problems

Basic problems that this project aim to solve are related to quality factors of students' administration office:

- Level of accessibility of personalized information to students
- Data processing quality and speed.

B. Goals

Basic goals of this project were related to:

- Determine state of information system of whole educational institution, particularly of students' administration office information system.
- Propose model of solution to improvement of information system
- Create a prototype of a software application in aim to improve current state of information system.

IV. STATE OF INFORMATION SYSTEM

A. State of information system of educational institution

In 2010, at project beginning, state of information system of this educational institution was as presented in Table 1.

TABLE I. STATE OF INFORMATION SYSTEM OF EDUCATIONAL INSTUTITION

LAYER	STATE
HARDWARE	computers - desktop workstations, servers, laptop printers network equipment - switch, ruter UPS devices device for automated SMS messaging
SOFTWARE	operative systems office software applications + databases web application + web site eLearning system
LIFEWARE	administrator for hardware and network equipment web administrator employees with computer skills
ORGWARE	laws and regulations

Regarding hardware, each office is equipped with workstations and printers and it is part of LAN network. Each of them has access to Internet.

Software in use (in 2010) at this educational institution is presented at Table 2.

TABLE II. STATE OF SOFTWARE AT EDUCATIONAL INSTITUTION LEVEL

SOFTWARE TYPE	DESCRIPTION
operative system	Windows XP, Linux, Windows 2000
office software	MS Office
software applications and databases	1. basic students' administration office software application and database 2. software for accounting office
web site	Web content management system for web site data publication (ASPX application and MS SQL database)
eLearning system	dLearn softver (ASP application and Access /SQL server database)
other software	software as tools in educational process multimedia software

B. State of information system of students' administration office

Students' administration office has 4 workstations with Windows XP operative system and MS Office and one workstation in the role of database server. Each of them have Internet access and use e-mail.

Software application was developed in 1994 in Fox development environment. It consists of two separate applications:

- Undergraduate studies administration (application ARSA)
- Graduate/master studies administration (application Nauka)

There is also another application developed in Visual Studio .NET environment for printing reports regarding exams, that uses basic ARSA's database.

Problems of current (in 2010) state of information systems at this office are:

- Incomplete functionality of software - it is not possible to enter all necessary data that are needed, especially for B diploma, i.e. diploma supplement.
- Statistics is not supported,
- Redundancy in administration of exams,
- Results of exams are delivered by teaching staff, which are obliged to publish exam results accurately at official web site, but sometimes students' office employees unnecessarily need to inform students about exams results by phone

Suggestions, made by employees at students' administration office, for improvement of current information system are:

- Creating completely new client/server application that could enable registration of all necessary data, as well as all other functionalities like printing all reports and statistics,
- Creating web application for students' exam registration and payments records to eliminate queues of students if front of students' administration office
- Creating web application that could enable personalized access to exam results lists, without the need for phone calls regarding exam results.

C. Strategic decisions

According to specified state of current (in 2010) information system of institution and students' administration office, problems and suggestions for improvement, there are three possible strategic directions:

- To complete (add) existing software
- To create the whole new client/server application and web application
- To buy off-the-shelf complete solution.

Each of these directions has some advantages and disadvantages.

- First direction advantages: low cost, in-house development, using existing software that employees are accustomed at, implement only additional features that are needed. Disadvantages: interoperability of different solutions, their integration
- Second direction advantages: in-house development, integral approach. Disadvantages: long time to implement,

possibly long time to test and quality assurance

- Third direction advantages: short time to start working well-tested solution. Disadvantages: dependency on software author for any adjustments to specific needs, high costs.

Within this project, strategic decision was made toward:

- Second direction: complete, in-house development with necessary development results regarding business process modeling, data modeling and software modeling
- First direction: implementation of a prototype of software that brings additional functionality that is needed and not supported within existing solution and integration of that new software to existing software applications.

V. MODEL OF SOLUTION

A. Business process model

According to text that describes knowledge about students' administration office workflow, detailed business process model has been created within CASE tool Power Designer.

The main workflow of students' administration office is presented at appropriate "swimlane", while other organization parts and actors in process outside of this office boundaries are also presented in separate "swimlanes". This way all activities within students' administration office, as well as activities that they depend upon are all presented at business process model at Fig. 4.

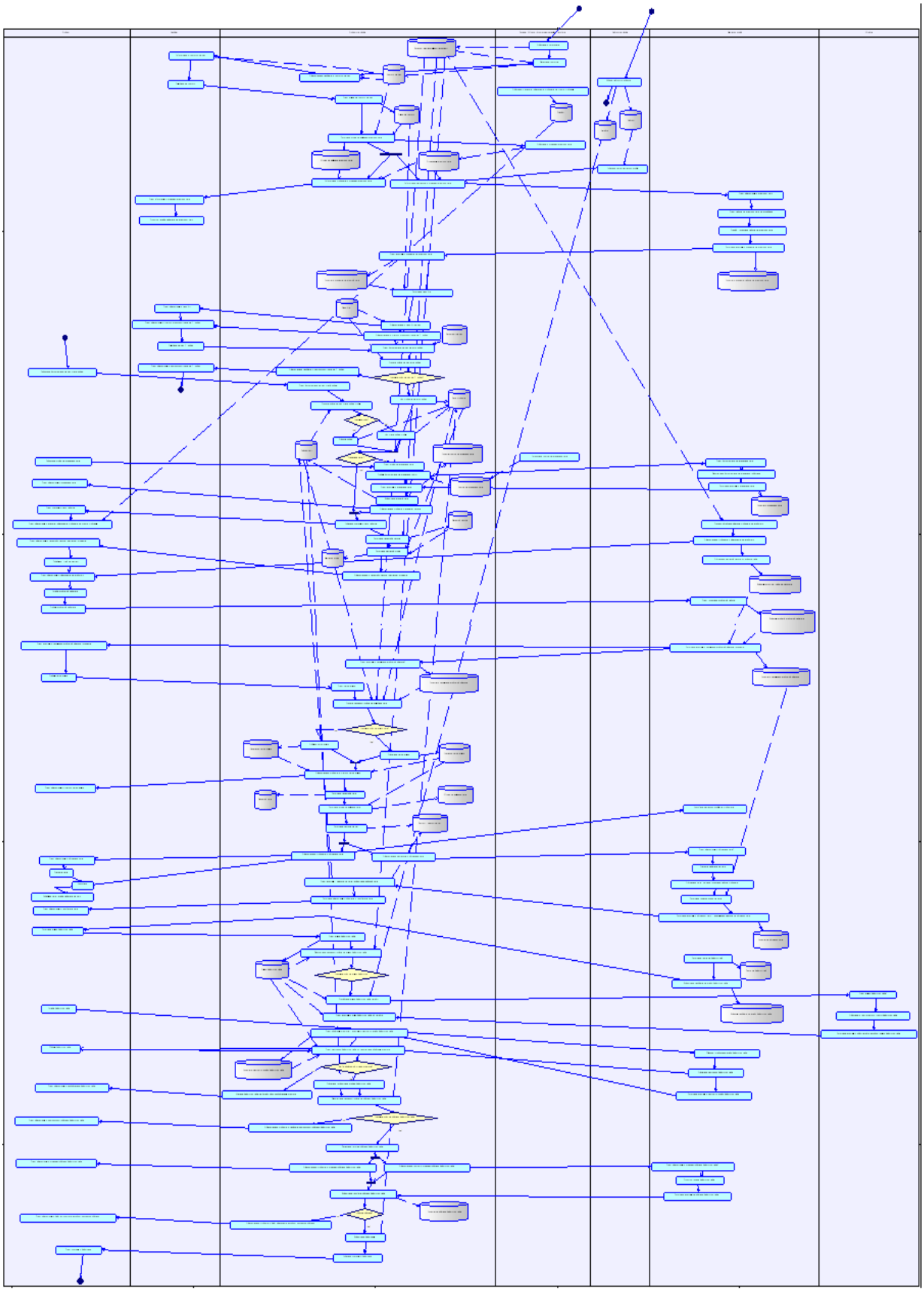

Figure 4. Business process model of students' administration office activities

B. Analysis of business process and conceptual software design

Each of specified activity at previously presented business process model has been analyzed regarding current technology and organizational aspect of functionality at this office and for each of these activities specific solution has been proposed regarding software support in client/server and web application. This analysis has been performed within a textual table with structure:

- Business activity: Working role/Actor, Group of activities, Activity
- Current state of technology/organization functionality
- Proposed new solution: Actor/User of software function, Software function, Type of application / module (Client/server, Web, SMS, e-mail)

After textual analysis and matching business activities with software functions, the complete list of actors, software functions and software modules was defined.

C. Actors

One of results of business process-to-software solution mapping is list of actors. Diagram that represents all actors (types of users by working roles) of proposed new software application is presented at figure 5.

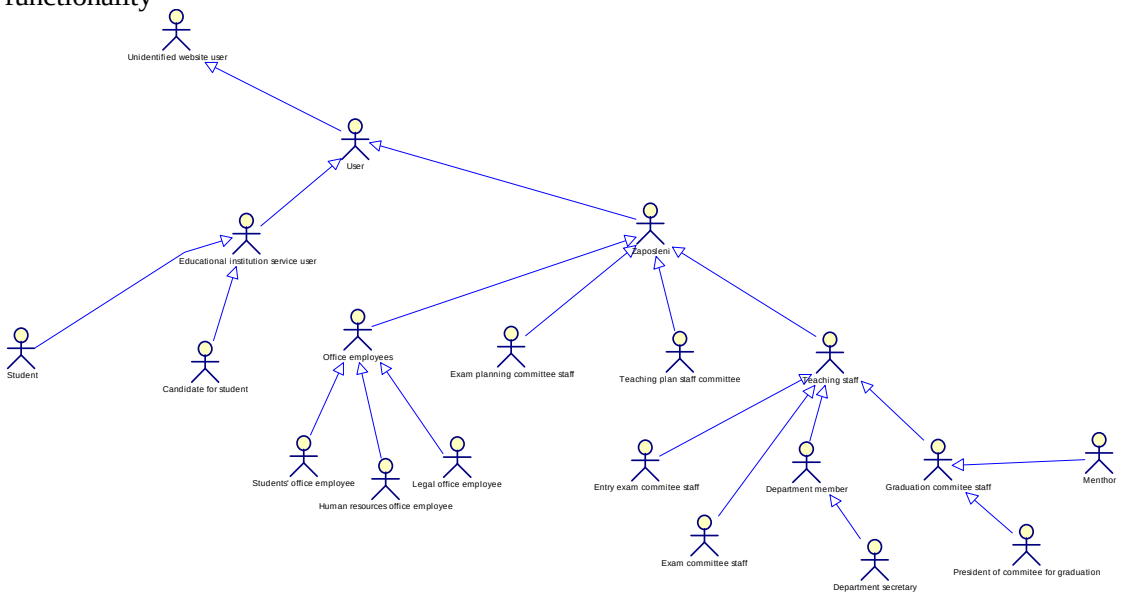

Figure 5. Actors of proposed integral software solution

D. Software modules

According to previously described tabular analysis, several software modules were identified as needed support to students' office administration as well as overall educational process (Figure 6).

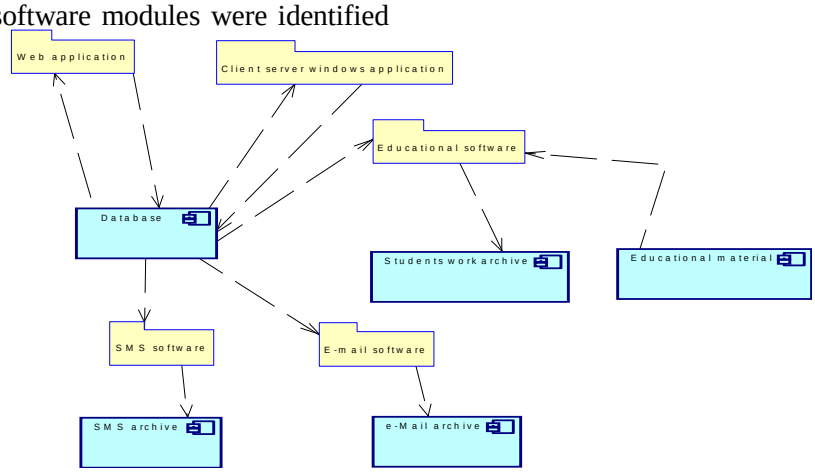

Figure 6. Software modules of proposed solution

VI. PROTOTYPE OF SOFTWARE SOLUTION

A. *Scope*

Prototype of software solution has been developed as web application that could enable students to register for exam and to be informed about exam results.

B. *Technology*

Web application was developed as three-tier application:

- Lowest tier(layer) is MS Access database.
- Middle-tier consist of Java classes (developed by using NetBeans development environment) that enable user interface to connect to database and perform queries for presenting and updating data
- User interface is JSP (Java Server Pages) web application that runs upon Java runtime integrated with web server, like Apache Tomcat web server.

C. *Database model*

Database model is presented at figure 7.

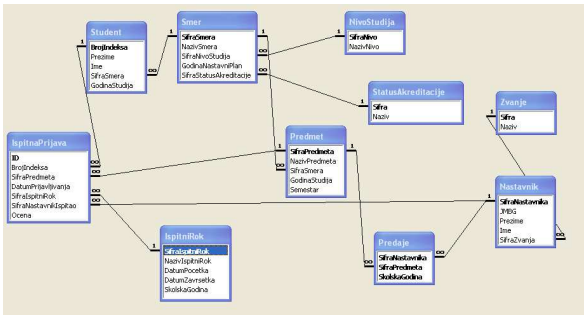

Figure 7. Relational database model for prototype application

D. *User interface*

In this section will be presented several main pages of user interface of developed prototype of web application. Figure 8. shows list of subjects/exams.

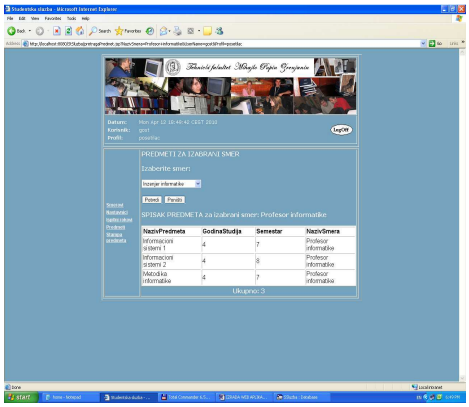

Figure 8. List of subjects within graduate course

Figure 9. shows page for exam registration by students.

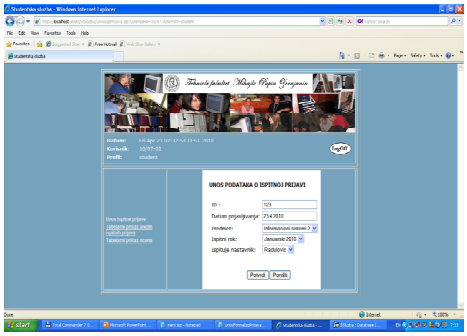

Figure 9. Exam registration by students

Figure 10. shows list of passed exams with marks for particular student (personalized display).

Figure 10. List of passed exams with marks

VII. CONCLUSION

In this paper project results of improvement of students' administration office information system were presented. Motivations for starting project, current state and the process of information system development were explained. Prototype of implemented web application was presented. Further development of system should lead to improvement of prototype and integration with existing modules of information system of students' administration office.

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HIGHER EDUCATION IN BANKING INFORMATION SYSTEMS

Lj. Kazi*, M. Ivkovic*, B. Markoski*, B. Radulovic*, O. Stanciu**
*University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia
** Tibiscus University, Faculty of Economics, Timisoara, Romania
leremic@tfzr.uns.ac.rs

Abstract – Aim of research presented in this paper is to analyze higher education in the field of banking information systems and to compare it to the needs of knowledge in this field for software industry in banking information systems development.

I. INTRODUCTION

"Banking information systems (IS) are professionally developed upon the needs of the business processes in banks. Generally speaking, there are three segments each business organization business processes: basic processes (realizing the existence goals of a company), supporting processes (enabling resources needed for basic processes) and management processes (defining rules, monitoring results of basic and supporting processes and initiating activities according to analytics of state of quality of results monitored). In the case of bank, basic processes are related to services directed to citizens, companies and other banks. Information systems technology is based on applying technology for functional segments of data updating, storing, manipulation, transport and exchange, display, query, analytics and printing documents. This functionality is supported at client/server architecture within a bank, as Internet applications for e-banking services, as well as other technologies such as ATM/POS terminal support and mobile applications. " [1]

"At Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia banking information systems education is established as a subject within education of students at business informatics course, at final year of study. Banking information system education at Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia is based on general banking business process, modern information systems technology, as well as commercially available solutions. The concept of the education process in previous years was designed as classess lectures (having Microsoft Excel lessons and MS Visual Studio NET programming lessons) and evaluation of students knowledge and skills (by partial laboratory exams and student projects)." [1]

Aim of this research is to improve technology areas of education within banking information education at Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia by analysis of trends of information technology development and using new technologies in professional development of banking information systems solutions and analysis of educational contents at universities in Serbia, South East Europe and West Europe.

II. BANKING INFORMATION SYSTEMS

Banking business processes are very dynamic. Changes to data are happening almost everyday. Banks' clients' demands regarding fast and reliable information access is especially important when clients are other business organizations. This is the reason why banks' information systems should be modern, following trends and opportunities of development of new information technologies.

Many large and complex software providers offer so-called total banking solutions (TBS), such as SAGA's TBS system [2], presented at figure 1.

Figure 1. Total bank solution from SAGA [2]

Generally speaking, banking information systems are modular systems developed upon a database, which enables support to complex bank business system as well as communication with clients.

Basic modules cover:

- Internal banking:
  - CORE banking information system [9] that consist of client-server application within banks' local area network regarding:
    - Basic business processes (with citizens, companies) - data entry, search, filter, report printing [2], [9]

- Internal supporting processes of bank as a business organization (human resources management [2], document management [8], accounting [2], etc.)

  - Management supporting processes tools - using business intelligence [9] (data warehouse, data mining etc.) and automated decision support systems for customer relationship management and segments of internal business process management

- On-line banking (includes Web, WAP, SMS) [3]

  - eBanking system [8] - support to data access and data entry via Internet by using Web browsers (Web banking [4] or eBanking by installing client/server application with data synchronization [5])

  - mBanking system [4], [6], [8], [10] - mobile banking (support to mobile devices applications, SMS, WAP portals)

  - iBanking system [7] - intelligent banking systems- intelligent content management according to CRM principles incorporated with online banking solutions), Channel systems [9]

  - B2B solutions [2], [5] - for remote connections and data exchange (XML, XLS, TXT) [5] with other business organizations and banks in country and abroad (international data exchange, specially with banks - SWIFT exchange)

- Payment systems with cards [11], ATM/POS terminals processing [2]

- Data security (smart cards [8], cryptography, passwords) [4], digital signature PKI [9]

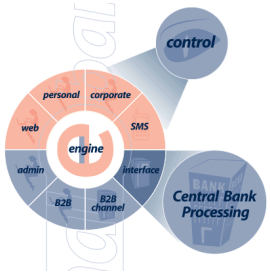

Figure 2. HALCOM products offer for banking IS [8]

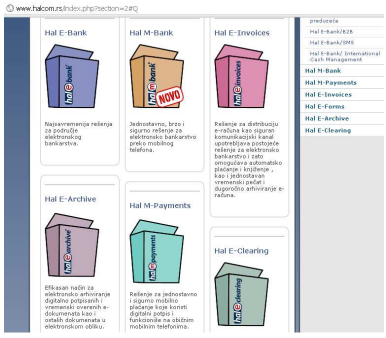

Figure 3. HALCOM new products offer for banking IS [8]

III. MODULES AND TECHNOLOGY IN BANKING INFORMATION SYSTEMS - SPECIFICATION OF KNOWLEDGE AREAS

In region of South East Europe, there are several software companies that develop and maintain solutions for banking information systems. These are: PEXIM solutions (ASSECO SEE), SAGA (New Frontier Group), HALCOM and others.

In this section we analyze technology used in solutions that are provided by these companies related to banking information systems. This way, we specify knowledge areas needed for a professional who works in these companies and knowledge that students' need to be provided by university classes.

TABLE I. MODULES AND TECHNOLOGY IN BANKING INFORMATION SYSTEMS

Module	Technology
1. INTERNAL	
1.1. Core	Client/server "multitier architectures, MS SQL, MS.NET, Java, Oracle, IBM IFW data models, DB II." [9]
1.2. Management	Data warehouse
2. ON -LINE	"Communicate with the bank through all available channels (Internet, Contact Center, IVR, SMS, Tablet, Smartphone ...) BankingOnline portal of great flexibility and high level of security, based on Microsoft technology (.NET 4.0 and SQL Server 2008 R2). " [12]
2.1. Web	"Continuous execution and monitoring of usual financial operations and necessary reporting on the Web 2.0 platform" [12]
2.2. SMS	
2.3. WAP	
2.4. Mobile apps	"Mobile banking consists of complete Java mobile banking solution" [10]
2.5. B2B solutions	"Integration with other business organization's information system by using data export in XML, XLS, TXT" [5]
2.6. e-Commerce	CRM solutions
3.DATA SECURITY	Smart cards, cryptography ...

IV. UNIVERSITY EDUCATION IN THE FIELD OF BANKING INFORMATION SYSTEMS

In this section we analyze curriculum of bachelor (undergraduate) studies of university level education in

the field of banking information systems in aim to present educational contents that is taught in higher education in this field. Major decisions regarding choosing which university will be analyzed are: a) it will be economy faculty where banking is taught; b) it will be large-city universities, while universities in small towns will not be analyzed and c) both state and private universities will be analyzed.

A. Banking information systems at higher education in Serbia

We choose several economy faculties from state and private universities in Serbia. We analyzed current (according to accreditation - last evaluated version of) curriculum of modules related to banking education as well as business information systems development education.

TABLE II. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT STATE UNIVERSITIES IN SERBIA

University /Faculty	Module	Subject
University of Belgrade, Faculty of Economics [13]	MAIN MODULE: Economy, business management and statistics	Business informatics
	SUBMODULE: Finance, Banking and Insurance	Business Information Systems (elective)
	SUBMODULE: Statistics, Informatics and Quantitative Finance	Program Languages; Business Information Systems; Data Bases; Information Systems Projecting; Data analysis
	Banking information systems course [14]	
University of Kragujevac, Faculty of Economics [15]	MAIN MODULE: Economy SUBMODULE: Finance, stock market and banking	Information technologies (elective); Information systems; Databases (elective); Internet technologies (elective); Accounting information systems
University of Nis, Faculty of Economics [16]	MAIN MODULE: Finance, banking and insurance	Informatics; e-Business (elective)

TABLE III. ANALYSIS OF BANKING IS EDUCATION AT UNIVERSITY OF NOVI SAD, FACULTY OF ECONOMICS [17]

Module	Subject
MAIN MODULE: Finance, banking and insurance	Information technologies; Information systems in finance, banking and insurance (elective); Management information systems (elective)
MAIN MODULE: Business information systems	Information technologies; Programming; Development of information systems; Business information systems; Intelligent systems; Object-oriented software engineering; Systems of business intelligence; Projecting of databases; Development of Web aplication (elective); Development of business applications (elective); Structured analysis and design (elective); Software quality management (elective); Knowledge management (elective); Electronic management of supply chains (elective); Methods and techniques of data analysis (elective); Software agents and soft computing (elective)

TABLE IV. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT PRIVATE UNIVERSITIES IN SERBIA

University /Faculty	Module	Subject
Belgrade Banking Academy, Faculty of banking, insurance and finance [18]	MAIN MODULE: Banking, insurance and finance	Information systems; e-Banking and payment
ALFA university Belgrade, Faculty for trade and banking [19]	MAIN MODULE: Economy SUBMODULES: Trade, Revision, Accounting	Basic information technologies; e-Trade; Banking information systems; Accounting information systems; Trade information systems
MEGATREND university Belgrade, Faculty for international economy [20]	MAIN MODULE: International economy and finance	Informatics

B. Banking information systems education at South East European universities

We presented banking information systems education at economy faculties from South East European universities:

- Bosnia and Herzegovina (University of Banja Luka, University of Sarajevo)
- Montenegro (University of Podgorica)
- Croatia (University of Zagreb)

TABLE V. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT UNIVERSITIES IN BOSNIA AND HERZEGOVINA - I PART

University /Faculty	Module	Subject
University of Banja Luka, Faculty of Economics [21]	MAIN MODULE: Economy	Business informatics

University of Sarajevo, Faculty of Economics [22]	MAIN Academic MODULE: Economy Management /Business Administration Applied Business	Business informatics; Digital economy (elective); Management information systems; Software for quantitative analysis; Theory of systems and informations; Business decisions; B2B marketing; Direct and Internet marketing

TABLE VI. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT UNIVERSITIES IN BOSNIA AND HERZEGOVINA - II PART

University /Faculty	Module	Subject
University of Sarajevo, Faculty of Economics [22]	Sub module: Management and information systems	Analysis and projecting of information systems; Decision support systems; IT management; Programming and databases; Competitiveness and IT; Business application of computer networks and telecommunications; e-Business; Strategic IS (elective); Database management systems (elective); System and network administration (elective); Expert systems in business (elective); Social, legal and ethic aspects of IT (elective); E-government (elective); IT economy (elective); Operation systems (elective); Application development for e-business (elective); Safety and protection of information systems (elective); Information systems development management (elective)

TABLE VII. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT UNIVERSITIES IN MONTENEGRO AND CROATIA - I PART

University of Podgorica (Montenegro), Faculty of Economics [23]	General module	Informatics economy; Informatics; Information systems; Business data bases (elective); Accounting information systems (elective)
	Sub module: Business information systems	Information systems projecting; Software tools; Databases; Decision models; e-Business
	Sub module: Quantitative economy	Internet technologies and e-Business
	Sub module: Management	Management information systems
University of Zagreb (Croatia), Faculty of Economics [24]	Undergraduate studies modules: economy, business economy, entrepreneurship	Informatics; Business information systems; Databases (elective); Knowledge management (elective); Business document management (elective); Management simulation games (elective); Security of information systems (elective); Informatization of business processes (elective; Internet marketing (elective); Information systems in trade (elective); e-Business for entrepreneurship; IT management (elective); Business communications; Information systems; e-Business; IS of production (elective); IS in office business (elective)

TABLE VIII. ANALYSIS OF BANKING INFORMATION SYSTEM EDUCATION AT UNIVERSITIES IN MONTENEGRO AND CROATIA - II PART

University /Faculty	Module	Subject
University of Zagreb (Croatia), Faculty of Economics [24]	Graduate studies module: Management informatics	Business data management Business processes management systems Decision support systems Knowledge discovery in databases (elective) Internet technology in business (elective) Knowledge management (elective) Management simulation games (elective)

C. Banking information system higher education at West Europe countries - Regensburg University

"Bankinformatik", i.e. Information Systems in Banking (ISB) as an educational module is taught at Regensburg University through several courses/subjects [25]. They are presented at table IX.

TABLE IX. INFORMATION SYSTEMS IN BANKING - EDUCATION COURSES AT REGENSBURG UNIVERSITY

COURSE /subject	Short description	Teaching hours	Assessment method
ISB I	Application of Information Technology in Banking Operations	2 hrs lecture, 1 h tutorial	written examination
ISB II	Electronic Banking	2 hrs lecture, 2 hrs tutorial	TBD
ISB III	Payment Transaction Systems	2 hrs lecture, 1 h tutorial	written examination
ISB IV	IT and Business Strategy	2 hrs lecture, 1 h tutorial	TBD
ISB V	Transformation of Banking and IT	2 hrs lecture, 1 h tutorial	TBD
ISB VI	Cryptography	2 hrs lecture, 1 h tutorial	TBD
Project Seminar		1 h lecture, 3 hrs tutorial	practical programming

TBD - to be discussed with instructor

Description of educational content for each of mentioned courses/subjects are presented:

- Information Systems in Banking I - description: Principles of banking (Role of banks in the

financial system, Products and services offered by banks, Organizational structures in banks), Structure of information systems, Support functions of information systems in banking, Management Information Systems.

- Information Systems in Banking II - description: The course introduces students to relevant basic technologies and the strategic options that are induced by IuK-Technology. In the second part of the lecture, the course focuses on distribution concepts (communication center, virtual branches etc.) and management of DV-connections. At the end of the course students get information about IT-based customer-management.
- Information Systems in Banking III - description: Lectures cover: I. Electronic retail payments: Card-based payment systems, Payment systems on the Internet, Competition of payment systems, Outlook: new forms of payment and new payment systems; II. Corporate payments: Cash management and related issues; III. Inter-bank payments: Fundamentals of large-value payment systems, Transaction processing, Liquidity and risk management in banks, Euro payment systems infrastructure. The tutorial covers: Fundamentals of cryptography, Smart card technology, Encryption using SSL, Trust center and PKI, Netting and pooling, Clearing and settlement systems.
- Information Systems in Banking IV - description: The focus of this course is on the connection between IT as enabler and Business Strategy. Basics of strategic planning are practiced (case studies). Students examine the influence of IT on Business Strategy and evaluate some strategy options (e.g. banking in E-Supply-Chain, Trust Services in E-Business etc.)
- IS in Banking V - description: This course shows the integration processes during a merger of financial services and points out the effects of E-Business on Banking.
- IS in Banking VI- description: The students get an insight in modern cryptographical methods. Topics are: One-Time Pad, DES, IDEA, AES, Public-Key-Encoding, Public-Key infrastructure
- Project Seminar -description: Students must have successfully passed AWI IV (Practical Programming) to participate this seminar.

V. CONCLUSION

Research results of this paper consist of several segments. First result is related to overview of structure and technologies in banking information systems. Total banking solutions modules are described. Sources of this research were: a) web sites of several banks in Serbia that offer variety of services to clients (citizens and organizations) by using information technology; b) web sites of software companies that are among main suppliers of software solutions for banks in Serbia. Results of this research show that there are three segments of IT support in banks: a) Internal for core banking and management support, b) On-line for communication and services with clients and c) data security segment.

Second research result is an overview of banking information systems higher education in Serbia, South East European countries and West European countries. Source for this analysis was information pack with curriculum for study modules at economy faculties of these universities.

It has been shown that in Serbia and South East European countries at economy faculties there are mostly general informatics or business informatics courses as mandatory, while banking information systems courses are elective or don't exist at all, even at banking main education modules. Economists, with special modules for banking economy, are taught to be "users" of general business information systems with theoretical knowledge in e-Business technologies, while practical work is mostly oriented to e-Office tools.

The need for particular professionals that will be able to create general business information systems and particularly banking information systems is obvious. Certain economy faculties in Serbia and South Eastern countries established special educational sub-modules for business information systems development education. Sometimes they are emphasizing their management support role and naming those modules with integrated name of management information systems, while others stay with general name related to business information systems development. Still, in Serbia and South Eastern countries at economy faculties there are no particular educational module with specific courses that would be focused on banking information systems development education.

More focused education module is found at Regensburg University in Germany. This module is named "Bankinformatik". This module provides many courses related to specific aspects of banking information systems development and enable students to focus to particular domains of knowledge according to professional needs in software industry for providing banking information systems solutions.

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MULTIMODAL HUMAN COMPUTER INTERACTION

A. Vaštag, D. Karuović, E. Tobolka
Technical faculty "Mihajlo Pupin", Zrenjanin
aruena@tfzr.uns.ac.rs

Abstract - In this paper a part of the teaching content from the subject Computer – Human Interaction which deals with user interface design is presented. One part of the subject is dedicated to designing of user interface for persons with development disorder. This paper presents educational software which can help children with development disorder to follow the teaching content more easily.

I. INTRODUCTION

Development of science and techniques, especially in the field of Information Technologies, has brought the changed relations between science and education. Changes in science influence the contents, methods, techniques and the whole organization of the teaching process: already formed scientific disciplines are connected and new integrated fields and knowledge are made.

According to its terminological and notion definition methodology as a scientific discipline has interdisciplinary and multidisciplinary character regardless the subject field that it represents. Methods in Informatics related to educating engineers represent complex scientific discipline because Informatics itself includes knowledge from a great number of sciences and furthermore, specific features of its methods are reflected in its relations with cybernetics, pedagogy, didactics, psychology, computer science and informatics itself.

Information education has a significant role in achieving general, social and civilization aims - educated and creative individual ready for challenges of information society.

Education and entire upbringing of each individual must be directed to development of entire personality, i.e. they must ensure unlimited participation in free society. EU has ruled that access to the internet is a fundamental human right. Considering the fact that Internet enables knowledge sharing and collaborative knowledge creation in ways which could not have been imagined so far, it is in the focus of development of society. [1]

II. THE ROLE OF COMPUTERS IN LEARNING

Intensive use of computer technology in different spheres of human activities has brought a new role of computers – they are getting more and more present in the process of teaching and learning. They caused and still cause the changes in the concept of education, teaching contents, teaching technology and teacher – student relations. In short, thanks to advantages that computers have in comparison to other teaching means, they have the leading position in introducing innovations in the teaching process.

Computers make possible a completely different organization of teaching, according to individual abilities and interests of students. Besides, computers provide control, regulation and managing of teaching and learning via continual feedback which represents a strong motivation impulse and makes the base of an objective system of evaluation and validation.

In elementary education, the advantages of computer aided teaching are also reflected in possibilities related to greater thinking mobility, active and independent work of students. Modern computers offer various possibilities such as simultaneous picture watching, listening to speech and the use of multimedia sources of knowledge, which contributes to faster and more complete assimilation of contents, more permanent remembering of learned units, more efficient use and creative implementation of assimilated knowledge. Computers communicate with students verbally and in written form, in dialogues, they give necessary information, graphs, pictures, films, book pages, projections, simulations, they give explanations of the presented material, clues, even offer additional instructions, correct mistakes and evaluate students' work.

III. THE ROLE OF COMPUTER – HUMAN INTERACTION IN TEACHING

There are numerous definitions of HCI. The most accepted is the definition of SIGCHCI

(Special Interest Group on Computer-Human Interaction) which says: *HCI is a discipline which deals with design, evaluation and implementation of interactive computer system made for human use and the phenomena they are surrounded by [2]*.

Computer – Human Interaction implies common task performance of users and computers; communication structure between users and computers, human ability to use computers (including the learning how to use interface); development of algorithm and programming of interface; the process of specification, design and interface implementation.

Software which is used in education represents a modern way of learning and is called educational computer software. It includes programming languages and tools, certain organization of teaching and learning which is based on logics and pedagogy. Educational computer software represents computer programs which can be used in teaching and which help and direct during phases of individual teaching process, especially if they are related to children with development disorder.

Computer which is used in the work with pre-school children must be used as didactic tool. Furthermore, the work (play) on computer in this delicate age mustn't be the purpose for itself but the accompanying content which will make children's experience richer. Nowadays, when there is a rich offer of educational software for children, children use computer as a source of information, as a help in development and creation of new ideas, as a help in learning foreign languages, for adoption of basic information knowledge. Technology progress imposes the change in methods of work at the very start of education.

Designing the educational software (OS) is an enormous challenge. The OS of a good quality relies on a relationship between a child and the computer. It is very important to include children in designing process of OS, because they do not hesitate to show their feelings or thoughts.[3]

When we want to speak about interactive educational software, first we have to define interaction in education. There is, for sure, no education without interaction. In the same time, it is not possible to imagine educational software without interaction. Interaction begins in the earliest phase of personality development, first in family, then in school, among friends, at work place….

Interactive- communicative aspect can be seen as an aspect of education along with two others: social – generational and individual aspect of personality development.

Interaction between students and interactive educational software is bridged by user interface or GUI (Graphical User Interface), and the main aim of user interface is improved Computer – Human Interaction.

In order to create a quality software which is user oriented it is necessary that user is involved in development process of software. The aim is to understand: users' work tasks, their mental activity at solving these tasks and the tools which are already familiar to them.

Nowadays, there is a lot of talk about inclusive education and making the teaching process easier to children with special needs.

IV. THE EXAMPLE OF EDUCATIONAL SOFTWARE WITH THE ELEMENT ... : ENGLISH ANIMAL QUEZE TUTOR

Engineers of Informatics are educated at Technical faculty «Mihajlo Pupin». Within the subject Computer – Human Interaction, at the third year, students are supposed to write Seminary paper in the form of educational software. Software is realized in many various tools but the most frequently used is Microsoft Visual Studio. This paper will represent student's Seminary paper which contains numerous aims in education of children.

Nowadays, when learning and knowing foreign languages, especially English, represents a significant fact for children there is a need for creating such a software that will teach children through games in an interesting way so they won't be aware that they are learning. By using these educational software children do not learn only the language but they can be paralelly introduced with computers, their techniques and the way they function. **English Animal Queze Tutor** is an educational software which teaches children in interesting, interactive way.

The program is designed for children from 5 to 10 years of age. Governed by scientifically proved fact that the best and easiest way of learning is through visual and auditive methods, the concept of this interactive, educational software is based on the principle that children learn via their senses

of hearing and sight while using this program. Children can read the names of animals and there is a picture below each answer, so they can connect the picture with the name after answering correctly. If a child can't read, there is an option that a child clicks on the answer by using a mouse. The answers are spoken and the child surpasses the barrier caused by illiteracy. This software encourages a child to learn the letters by memorising the way of writing and speaking.

The program can be started on any kind of computer with the installed MICROSOFT Windows XP or a newer MICROSOFT Windows operation system with a minimum resolution of 1024 x 768. **MICROSOFT Visaul Studio 2010** is used for design , the language **c#** is based on **NET Framework 4.0** and as a data base is used **XML.**

Figure 1 – Elementary window

In the Picture 1 we can see the elementary window which is visible after starting the program. A computer chooses an animal from the data base at random and it puts its name in one of three offered answers. It is interesting that the correct answer can never be found at the same place nor it is coloured with the same colour or is written with other two wrong offered answers. The offered answers are in different colours (RGB) and therefore the software is interesting to children. Color represents sensitive experience which is the result of reaction of retinal receptors to the light of certain spectrum. We also attribute color to object surfaces, materials, sources of light, etc. depending on their abilities of absorption, reflection or emission of light spectrum. Red, orange, yellow, green, blue and purple colors chronologically follow each other in eye spectrum, i.e. set of colors which can be recognized by human eye. [1]

After answering correctly various information about the animal are presented and it is possible to change the colour (fig. 2) and the size of letters (fig. 3).

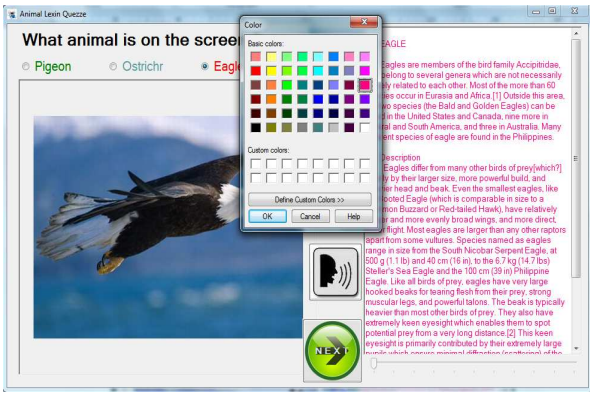

Figure 2 - Changing the colour in software

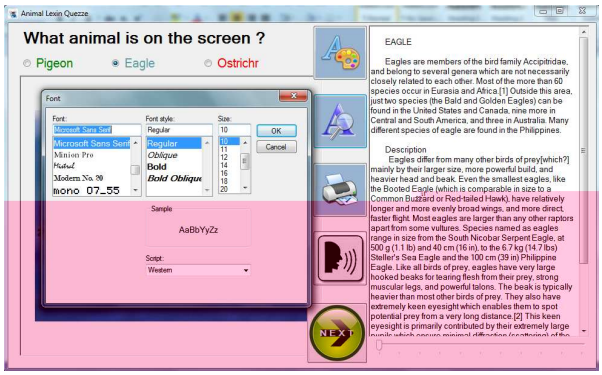

Figure 3 - Changing the size of letters in software

In order to make information about the animal more interesting and attractive to children with visual impairment it is possible to enlarge the size of the letters additionally (fig. 4) below the information about the animal.

For the given functions there are icons which unambiguously illustrate their purpose. There is also a button for printing information which can be read at the moment.

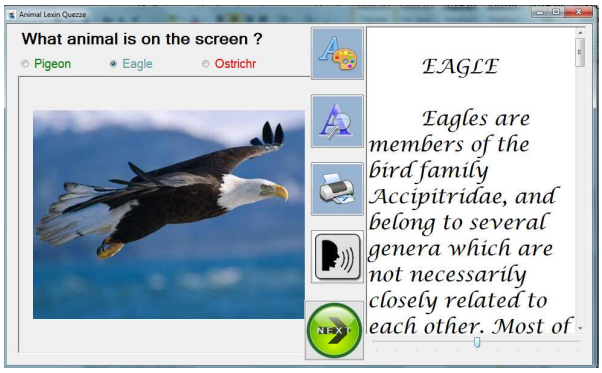

Figure 4 - Enlarging the size of the letters additionally below the information about the animal

In order to make the program more interesting to children, reading is also integrated (by means of MICROSOFT Speech SDK 5.1) Information are obtained by clicking the button which indicates this possibility. This option has numerous aims:

- teaching

- gives help to children with hearing impairment
- teaches pronounciation of foreign words
- stimulates the wish for learning reading.

V. CONCLUSION

The use of computers at the age of pre-school children encourages development of speech, reading and writing, not only related to native but foreign language as well. By means of computer small children learn a foreign language naturally because it is a critical period of life for speech development.

Computer positively influences psycho – motor abilities of children, for example, it is possible to play their favourite music on computer and they will dance. Development of fine motor abilities and motor ability eye – hand is very important. It can be done by using a keyboard and a mouse. It can be often seen that a three-year-child watches arrow movement on the screen and uses a hand (sometimes both hands) to move the mouse.

The aim of this project is to help children achieve new knowledge, add new knowledge to the previously achieved one, introduce themselves with computer work by means of interaction, along with amusement and play.

Secondary aim of this paper is to present education of Information engineers, in other words, to enable them to realize software for children with development disorder as better as possible. Evaluation of educational software is important but not a simple task.

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EXPERIENCES OF APPLYING WIKI IN UNIVERSITY COURSES

M. Mandić*and M. Ivanović**

*Faculty of Education/Department for Informatics and Media, Sombor, Serbia

**Faculty of Science/Department of Mathematics and Informatics, Novi Sad, Serbia
milinmand@gmail.com, mira@dmi.uns.ac.rs

Abstract - Wiki is one among the Web 2.0 technologies with an important role in education. Wiki is able to improve the process of education through cooperation among students. The paper presents wiki's advantages and disadvantages in general, its possibilities and flaws when using it in education. We present wiki's specific applications at several courses classified into fields and suggest its use at two study programs at the University of Novi Sad.

I. INTRODUCTION

Wiki [1] represents means of a quick and simple change of content directly at the Web page. Any reader can also be a web page creator, which means changing text, making hyperlinks, adding pictures, video or sound records and all that – using any Web browser. Reference [2] supposes that the knowledge created by the whole group of users („the wisdom of the masses" [3]) is greater than the individual one, which is supported by the fact that a group creating wiki pages is the one reading them.

Wiki represents one of the main components of Web 2.0 technologies and a support to collaborative modern classroom [4]. Regarding the current e-learning tools, wiki shifts the focus to construction of knowledge, rather than presentation of information, often giving students an active role in the formation of knowledge representations [5]. As a form of social software, wiki is easily and quickly adopted by students in some forms of the education process.

Higher education has only recently started researching wiki's potential educational implementation as a means of promoting „deeper learning and integration of learning experiences from inside and outside the classroom" [6].

The earliest documented implementation of wiki in education was at a college level within Georgia Institute of Technology, where the first version of CoWeb, a variation of the original WikiWikiWeb, was developed in 1997. „The extreme flexibility and lightweight nature" of the wiki technology has, in time, led to the growing number of wiki's implementations in education [7]. As expected, the first official researches that used wiki in education were done in computer science courses. In the last few years, Wikipedia has made the idea of wiki more popular and has introduced it into education process more.

Teachers from some faculties at our University also started to use potential of wiki as a part of educational processes within appropriate courses. Some possible applications and usages of wiki are discussed and first experiences are presented in the paper.

The rest of paper is organised as follows. The second section presents wiki from the perspective of its educational use, collaborative features, advantages and disadvantages of its application in education, and examples of wiki's specific use in chosen fields. The third section analyzes its current use at the University of Novi Sad (specifically at the Faculty of Education in Sombor and Faculty of Sciences in Novi Sad), and the possibilities and plans for its future use. In last section some concluding remarks are given.

II. USING WIKI IN EDUCATION

According to [8], cooperative teams of students have reached a higher level of cognition and longer memory of information than students who have worked individually. Cooperative learning, by [9], leads to positive interdependence of the group members, individual responsibility, face-to-face interaction, but also to developing appropriate collaborative skills. According to [10] collaborative learning in wiki takes place when students comment or change a page and "reflect" what they have learned, which, according to [11], helps construct own knowledge and improves meta-cognitive skills. Wiki has important elements of „communities of practice": a virtual presence, a variety of interactions, easy participation, valuable content, connections to a broader subject field, personal and community identity and interaction, democratic participation, and evolution over time [3].

Wiki leads to immense differences in relation of authority between a teacher and a student if traditional learning is concerned. Reference [12] states that teachers are no longer obliged to control the whole learning process. In wikis, they are not necessarily the only organisers of student activities, distributors of student material and tasks [12]. Since constant surveillance carried out solely by a teacher is not practical, it is possible to assign administrative right to students who are then in charge of the page content, the changes made and who make the necessary revisions. Awareness of the existence of a wide public may raise students' responsibility and motivation in creating a proper and relevant content [3]. Moreover, being anonymous and hidden behind the group might encourage individual students to be more active in performing group tasks and stating critical opinion [13]. Previous studies have shown that some students make progress even while not directly contributing to the joint project, a feature known as "lurking" [14].

According to [15], using wikis in education without including other approaches and tools does not guarantee more efficient learning. Although researches ([16]) show that students are more likely to use wiki than traditional methodology, wiki does not necessarily have to lead to interaction among students, but what is required is that teachers create a more efficient model that promotes critical opinion and collaboration within groups of students [17]. Results in [18] show that a student's attitude towards group work can be problematic/mixed and that wiki, does not improve students' habits in collaborative work.

Since students, when experiencing wiki for the first time, might feel anxious because of being potentially criticized and the result of their work be widened/changed by other students, or even erased, teachers, according to [3], should meet students with the fact that content editing is wiki's internal feature and collaborative learning requires cooperation and direct exchange of ideas. „Collaboration, rather than competition" should be, by [3], affected as a main goal of any „wiki-based activity".

Reference [19] states several possible applications of wiki in education:

- for developing research projects and presenting ongoing documentation of students' work,
- for adding summaries of their thoughts from the prescribed readings,
- for publishing course resources like syllabi and handouts,
- as a knowledge base,
- for tracing various versions of documents,
- for mapping concepts and for "brainstorming",
- a tool for presenting, such as a conventional software,
- for collaborative work and group learning.

In the rest of the section we will mention only some fields where wiki can be applied: computer sciences, mathematics, engineer application.

A. Using Wiki in Computer Science Courses

In [20] wiki is used within a project-based course in software engineering. Wiki is applied in collaborative work for: Project planning, Requirements management, Project tracking/progress reports, Test case management, Defect tracking, Client notes, Developing user documentation. Wiki was used as a tool for controlling various versions of documents and as a substitution to costly commercial defect-tracking tool. Article [21] recommends using wiki in software design for creating project documentation.

In the course in Information Systems and Technologies [22] students, divided into groups, have created a knowledge base from the given field.

Within the course in Computer Sciences [23] wiki is used for studying data structures and algorithms; students have recorded program code and diagrams and saved links to useful web pages related to the course. Wiki has also been applied for coordinating teaching activities: classifying students into a specific group/team, distributing topics among teams, determining dates for group meetings etc.

Reference [24] suggests applying wiki in teaching programming to students-beginners. Wiki „can foster learners' ability of algorithm thinking through processing of sharing ideas and collaborating on a work with learners". Students give their solutions to the problems and compare them to other students. The phenomenon of „lurking" has been used here, too: students with lower levels of skills and knowledge might learn by watching how advanced students correct mistakes and optimize algorithms.

Wiki makes it easier to repeatedly reuse software solutions in new projects and systems [25]. It has been proved that wiki is at great

advantage with many of the existing software solutions in terms of the following: repeated use of information, exploring and sharing information (particularly those related to requirement phase in software development and complete documents), and higher trust into knowledge transfer.

Reference [26] shows application of wiki based project within the „New Media Technologies" course. Students have, by applying (Media)wiki, developed *M/Cyclopedia of New Media,* an encyclopaedia consisting of a collection of topics and concepts in the field of new media.

B. Applying Wiki to Other Courses

In [27] wiki has been used in a Mathematics course in a German high school for collaboratively solving and elaborating mathematical problems, and for presenting results they have obtained through group work. In [28] students generate the content and mathematical quizzes in wiki. In [29] a semantic Wiki was developed and used as a mathematical resource for both teachers and students, with several hundreds of examples. Wiki has been used in [30] in learning statistics in collaborative writing, discussion and review, glossaries, statistical projects, self-reflective journals.

Students at Faculty of Mechanical Engineering [31] use wiki for collaborative product design. Wiki provides simple recording of the ideas on design principles, which makes them quicker and easier for downloading and using. This is why, in [32], wiki is used for students of Engineer Design course in the stage of generating basic concepts during the design process. In [6], within the project based course of engineer design, wiki was chosen in order to enable the students to gather, organize, and share their writing, photos, videos, presentations, and other digital artefacts.

III. SUGESTIONS FOR APPLICATION OF WIKI AT THE UNIVERSITY OF NOVI SAD

A. Faculty of Sciences, Novi Sad

At Department of Mathematics and Informatics, Faculty of Sciences different modern educational tools and software systems have been using for more than two decades. Starting from first educational software developed at the Faculty for preparation of lessons and their usage for learning at different levels of education [33], [34] until everyday usage of contemporary LMS and recently introduced eLearning 2.0 and collaborative activities.

First experiences in usage of collaborative tools we obtained after introducing usage of wikis and blogs in an introductory eBusiness course. Collaborative work was introduced to first-year students and this was convenient since we had a lot of students, unfamiliar with their classmates and the course of studies, but very familiar and willing to use modern Web tools. Main goal was to group students in teams consisting of 3-5 members and allow them to go through several steps of an imaginary eBusiness development. This not only gives them possibility to learn how to more productively use Web 2.0 tools, but it also helps them in gaining soft skills and team communication.

The first experiences were more than satisfactory – results at the end of a course showed more realistic mark distribution than before and the use of collaborative tools (e.g., wikis and blogs) proved to be justifiable, especially in the circumstances where personal team work was not possible.

Collaborative work was a challenge for students, but also for teachers that had to introduce it to first-year students and carefully track their advancement. The usage of wiki was suitable, since there were a lot of students, still unfamiliar with the topics of the course and their colleagues, but skilled and willing to use modern tools online on daily basis.

After rather successful usage of collaborative tools in this introductory course we try to spread similar activities to other courses. Last year we started to use wiki in Software Engineering course for 3rd year students. During the entire course, students have to solve seven relatively small assignments. To do that in appropriate software engineering manner they are divided into teams and teachers expect their cooperation and collaboration in order to successfully solve these assignments. So it seems that usage of wiki will be good solution to support team communication activities. After preliminary positive experiences we expect to continue in the future with more serious usage of modern collaborative tools.

In spite of fact that similar courses at our university are quite rarely offered in this way, especially to first-year students we gained very positive experiences and we are going to use such system of work also within other courses in which practical aspect of the course is based on team work.

B. Faculty of Education, Sombor

The „Media designer in education“ study program at the Faculty of Education in Sombor has been applying wiki (within the Moodle LMS) since the academic 2010/11 year within the courses related to media and computer sciences. The „Designing Media in Education“ course applies wiki in collaboratively creating resources which are related to using media for educational purposes. The task is to create a knowledge base in this field. At the beginning of the course students are divided into groups and teacher presents to them necessary information:

- explanation of tasks,
- topics to be elaborated by each group,
- way of gathering and updating resources,
- principle of grading and
- guidelines to using wiki technology.

Other information, like a list of group members, assigned topics for each group, time frames for implementation of tasks etc. are put on the home wiki page as well. Students are given their user names and passwords and they then create their own page and profile at wiki. They are also motivated to regularly track the changes made by other students within the same group, but also to follow and use the topic created by students in other groups. Although they have not been assigned authority to change the content of the students in other groups, quoting and commenting these topics is allowed (and desirable). Default Discussion page, which already exists in the wiki application of Moodle LMS, is recommended for communication. Wiki is, during the course, used for coordinating teaching activities and uploading all necessary information for the course. There are several criteria included in each student's final grade. The quality of the final text created by the whole group is what is primarily graded, but the grade includes quantitative indicators of individual contribution: the number of changes entered by each student; the number of readings; comments; how long a text, contributed to by certain students, remains in wiki before it has been changed by some of the other students (this method is, according to [35], resistant to manipulations of its users, i.e. to artificial editing of pages with the goal of raising the rates). The grades and the final report, at the end of the course, are uploaded in wiki.

Course evaluation, in its first academic year of using wiki at the Faculty of Education, was carried out orally, by talking to students about the advantages and disadvantages they see in applying wiki technology at the courses attended.

Since curriculum for study program „Media Designer in Education“ includes to a great extent the courses in the field of computer science, students gain advanced computer skills in variety of subjects, and very quickly, without resisting the new technology, master the wiki software. The reason for this is, naturally, the simplicity which, according to students, is characteristic for the used wiki application, but also the fact that some students have already individually edited some articles in Wikipedia. Current experience shows that students gladly use wiki for collaborative work in the tasks assigned. When compared to similar courses implemented without using this tool, they themselves claim, make progress much quicker - while doing collaborative work at the same time they learn the content included at their group's task. Even objective parameters indicate the efficiency of wiki technology being applied: when compared to the previous academic year when wiki had not been used within the same course, the total average grade of all the students was higher. Nevertheless students pay little attention to the changes entered by students from other groups, although this affects their final grade. We can see also that those students who have not directly contributed to the final content, made some progress („lurking“). Still, in some occasions, more ambitious students (mostly those with higher average grades) were less motivated in the beginning due to the anxious feeling that „it is them who do all the work“. But once they have got to know the principle of grading and the fact that the teacher is monitoring the contribution made by any single user account, they have become fully involved into collaborative work.

Other courses, too, devoted to designing various forms of teaching material can implement wiki for collaborative development of ideas on principles and ways of designing educational content, including brainstorming. Moreover, as the curriculum for this study program contains courses based on modern programming languages, wiki can be used for learning programming in the way similar to the one described in [24]. The possibility of applying wiki is particularly important with the courses intended for project work of students organized in teams. So, wiki can be used for collaboratively creating and maintaining the entire project documentation that could further be included into all the stages, such as those listed in [20].

After these first positive experiences, we recommend using wiki in other study programs at

the Faculty of Education in Sombor, particularly for primary school teachers, in order to improve teaching. At methodology courses (of various disciplines like mathematics, art or music, nature, social sciences, physical education etc.) students can use wiki for keeping diaries for practice classes which would include current reports on the results achieved, goals, methods, results etc. Since the winter semester of the current academic year (2011/12) within the Educational Technology course, wiki has been applied in collaborative design of tutorial on using technical means and software applications in educational processes.

IV. CONCLUSIONS AND FUTURE WORK

The significance and the possibilities of applying wiki in education, its availability and wide choice of open-source software, the easiness of installation and application all make wiki one of the most important and prospective information education technologies. It seems that usage of wiki in the teaching process for both teachers and students will rise. The paper presents a number of advantages and possibilities of applying wiki in education. The authors' first experiences in applying wiki technology at the courses within the University of Novi Sad, indicate that wiki improves cooperation among students and enables agility. Still, many issues should be addressed or solved in the future:

- Does wiki increase or decrease plagiarism?
- Do students and to which extent approach the administrator role responsibly?
- Do wiki applications provide enough quality information for objectively grading students' contribution?
- How to improve the process of grading; which and whether to apply one of the data mining techniques?
- As with the other distance learning technologies, there is a dilemma should the given grade or a student's contribution be included into legitimately forming the grade in a specific course, having in mind safety risks and the possibility of using other people's identity?
- Does wiki, by being simple to use, raise or reduce students' affinities towards web design and more advanced solutions in the fields of web application design?
- In what way does this, collaborative approach, regard the best and most ambitious students?
- In what way does it regard less ambitious students; are they included into the teaching process more or less when compared to the traditional approach?

In order to address some of the issues, the authors' goal is to do an objective quality and quantity research at the end of the current academic year within the courses that apply wiki technology. Moreover, it is necessary to develop awareness on the possibilities and advantages of wiki's application in other study programs and courses at the University of Novi Sad. Our future work would be directed towards that goal.

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ANALYSIS OF THE USE OF THE INTERNET AMONG SCHOOL AGE CHILDREN

M. Blagojević, N. Stanković, Ž. Micić
Technical Faculty Čačak, University of Kragujevac, Srbija
marija_b@tfc.kg.ac.rs

Abstract - The paper presents the results of the research on the use of the Internet in Serbia conducted among pupils in primary and secondary schools. The usage characteristics, the effects and provided possibilities, as well as suggestions for improving the teaching process have been clearly established. At the same time, the paper presents a comparative analysis of the Internet with other IT fields in primary school curriculum. The forthcoming paper pertains to the segment that covers the analysis of the Internet in secondary schools and includes a continued research to determine the effects of the use of social networks in the teaching process.

I. INTRODUCTION

The use of computers and the Internet is integrated into nearly all facets of daily life and provides the necessary information about all areas of life. Children are part of this new system, using the Internet as a learning aid and developing skills through the use of computers. Considering the advantages of the Internet in learning, the increasing use of the Internet by children is evident both in school curriculums and in extracurricular activities.

Regardless of the increasing use of the Internet by children, there is still an insufficient number of definitive research results dealing with the effects of such use [1]. This question is in correlation with the temporal dimension, as well as "geography" i.e. the local environment in which the best solutions are reached (the state, the school administration, the region, the municipality, the school, the family, the individuals etc. [2]).

TABLE 1. INTERNET ACCESS IN SCHOOLS (SERBIA - UNITED KINGDOM)

	2000 (%)		2004 (%)	
	Primary	**Second.**	**Primary**	**Second.**
UK (EU)	86	98	99	99
Serbia (Valjevo)	2	20	43	82

This study was supported by the Serbian Ministry of Education and Science (Project III 44006, http://www.mi.sanu.ac.rs/projects/projects.htm#interdisciplinary).

The use of the Internet in Serbian schools in recent years was lagging behind in comparison with the developed countries of EU, [2]. Table 1 presents an extract from a comparative overview of schools with Internet access, given in percentages (United Kingdom – Serbia, the illustration is based on the example of the school administration of Valjevo which comprises 100 schools, 72 of which are primary schools and 28 secondary schools).

In this paper, the use of the Internet among children of school age is analyzed with regard to the following effects it produces:

- Educational: with the primary aim of improving teaching, the learning models and the knowledge and skills, as well as providing opportunities for better training of teachers and students, etc.
- Social: The use of the Internet should not affect a child's social life, which is exactly what comes to the foreground in the research results.
- Health: The time that children spend at a computer should be carefully balanced with the physical activities they should take.
- Familial: The need for guidance and support, as well as responsibility for behavior on the Internet of every individual in a family community.

The focus of this paper, as well as previous ones [3], is on the educational elements and the place of the Internet in the teaching process. There are many levels ranging from the state to the individual, which is why this path is cut short in the paper: from the state level to the level of individuals in the system of education.

There are a number papers which deal with some of these effects and which analyse the effects of the Internet on the users of school age. The

increasing use of the Internet among children of school age, as well as recommendations for the school and the family environment are indicated in [1].

The research part of this paper determines the effect of the Internet on the socialization of boys and girls (in correlational analyses), as well as on the leisure activities of children of school age. In this regard, some authors (as in [4]), have conducted a research with the aim of determining the effect of the Internet on psychological, cognitive and social development. The results of that research indicate that the Internet has a negative effect on the relations between friends or family members, but they also point to the need of educating parents in order to overcome these negative effects.

There are many ways in which the Internet can affect learning, but this paper indicates directions that may be useful for future data collection procedures and analyses in empirical studies. The study of skills and characteristics of juvenile users of the Internet through the model of e-learning is presented in [5].

With regard to this special group of the Internet users (children and adolescents), there is a need for a new field of developmental psychology [6], which may be of relevance for target effects of education with the aid of Internet communications.

II. PURPOSE OF THE STUDY

Bearing in mind the increasing use of the Internet among children of school age, there is a need to explore the ways and purposes of using the Internet, as well as the effects and characteristics of the aforementioned group of users.

A. The tasks and the goal of the research

The goal of the research is to obtain detailed information on the modes and features of the use of the Internet among children of school age.

In addition to a comparative analysis of the use of the Internet for educational purposes (chiefly in primary schools in Serbia), the tasks of the research were also performed:

- Questionnaire construction
- Survey sampling
- Conducting a survey
- Analysis of results

III. RESEARCH METHODOLOGY

A. The sample

The paper applies a methodological approach to analyzing the use of the Internet along with other standardized IT fields. This approach is of overriding importance for the levels of educational processes.

The survey is based on a sample of 446 pupils (both from primary and secondary schools). Table 2 presents the characteristics of participants of the survey. The questionnaire comprises 20 open-ended and closed ended questions.

TABLE 2. PARTICIPANTS' INFORMATION

Gender	Frequency	Percent	Valid percent	Cumulative percent
Male	223	50,0	50,0	50,0
Female	223	50,0	50,0	100,0
Total	446	100,0	100,0	

The sample was obtained from the school administrations of Čačak, Kraljevo, Užice and Kruševac during the year 2012. The sample consists of 192 pupils in primary schools and 254 pupils in secondary schools.

The level of IT equipment in 12 school administrations in Serbia was determined in the course of previous multi-year researches. The research methodology of the temporal difference (i.e. of lagging behind, according to Benchmark parameters) in equipping schools in Serbia with IT is laid out in previous papers.

B. Tools

MS Excel 2003 [7] was used for data processing and the visualization of the results of the survey.

IV. RESULTS AND DISCUSSION

This section presents the results of comparative analyses of the use of the Internet on the basis of two subjects in primary schools, as well as a conducted survey. The results of the survey are given on the basis of the specific questions the pupils were required to answer.

Owing to the heterogeneity of curriculums in secondary schools, these analyses have been left out. Likewise, the paper does not present the analysis of the entire questionnaire. Only the questions that are relevant to the above-mentioned target effects (see introduction) are presented. The questions that are not shown in more detail relate to the mode and frequency of the Internet access, as well as to familial and social effects). In most

cases, pupils use the ADSL connection, and the amount of time they spend on the Internet is approximately two hours a day.

This paper does not present the analysis of the results of the survey:

- with the answers and opinions of teachers and parents
- on the basis of curriculums and the use of the Internet in educational institutions
- with a comparative analysis of these results with the results in the educational institutions in the countries of the EU or in other developed countries, with the use of corresponding Benchmark parameters.

A. The survey

What follows is a list of questions analyzed in the paper.

1. What do you use the Internet for?

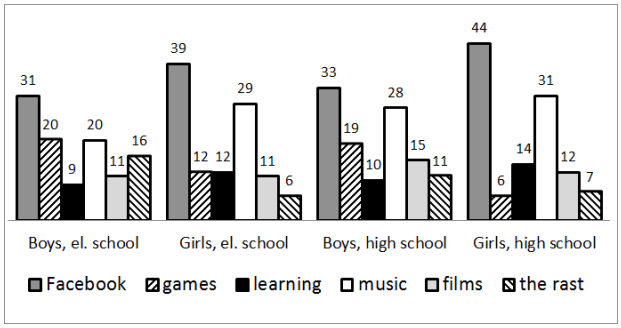

Figure 1. The purpose of using the Internet

Figure 1 shows the answers regarding the purpose of the use of the Internet by pupils in primary and secondary schools. Facebook contacts have the highest percentage (33%), immediately followed by music (24%), games (13%), films (12%), learning (10%), etc. The highest percentage of students (both in primary and secondary schools) opt for the most used social network. This is true of pupils of both sexes. These results should be used in terms of learning opportunities through the network that pupils mostly use and including this network in the teaching process.

2 Do you have a profile on any social network (Yes/No)?

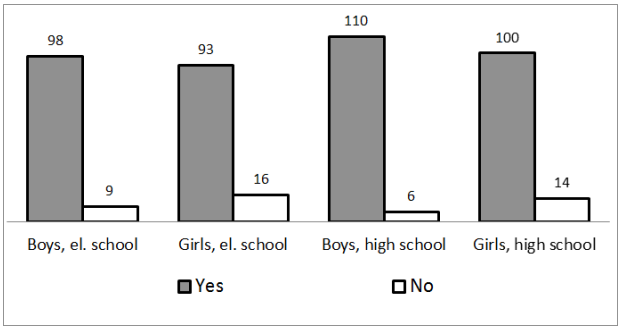

Figure 2. The existence of profiles on social networks

Figure 2 shows the actual number of students who have a profile on one of the social networks on the Internet. The vast majority of students (90%) have a profile on one of the networks. This result corroborates the previous conclusion that social networks should be included in the teaching process.

3 How long have you had a profile on social networks?

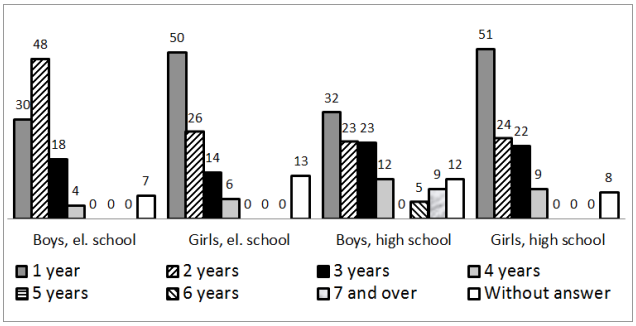

Figure 3. The length of time the pupils have had a profile

Figure 3 shows how long the pupils have had a profile on various social networks. The greatest number of pupils have had a profile for only a year and a significant percent of pupils have had a profile for two years.. Therefore, over 60% pupils have had a profile long enough to master the teaching materials presented by means of social networks .

4. On which social network do you have a profile?

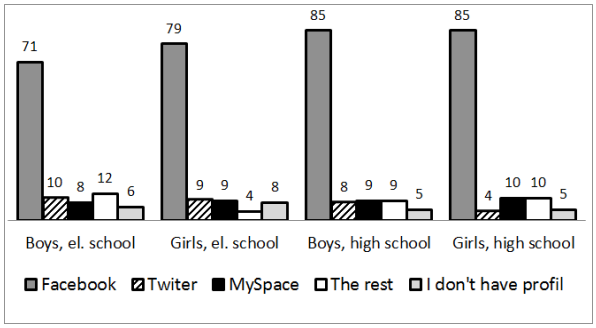

Figure 4. Networks on which pupils have a profile

Figure 4 shows the networks on which pupils have a profile. The given results can be used to select the network through which to represent the teaching materials. The results show that Facebook has the highest percentage of users (72% of pupils have a profile on this social network). 8% of pupils have a profile on MySpace, 7% on Twitter, whereas the number of pupils who do not have a profile is negligible and amounts to only 5%).

5. Do you use the Internet for educational purposes?

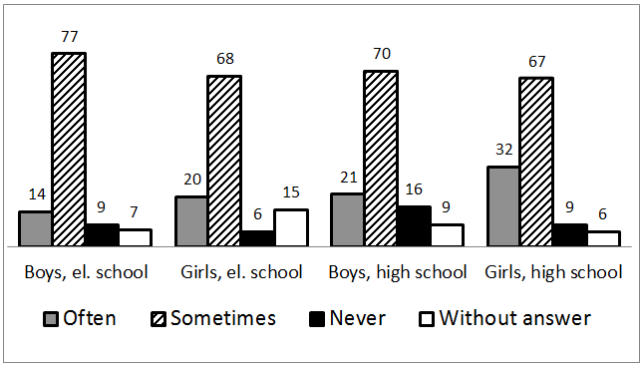

Figure 5. The use of the Internet for educational purposes

Figure 5 shows the proportion of the use of the Internet for educational purposes.The highest percentage of pupils sometimes use the Internet for educational purposes (63%). By including the teaching materials in social networks that students mostly use, it is possible to increase the percentage of pupils who use the Internet for educational purposes.

6. Do you consider yourself an Internet addict?

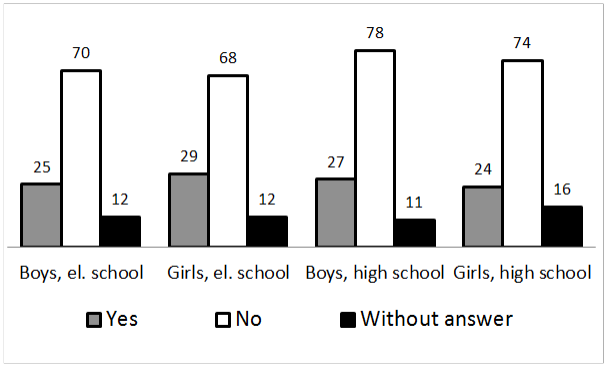

Figure 6. A presentation of answers to the question regarding Internet addiction

By analysing the results in Figure 6, it is possible to draw a conclusion that a significant percentage of pupils (24%) consider themselves to be Internet addicts. This data indicates that there is a need for more thorough research on this topic. It also points to the need of organizing special courses and lectures with the aim of educating young people on the ways of eliminating this addiction.

B. The availability of the Internet in schools in Serbia

What follows is the analysis of the availability of the Internet in primary schools in Serbia. As far as secondary schools are concerned, this analysis has been left out due to the scope and diversity of curriculums.

Starting from the school year 2010/2011, the pupils of higher grades in primary schools are taught according to the new curriculum of the Ministry of Education. Thus, the pupils have one class a week in the subject called Informatics and Computing, which is an elective course. Information technologies (IT) are also studied within the subject called Technical and computer studies and pupils have 16 classes in this subject in the fifth, sixth and seventh grades, whereas pupils of eighth grade have 26 classes. The aggregate number of classes in these subjects (Informatics and Computing and Technical and computer studies),which are dedicated to the study of IT in primary schools, amounts to 216 classes a year, which represents 50,7% of of total classes in these subjects.

Based on the analysis of the current proportion of IT in teaching Technical and computer studies (see Table 3), it is possible to draw a conclusion that that segment VII of IT (Computer Graphics) has the highest proportion. It is followed by segment XII (Practical application of IT), segment II (Data organizing , multimedia, security, etc.), segment V (the Internet, i.e. the ISO-OSI model) and segment VI (Work in local networks). Likewise, it is obvious that Introduction to IT (segment I) and Processor systems (segment VIII) are present with only two teaching units, and that only segment III of IT (Programming languages) is not present at all.

The comparative analysis of the previous curriculum and the one created by the Ministry of Education, which was in force during the school year 2010/2011 [8], shows that the greatest progress was made in segments II and VII of IT.

TABLE 3. PROPORTION OF IT IN TEACHING "TECHNICAL AND COMPUTER STUDIES"

"Technical and computer studies"										
Field of IT	**5th grade**		**6th grade**		**7th grade**		**8th grade**		**Total**	
	classes	**%**	**classes**	**%**	**Classes**	**%**	**classes**	**%**	**classes**	**%**
I	1	1,39	1	1,39	-	-	-	-	2	0,70
II	-	-	-	-	8	11,10	-	-	8	2,82
III	-	-	-	-	-	-	-	-	-	-
IV	4	5,55	-	-	-	-	-	-	4	1,41
V	-	-	2	2,78	-	-	6	8,82	8	2,82
VI	-	-	-	-	-	-	8 22	11,76	8	2,82
VII	2	2,78	11	15,28	4	5,55	2 3	2,94	19	6,69
VIII	1	1,39	-	-	-	-	1	1,47	2	0,70
IX	2	2,78	1	1,39	-	-	-	-	3	1,06
X	-	-	-	-	4	5,55	4 7	5,88	8	2,82
XI	1	1,39	1	1,39	-	-	1 2	1,47	3	1,06
XII	5	6,96	-	-	-	-	4 9	5,88	9	3,17
Total	16	22,2	16	22,2	16	22,2	26	41,18	74	26,07

Working on the Internet in primary schools in Serbia includes:

- using Windows Explorer (sixth, seventh ang eighth grades), e-mail messaging using Outlook Express (sixth and eighth grades),
- discussion groups (seventh and eighth grades),
- instant messaging with Yahoo, Google, Skype (seventh and eighth grades), etc.

Based on the analysis of the proportion of IT in teaching Informatics and Computing (see Table 4), it can be concluded that most attention is dedicated to the Practical application of IT (Segment XII), which is immediately followed by segment II (Data Organization, multimedia and security).

TABLE 4. PROPORTION OF IT IN TEACHING "INFORMATICS AND COMPUTING" - IC

"Informatics and Computing" – IC										
Field IT	**5th grade**		**6th grade**		**7th grade**		**8th grade**		**Total**	
	classes	**%**	**classes**	**%**	**Classes**	**%**	**classes**	**%**	**classes**	**%**
I	2	5,56	-	-	-	-	-		2	1,4
II	12	33,33	3	8,33	20	55,56	(10)	29,41	35+(10)	24,6+(7)
III	-	-	(9)	(25,00)*	(10)	(27,78)	(10)	29,41	29	20,4
IV	7	19,44	-	-	-	-	-		7	4,9
V	-	-	4	11,11	6	16,67	-		10	7
VI	-	-	-	-	-	-	-		-	-
VII	-	-	10+(9)	27,78+(25,00)	(10)	(27,78)	-		10+9	7+(6,3)
VIII	-	-	-	-	-	-	-		-	-
IX	1	2,78	-	-	-	-	-		1	0,7
X	-	-	-	-	-	-	-		-	-
XI	-	-	-	-	-	-	-		-	-
XII	14	38,89	10	27,78	-	-	24	70,59	48	33,8
Total	36	100	36	100	36	100	34	100	142	100

** The classes of the elective module are given in parentheses (pupils in the sixth grade choose between Programming and Interactive graphics, pupils in the seventh grade choose between Programming and Graphic Design, whereas pupils in the eighth grade choose between Programming and Web presentation.*

The comparative analysis of the previous curriculum and the one created by the Ministry of Education for the subject Basics of informatics and computer science shows that significant changes were made to the curriculum, because previously most attention was dedicated to segments II, III, V, VII and XII of IT.

This paper does not present the analysis of the level of IT equipment in schools, although the results are relevant for comparison with the EU countries (see Figure 7) and the positioning of the Internet within IT.

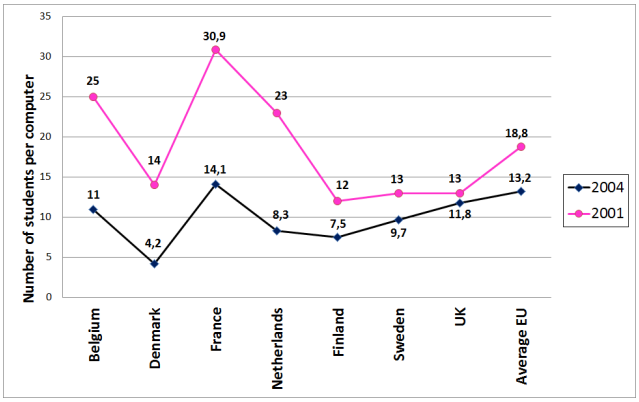

Figure 7 Keeping pace with the EU (Benchmark parameter)

V. CONCLUDING REMARKS

Bearing in mind the presented results, it is possible to draw conclusions about the characteristics of using the Internet by children of school age, as well as the effects and possibilities offered by social networks and curriculums in Serbia.

Likewise, it is possible to come to conclusions regarding the justification of the methodological approach to the analyses of school curriculums according to standardized segments of IT. Such approach leaves plenty of room for:

- development and implementation of all 12 segments of IT, along with the development and the use of the Internet
- comparison of individual subjects and the subsequent planned/anticipated advancement of knowledge according to levels of education: primary school - secondary school
- improvement at all levels of education, from primary school to academic level (the title of professor, current and future specialized teachers), etc.

The results of the survey indicate that a significant percentage of students have profiles on social networks, mostly on Facebook. What is more, most students have recently started using the Internet in the sphere of social networks. With this in mind, the integration of the teaching process into social networks would increase the percentage of students who use the Internet for educational purposes.

In addition to using the Internet for educational purposes it is necessary to strike a balance between the desirable purpose of overall use of the Internet and effects:

- Educational - with the use of the Internet for knowledge innovation in IT, but in other fields as well
- Social - with mandatory inclusion of cooperative learning on social networks, as well as in the conventional teaching method
- Health - with a proper balance between time that schoolchildren spend on the Internet and physical activities that they take
- Familial - with the support and guidance of family members in using the Internet.

Due to the scope of problems in secondary schools, a new paper is to follow, as well as additional presentations of the obtained analyses of the results. The forthcoming paper relates to the second part of the research and determines the effects of the application of social networks in the teaching process. In addition, the forthcoming papers include a presentation of more extensive, varied and comprehensive analyses of secondary school education, as well as the Internet addiction and the possibility of overcoming it.

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SOCIAL NETWORKS - NEW SOCIAL SKILLS

M. Kovačević, B. Egić
Technical faculty ,,Mihajlo Pupin'', Zrenjanin

Abstract - The key question in everyday modern man's life has become which mode of engagement is appropriate to use for the current task. Tools and services which were, until recently, used massively or exclusively, were replaced by new forms of media literacy at the same time facilitating cyber-communication and navigation - a social network. In spite of being accepted or rejected with skepticism, social networks are justifying their origin and purpose – they have found their way to the millionth customer who offered many in the chain the possibility of profit or fun.

I. INTRODUCTION

The overgrowing convergence of the media, the incorporating of technologies with a goal of multi – purpose value, the availability of information and disinformation, and the absence of authority and methodic approach as well, contribute to the upbringing of new modern generations of young people, who live completely different from most of the active working population. Differences between them are not small, infact they are crucial: young people are in the age when they acquire new knowledge and life habits, and the others in the position to create laws and curricula and present all of that in a way they have adopted before all technological changes of the last decade. These two groups of people do not speak in the same tongue, communication between them is difficult, and their standards and outcomes completely different. The virtual world also has different places for each group: Microsoft vs. Apple, Facebook vs. Twitter, You tube vs. My Space, Wikipedia vs. Wikiliks…

II. MEDIA OR INFORMATICS LITERACY?

Media literacy is based on how well we know the media, on being able to decode their messages and products, as well as managing to produce, analyze and value them ourselves. Developed societies care about how much their population is educated in this area, as well as the ways of developing those skills in their citizens. In Serbia, only the greatest enthusiasts talk about media literacy.

While aware of the fact that we can't cross the road to the European Union without adjusting to higher standards of the educational system, at least when it comes to its form and shape, authorities have started supplying schools with new working equipment – computers. Nonetheless, the biggest imperfection in the whole system since the last implemented reforms – process controlling, is absent again. In addition to that, media literacy in primary schools has come down to curriculum of informatics class, partly through Serbian language class too (depending on the free assessment of the professor while lesson planning), but never touching its essence – studying for the media. If we educate children only for working on the computer, or realizing some of the computer programs, we are still far away from media literacy, since those children were never taught understanding, analysis and valuing of the media products. With that in mind, it is too much to expect a critical point of view from children and youth towards comprehension of the media reality, let alone a sense of reservation when it comes to accessing social networks and groups that are currently offered to them on the internet. Even though there are statements[3]. (Elearn magazine, January 2011) which suggest that for forming knowledge and skills of media literacy it is enough to have an immediate influence of family while growing up, we regard that this author is relying on strictly legally regulated and supervised social systems of developed countries, when it comes to media politics and the educational system. In Serbia, a serious crise of family and social values has been occurring, because, in the lack of funds for securing decent existence, people are forced to either be more absent from their homes in order to work, or sit in front of television because it is the cheapest form of entertainment they can afford. Exactly in these difficult days and years for development in our country, reality shows surfaced, to offer cheap fun behavioral models, completely devastating in comparison to former traditional values of our society. The media slowly became dominant in setting trends, especially television which uses image to further firms opinions and habits, as well as the internet with communication and online socialization through social networks. Seeing how entertainment is the best selling product on the media industry market, for television it became ,,suprai deologies'', the ultimate law for all discourse species

(Postman, 1986). This leads us to the hypothesis that due to already mentioned reasons of devastated social values, intercultural, none-verbal and interpersonal communication is in serious crisis, mostly threatened with mass usage of reduced language forms, but supported with creative audio-visual effects of highly developed technologies.

III. SOCIAL NETWORKS AS A NEW FORM OF ENTERTAINMENT

Various socialization models may have contributed to greater differentiation of children and youth when it comes to their relation to leisure in the past, but with social networks those social/economic differences get lost, and every individual is in the same way given the opportunity to realize interaction and communicate using reduced language forms which neither set, nor assume any educational levels. The ability of orientating on the network and using tools and program packages, provides the individual to create their own best '(shop) window' by setting up a profile of an ideal person, ready for a new role. This is repeated several times, since the number of profiles isn't limited, and they never have to be an authentic review of what we are. The earlier communicational scheme that was usually limiting to one emitter and one receptor is being changed to an indefinite number of both. A fast exchange of information and ideas satisfies the expected dynamics and at the same time imposes new behavioral rules, which shift constantly. The very exchange of words by ways of social networks is a new form of fun on its own, because it allows hidden gesticulation, facial expression and the (dis)honesty of intention. Gestures, facial expressions, body language, the space bodies occupy and touches, are no longer a subject to appraisal and are unfettered in their expressionism, individuals are prepared for anything and at the same time have a feeling they can realize a lot of things differently. And that very potential of showing yourself in a different, better light, is one of the magic powers social networks use to lure millions of users. Aside from already mentioned, the usage of social networks in realization of tasks or for spending free time provides users with a sense of good mastering of high-tech tools, although many don't even know how to use basic computer programs. Mastering of any technological request, even using social networks, gives the individual a notion of a modern and urban life style, which is in vogue.

Social networks allowed an even better access to online video games that have became a basic form of fun for the youth of our country. If we take under consideration the state in the transition of society and a crisis of economy, it is completely clear that a budget-free approach to this kind of fun has become not just favorite, but almost the only thing children can afford for themselves. Aside from that, it is a fact that there is a very small number of cultural-art-entertainment facilities intended for the population of ages 10 to 15, and that the online fun is the most available and the widest, and that the social networks help with spreading these contents.

IV. INFORMING AS A NEED AND A CONSEQUENCE

Accessibility to information is another option that social networks offer. The youth isn't always interested in informing through the media in a form that is omnipresent in our country. Informing for them requires a form to which they are used to on the internet: dynamism, fast selection and dissemination. Again stressing that all standard things that are offered are too conservative, it is completely understandable how informing through social networks as awfully attractive, became desirable. This fact is rather important for every researcher for several reasons: foremost it is important for choosing the methods for approaching and working with the youth, it is relevant in creating messages of all sorts – educational as well as entertaining or commercial; mostly it is important as a way of shaping the conscience of this targeted group towards information and informing as an educational category in every individuals' development. However, informing through social networks is based on selection of what's offered, which immediately implies that it's attractive and interesting, not just in content but in the appearance of annunciation of the information itself. All of these activities require media education, because only a media educated individual is capable of receiving, selecting, spreading and criticizing information. These shortages are mostly used, amongst others, by those who bear the greatest responsibility for all flaws in the educational system – political organizations. Everyday messages about political groups' activities circulate on Facebook (and other networks), sometimes clear, and sometimes purposely hidden not just in the agenda of influencing voters and their commitment, but to 'raise' same beliefs, or rather create opinions in early ages of children and young people. From an economic point of view the same is noticeable as for political acting, only here we can add creating traits and habits of the consumer society, which directly

helps powerful creators of social networks since there goal is making profit by advertising.

If informing is a need amongst most of adult and mature persons in our country, in social networks this concept gains a form of a status, because the most informed are the most popular, which is why informing becomes a need for much lower ages and for those for whom all news and contents is not designed. Seeing how the very access for creating a profile on social networks is caused by lying, as an unwanted trait (the age for accessing social networks is mostly limited by a minimum easily overcome by simply typing in an inaccurate year of birth), the children are in the start given a message that it's alright to lie every once in a while, and then that the strange and unwanted contacts, reading of unintended content, communication with unknown members of the group, is also nothing scary. The imposing conclusion is clear: everything that makes the surroundings of a social network on the internet is available, free, desirable, interesting, dynamic and attractive for children and young people. Information and messages that surround them have same qualities.

Observed from a different angle, it is necessary to emphasize the positive aspect of social networks, which can be more important to some observers, especially when talking about developed countries where the methodology and access to media and informatics literacy is on a much higher level. Maybe the largest contribution lies in the area of education: the exchange of information about useful content is quicker and more efficient, the motivation for new knowledge is that much greater if the content is highly rated by a member of the target group, the content itself gains bigger affectivity because the individual is motivated o learn and has a better status in his environment because of it. Professors, mentors or lecturers who realized the influence and significance of social networks on young people, already communicate with them in this way because that brings them closer, they can spread their influence by posting links and status updates, share information and interests, and through all this get the data necessary for preparing their class. Educators who have discovered the power of this way of communication, are in the position of finding out the ratings of their work, effects and accomplishments, and make themselves even better and more recognizable in eyes of those to whom they communicate. By looking back on everything mentioned so far, a deduction that throughout all this communication monitoring of quality is present, and at the same time controlling of view and opinion expressing is absent, imposes – there are no prohibitions or impositions. It's all there: the critical thinking unfettered and not guided, the praise and review. The only thing that should be done is using the information in a right way, which can be helpful with shaping and influencing, but in guidance to the end result according to the wish of the participant in communication as well. The simplicity of checking everything young people are interested in and that makes their surroundings should be emphasized: brands and products, the people they communicate with or wish to know, content and relativity of internet pages, books and films, efficiency of seminars or volunteering activities which are offered to them, scholarships or exchange programs, etc… Another uniqueness when it comes to social networks which can't be overlooked is the number of users: "If the users of Facebook founded a state, it would be the third biggest one in the world, after India and China"[2].

V. IN SUPPORT OF MEDIA EDUCATION

Consequences we look at, and which refer to social networks bring a lot: informing changes the form of an individual from an active member of society in a well-meaning relationship of professional and personal contribution to his healthy construction, into a person who acts as an individual, but in reality acts in a relation with the desirable status of the group with which he communicates. And not just that, we raise youth in a surrounding which nurtures the habits of consumerism as wanted social values, lifestyle and status. In such surrounding education and up bringing can't gain a high status, because they are easily avoided with labels "unwanted or boring" content. Aware of that, we cannot allow new social skills which occur in the virtual world to be built on wrong grounds, without critical thinking and a clear consciousness about the consequences.

We need an active way of fighting on the path towards building new generations, and that is media literacy of youth, or preparation for life in a technologically advanced society. Countries who saw the significance of informatics and media literacy, implemented innovations in their curricula and achieved remarkably different results not just on the PISA tests and various other competitions, but in their economy foremost.

It is necessary to set the status of informatics and media education as a quality and competence measure in our system. If the key competence for measuring preparedness of youth and adults for life challenges, realizing educational goals and

orientation towards a whole – life education is looked at through a frame in wich there are interactive usage of tools, interaction in heterogeneous groups and individual acting, it is logical that every individual should government enough informatics and media knowledge to pass those kinds of assessments. These sorts of standards were posted by the Organization for economic cooperation and development that is also the iniciator of PISA (Program for International Student Assessment) and DeSeCo (Definition and Selection of Competencies) programs. Ilustrating the intention and the goal, in OECD they offer an example: ,,The ability of effective communication is competence which can be based on individual level of the knowledge of the language, practical IT skills and opinions which match the ones of the person the individual is talking to."[6]. Further in the text it is insisted on the fact that sustainable development and social cohesion of one society critically depend on competence of all individuals of that population – with competence they can understand knowledge, skills, opinions and values. When it comes to practicing evaluation of students' knowledge, it usually comes down to checking memorized rules, terms, facts, schematic constructions and causal links. However, competence is more difficult to check because it represents a combination of knowledge, skills, opinions, habits, motivs and other individual characteristics, as well as orientaiting in familiar and new situations. Selection of knowledge and informations, skills and opinions, the choice and usage og knowledge as well as the slection of strategies, etc. are intellectual functions on a higher level, and charascteristick in various shapes, forms and width to each individual. With all of the metioned requests, more or less, every member of the society is confronted and his competences in that moment help the overall result.

VI. CONCLUSION

Social networks have set new rules of communication and by widening their influence, disrupted the rules of marketing business in the digital era. Viewd from the aspect of education they have brought a number of changes in relations towards information, innovation and authority, as well as reactions to what's offered in a sense of freedom and demands. Viewed from the aspect of market economy and entrepreneurship, new demands have been put infront of the managers and marketing experts, as well as a special approach to market research. Afcourse they have implemented new rules in acting and communicating, and created new socialy desirable skills and new competences for establishing working relations. In the educational system itself, which should answer all challenges of the modern age, a lot of changes are needed in order to raise generations capable of functioning in this framework, and to understand challenges and consequences. Media and informatics education on all levels of the system, has the leading part in the process of creating key competences with which is the readiness for challendges which life brings defined, and which because of that deserve a serious approach in a new curricula.

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FACEBOOK IMPACT ON SUCCESS ACHIEVED BY ELEMENTARY SCHOOL STUDENTS

D. Ostojić, J. Danikov, J. Gavrilov, S. Karanjac, Lj. Knezević
Tehnički fakultet »Mihajlo Pupin«, Zrenjanin, Serbia
ostojic dalibor@sbb.rs, jelena.danikov@gmail.com, djurovic_@live.com, karanjacsonja@gmail.com, knezevicc_@hotmail.com

Abstract - This paper provides an overview of social networks. Introduction of the impact of social networks on Facebook achieved the success of students in elementary school. The review of primary schools in Serbia, and the region and the relationship between websites and facebook profiles that have schools.

I. INTRODUCTION

Social networks are no longer just an interesting phenomenon in the virtual world they represent a new social and economic environment in which new rules of communication apply. According to Deloitte Research Agency in October 2009 despite the global recession, 94% of the company continues to invest in on-line communities and social networks. Opportunities that arise in this new environment encourage "social fever" that has affected many businesses and is very reminiscent of the "gold fever" of the early twentieth century, but the road to success is not so simple. Networked markets is not just a new territory that is proven winning methods, but a new culture in which every individual must first change yourself for others to understand and accept the general communication.

The fast development of mobile technology and Web content that access via mobile phones and laptops resulted in a slight suppression of the current mechanisms of exchange of communications, such as electronic mail, forum ii SMS / MMS messages as in [2].

Based on statistics from 1st January 2012. was taken from the official websites Facebook, Twitter and YouTube, we can see that their representation in the time designated for leisure activities from year to year or from day to day increases enormously.

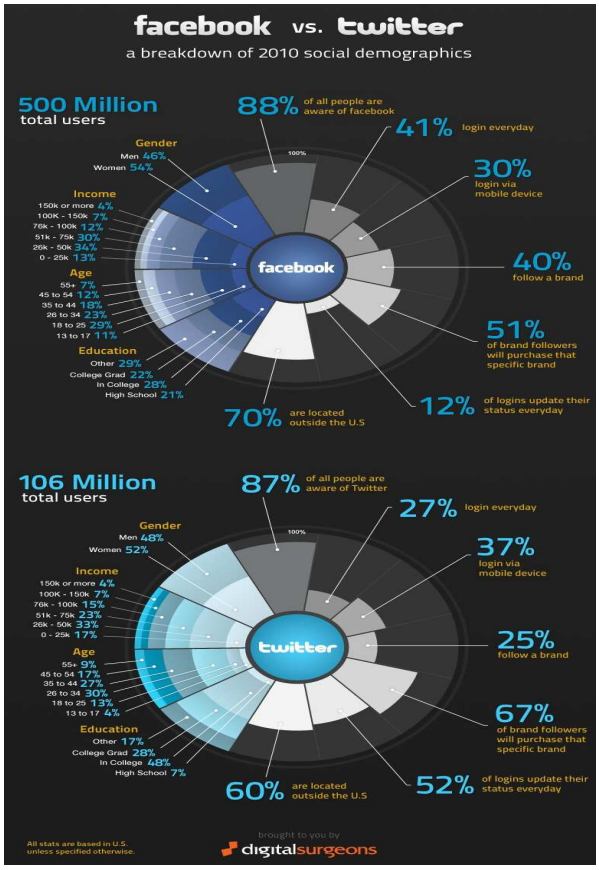
Currently social network Facebook has 800 million registered members, 175 million Twitter, and YouTube every minute put more than 50h of video, which means that every 30 days to put more video material than the three major U.S. television networks (NBC, CBS and ABC) created for the past 60 years.

In addition to these aforementioned social networks, there are others such as LinkedIn and Xing (to establish a network of business contacts, first with 100 million members, and the other 11 million), Flickr (a network in which to exchange photos and videos from the 10 million members) and MySpace (the networks that connect people interested in multimedia content such as music, film and video games). Global statistics, the most recent istraživajima, show that members of the female population more active users of Facebook and Twitter, and LinkedIn to lead users are male.

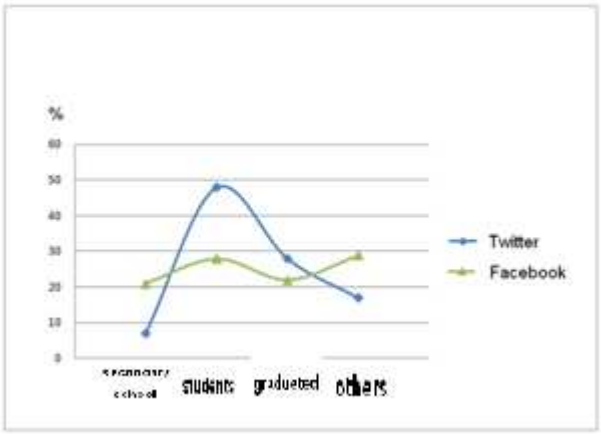
Individuals in secondary education is dominated by all networks, except on LinkedIn, most of whose users have higher education.

Demographic oldest populations are LinkedIn users, while Facebook and Twitter "find new homes," the younger population. On the first chart shows the comparison of Facebook and Twitter for various parametrima. Chart is taken from a Web site that combines research DigitalSurgeons.com various international agencies for public opinion in social networks.

On the first chart can be seen that the statistical distribution of users generally follow a standard distribution curve for these parameters under which they were created the following charts (2nd chart shows education, 3rd chart shows year of life chart and finally 4th chart shows annual income).

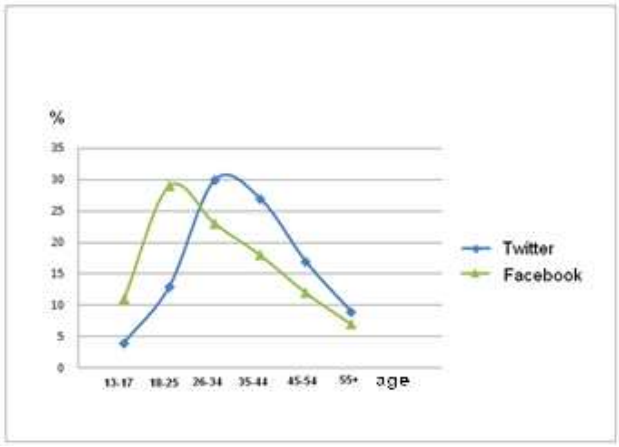


1st Chart Comparison of Facebook and Twitter, according to various parameters

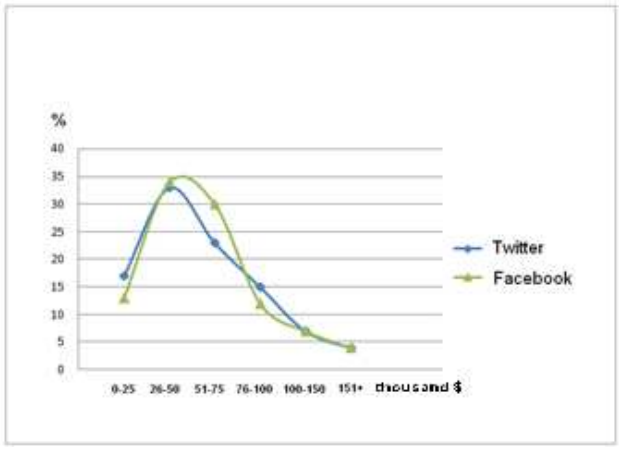


2nd Chart The statistical distribution of users by educational structure

In Serbia, the most popular social network is Facebook with 3.2 million registered accounts. All other social networks have fewer total users compared to users of Facebook, although the popularity of Twitter and LinkedIn in a slight rise, it is also for YouTube and Flickr, the most popular network for sharing photos and video snippets. Each of the above social networking has its specific, but tentatively be said that Facebook is a generally accepted standard because it offers the widest range



3rd Chart The statistical distribution of users by age



4th Chart The statistical distribution of users according to the annual income

of options and constantly improving with new features (commenting, "liking", ask questions, share photos and video clips, games and applications development, etc.). Twitter is so. microblogging service that is used for fast transmission of information, short, 140 characters in length, usually refers to the status, comments, discussions and links that link to other content. LinkedIn is enthroned as the social network through which individuals place their CVs, while the company used to close his business as a wider group of people together and influential individuals in their own interest groups and networks. In other words, LinkedIn is where employers require employees and consultants, and vice versa as in [2].

II. FACEEBOOK GENERATION

The inspiration for the research and selection of topics the author of this work, hereafter referred to as the author received when he attended a class in the subject "Computer Science" under compulsory hospitalization in a high school. Rather than deal

with the intended teaching unit students were asked the teacher and said: "Can we still on Facebook, again?", The teacher was surprised author by this permit. The key role played in their application the word "again" that tells us that their request to meet earlier. When the author was obliged to handle the next hour and do the teaching unit provided by the curriculum, the lecturer did not allow him to use multimedia resources that are normally installed together with a dozen new computers (so to speak "under the hammer") on the grounds that not anything that "picks" until he could approve "those" who have donated an electronic classroom. Although the author tried to explain to the teacher that no local area network to each student individually over the author's presentation and just over the author's Facebook accounts can all take to file within which there is a presentation of the teacher explained that it was all too complicated and that the best the author of a teaching unit "recount."

Given that the author has prepared a PowerPoint presentation with prepared tasks for students, one can imagine how the author must have been inspired by the video presentation compiles aka translate into audio format that is speech of words.

From this stems and imposes itself is an important question, how much free time students "spend" on Facebook, if they are allowed to do in school?

"Despite the global technology and information infrastructure, information society will not tranformisati the knowledge society, while each individual is not qualified to select, organize, transfer and use information in a creative and socially responsible manner". (Vuckovic, 2011, 474)

Most of today's students grow and develop with Faceebook phenomenon, so that the various scientific literature may find the term Facebook generation, as a consequence of the "explosion" of Facebook and its rapid penetration into every aspect and every pore of human life. For such statistics speak every Facebook user has an average of 140 "friends" as a global cause daily exchange of over one billion of multimedia information (text messages, photos, video and audio).

Because of this, they appear sharp scientific debate about the nature, direction and meaning of information revolution, and we have no doubt discuss the great influence of the IT revolution in education, and therefore the education of today's youth, especially the younger generation.

Participants in the discussion can be divided into those who argue that the digital world natural heritage and to those who suggest that this process occurs too quickly and that the consciousness of today's generation is not able to adequately monitor IT technology development.

In the first group of American futurist Nicolas Negroponte is one of the most influential representative of endless technological optimism in the book whose title is "Being Digital" explains his belief that only in the information society will be possible to complete freedom of each individual, supported by computers and telecommunications as "the final technology freedom. "

"Accessibility, mobility and ability to affect change are factors that will make the future so different from that of the present. As children they adopt a global information and resources to be discovered without the freedom to license teachers work with them, we'll be on your way to find new hope and dignity in places where they previously existed very little, "(Negroponte, 1998, 236)

In another critical group is S. Birkerts, which in his book entitled "The Gutenberg elegies" explores the fate of books and reading in the digital age. He believes that books are an ideal vehicle for the transmission of ideas, that the space of reflection and wisdom, the foundation for learning and understanding the world around us. Birkerts also states that the transition from culture to culture of the book display and electronic communication has the following consequences: fragmentation space and time, loss of attention and dedication, impatience, speed and superficiality, losing faith in the storytelling, a radical break with tradition, the absence of vision, depletion and erosion language, cancellation policy and a total dependence on technology. In short, the postmodern electronic world offers us Faust settlement in which we sell our spirituality and our souls for the uncertain digital future.

III. THE RESEARCH PROBLEM

Facebook is a phenomenon of recent origin, therefore the world, and in our country there are many research projects that are similar to the author's research. Abroad, similar studies are performed, while in our area, the volume reduced to a minimum due to difficult economic conditions

in which our education is so scientific and research papers are not sensitive enough, usually because of small sample of what is being tested. Recently, columnist Bill Thompson wrote a report about how bad Facebook affects students' grades. Some students who were included in this test reduce their visits to Facebook and achieve better exam results, while those who were often on Facebook recorded much worse ratings. This story is found in numerous magazines and Web sites including The Times, The Calgary Herald and The Australia who told his readers that "excessive devotion to Facebook bad influence on students' grades," and pointed readers to the existence of a group of students from universities in Sydney titled "I want to sue Facebook if I do not pass the exams" as in [10].

Our society is a breeding ground for fashion, which is not absent even in the field of technological innovation. Parents who are the biggest critics of the school system consists of "lip-service" to their children as they try to meet them and buy the latest mobile phones, portable computers with virtually unlimited access to Internet services and social networks. On the other hand, we get the results that were obtained from the survey, anketirananjem total of 186 parents of children between seven and 17 years. Almost half of parents had negative attitudes towards the use of computers by children. Is reason to believe that some parents formed their attitudes based on experience with the way their children use the computer. One in five parents reported that after the introduction of computers in the home child achieve success worse than the previous period of schooling. This is consistent with the data that children rather rarely use computers for their homework assignments. Every six parents noticed that the lower concentrations of children and every nine that they become socially isolated. Dangers of this kind should not be exaggerated, however. Although only 6% of parents admitted that they did not know how their children spend time at the computer, it is likely that number is higher in reality because the parents' answers did not mention a very popular activity for children and young people on the Internet (such as social networks such as). It is striking that the parents surveyed seldom or never mention some of the dangers of potentially threatening young users of Internet services and social networks (access to sites with objectionable content, disclosure of private information, etc..). On the renewal of it can be concluded that parents do not know the risks their children are exposed to when they're online as in [8].

Theoretical discussion of social and educational consequences of the Internet and social networks in the world follow a systematic empirical study of information behavior of Facebook users, such as those conducted at the Institute for Software Systems (MPI-SWS), "Max Planck" belonging to Rice University Kaiserslautern / Saarbrücken, Germany, entitled On the evolution of the interaction among the users of Facebook, which included nearly 800,000 participants from America and Europe, where they established the following facts:

- Faceook users have on average ten times more friends on their profile, who have never met than they have in real life, while one user had a 25 000 Facebook friends
- Facebook has become a major IT brand
- Quick and superficial adoption of various facilities without analysis, but the contents insatiable "swallow"
- Users feel the need constantly to be on the network with a constant increase frekvencionim
- "Friends" are considered the major source of information from formal authority, and various facts
- accept the "face value" and as such they carry on unchecked.

The results of these studies were one of the reasons and incentives for the research that has the title "Impact of Facebook on the success achieved in primary school."

IV. CASE AND PURPOSE OF RESEARCH

The case studies are the consequences and impacts of social networks on the success of students that will be implemented in several elementary schools in the municipality of Kikinda. The study aims to determine the percentages of use of services within the Facebook network of student free time, and to identify ways to access the Facebook network.

V. MAIN AND AUXILIARY HYPOTHESES

Based on the theoretical aspects of the problem, previous empirical research and practical experience of its own placed the following hypothesis.

The main hypothesis is: the methods and speed of the Facebook network is directly proportional to reflect on the achievements of students in elementary school.

The other hypothesis are:

- there is no greater deviation from the mean of values of time spent on the Facebook network for students of different generations
- rural students spend less time on Fasebook network in relation to their peers in urban areas as a result of limited access to Internet services, and thus the Facebook network.

VI. ORGANIZATIONS AND RESEARCH SAMPLE

Based on the nature of the problem is the author of zaljučio that this is the most appropriate pedagogical research methods of descriptive and causal, and they tend to interact only in rare research can be applied in isolation Hubby says, in his "Methodology".

Descriptive method we used for comparison and evaluation of research results. The basic methodological approach is a transverse, because the research conducted on the sample at a particular point in time.

The sample consists of 1200 students from 5th to 8th elementary schools of which two schools of Kikinda and one from Bocar and Basaid. In this study involved students and inclusive education.

The study was conducted in the March 2012 further investigation of the structure that we dealing with pupils in their spare time to enable us to describe the current situation of educational phenomen and pupils success.

VII. PROCEDURES AND RESEARCH INSTRUMENTS

In this study we will use the documents stored in the school and will serve to compare the achievements of students in the study of their success before the survey.

The researcher carried out an anonymous survey in each ward of 5th to 8th class. The instruments with which the researcher will use the survey sheets. The measurement results will be indirect because the students will indirectly give answers that. rounding of answers and filling in data in the survey list.

To increase the validity of the results and to avoid responses that could be guessed from the settings issue must be specifically taken care of every detail during the interview itself and in the development of a questionnaire.

Each question must be formulated well and clearly, tailored to pupils' age. The questionnaire (Table 1st) we will do in a folded form so that when the student is taught a paper to the teacher or researcher, his answer will be opaque.

Some questions have similar content, which requires that the sequence of questions that must be made to neighboring issues not directly related. Survey respondents do not know that the answers are already available for the researcher, so that the researcher based on some subjective responses to specific questions can roughly determine the overall objectivity of research. In the survey list of 14 questions open-ended. The survey will be carried out within the hour Technical and Information education and will last up to 20 minutes.

VIII. DISCUSSION OF RESEARCH RESULTS

Based on fundamental research that is done by analyzing the sites on the number of primary schools in the Republic of Serbia and its immediate and distant environment, came to the following results. In Serbia, a total of 1207 primary schools, 176 schools have a site which makes 14.6% of the total, while 16 schools have their own Facebook profile, which makes 1.3% of total primary schools.

In Croatia, a total of 839 primary schools, 95 schools has its own website which makes 11.3%, and 4 schools have a Facebook profile, which makes 0.5% of total primary schools. In Montenegro, no school has its own site, but they were all in one portal called "Moja škola.me" is arranged so that each school has its own administrator who regulate their school site.

Of 88 primary schools 157 have arranged their school site, which makes 56%, while Facebook profile does not exist for any particular school but I have a portal Facebook profile. By the uniform data for Bosnia and Herzegovina could not be reached due to the inhomogeneity in the way of presenting data.

The EU statistics on the number or percentage share of primary schools that have Web site range from 10% in Romania and Bulgaria to 90% in Germany, Norway and Sweden. Percentage of primary schools that have a Facebook profile is questionable.

The reason is that in many EU countries banned students under 13 have a profile and therefore, neither the majority of primary schools in these countries do not have a Facebook profile. Since the opening of Facebook accounts for free, and requires only an e-mail address which is also easily obtained, most students younger than 13 years, often agreed date of birth when you open your profile.

Therefore, in most EU countries more frequently a debate on the subject in order to find a way to restrict access to minors Facebook. The reason is the increasing percentage of misuse of data, which are placed on the Facebook profile, by those persons using the naivety and recklessness of minors.

Table 1. The appearance of a questionnaire

Gender of pupils (circle answer)	male female
Upiši odelenje kojem pripadaš.	_____
Do you have a profile on Facebook?	yes no
How much free time do you spend daily playing sports or other physical activities?	_____min_____hour or I am not physical active
Where do you live?	_____
Which school is your parent completed? (circle answer)	mother father elementary elementary secondary secondary bachelor bachelor master master Ph.D. Ph.D. others others
How much free time do you spend daily playing computer games?	_____min_____hour or I do not play computer games.
Which members of your household have a profile on Facebook?	Brother sister mother (circle the corect answers) father
What are the success achieved in the previous school year?	Unsatisfactory sufficient good (circle the answer) Verygood excellent
How much free time do you spend on daily Facebook?	Enter the time or I have rounded profile. _____min_____hour I haven't profile
Did your parents approve of the use of Facebook?	yes no
How many times a day do you spend studying?	Enter the time. _____min_____hour
Which method you use to access the Internet?	on-line (cable, ADSL....) wireless
(You can circle more than one answer)	mobile phone
How much time do you spend a day learning with a computer?	Enter the time or I have rounded computer. _____min_____hour I haven't computer

IX. CONCLUSION

The fact that the Facebook phenomenon has become inevitable today and that a pandemic is spreading fast, it is normal that it will follow the "children's diseases," a term that has transferred except by accident, and the real meaning. Facebook becomes a kind of addiction for members of the younger population, you also are not immune either the older generations.

The task of our society and each of its elements, is to adequately prepare and participate in eliminating the negative effects that come from the flood of technological innovations and turn them into strengths, ie. the information-technology revolution to support progressive facilities, related to educational development, educational and above all to the moral consciousness of younger generations, and for society as a whole. Finally we come to the conclusion that technology change does not start but it only allows them.

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LEARNING IN INCLUSIVE EDUCATION

D. Radosav, J. Janjic, D. Karuovic, J. Tasic, I.Tasic
Technical faculty „Mihajlo Pupin“, Zrenjanin, Serbia
jelazlatko@hotmail.com, radosav@tfzr.rs

Abstract - This paper is to assist all those involved in educational work, especially for teachers and educators, because the educational work process that entails many changes in the personality of teachers and students, primarily in the organization and teaching.

I. INTRODUCTION

The natural tendency of society or civilization is to progress in its fields. At a time when the continuum on the Education question, did the move from traditional to modern schools. When asked what it is that makes the modern school at some point responds modern: innovation.

Innovation as the desire to create something other than paper includes enhancing element. Today the system introduced by Comenius in the 16th century still exists but the application of modern society, new information, though deemedinadequate and that the organization should continue to introduce newspaper.

In the same plane with the education, and social stratain the area of progress was from the class society and inequality is viewed as a natural ability, the idea of equal opportunity for all. The theory of equal opportunity for all, from the integration of certain marginalized groups to inclusion. For education, in general, and to develop positive self-image in students, it would be important to train other teachers and parents in order to able to use appropriate methods, tools and procedures that would support in achieving this goal [1].

Individuals always have a certain self-consciousness, or in some ways they understand and evaluate their own ego. Each individual perceives that he is a certain type people which has certain personality traits, habits, characteristic behaviors. Also possess certain abilities, skills, knowledge, have certain interests, attitudes, perceived their relationships with the environment, ie. What kind of social group they belong to, what their social status, how they look in the eyes of others. All these aspects of existence make up the overall self-awareness and understanding of their self-self concept. The structure of the self is layered and there is a central part of our self and the peripheral parts. The central part is one that is mostly directed flows of our actions, which will evaluate them and thus bring judgment on themselves. There are real I and the ideal I. Ideally, I direct the person to strive for better and more we can talk about a more stable personality. When you take into consideration that I caused by numerous factors, it is clear that the picture is subject to distortion. This points to the relativity of the notion of self-image and its susceptibility to subjective factors [2].

The development of self-image has a prominent role the process of developing self-esteem. “Self-esteem is a personality assessment that seems to determine whether her self-image reaches its moral standards and values. This evaluation has a significant impact on how a person feels. Person who does not like the picture you have of yourself has a tendency to experience ourselves as a negative, depressed, fearful and alienated, while the person who evaluated themselves favorably tend to face difficulties and be optimistic.”[1]

A significant number of studies indicate that students achieve better results in learning if they believe themselves responsible for the results of their work.

II. INCLUSION

Inclusion is based on the principle of respect for the rights to education. Every child has the right to quality education without discrimination, in accordance with their abilities and skills. International documents on which it inclusive education are:

Universal Declaration of Human Rights (1948).

Convention on the Rights of the Child (1989)

World Declaration on Education for all

UN Standard Rules on the Equaliuation of educational opportunities for disable people (access to education within the regular school system)

The Salamanca Statement (…”school must educate all children, regardless of their physical,

intellectual, social, emotional, linguistic and other characteristics…)

Education for All 2001 –Education for All (EFA) –Domestic Document: Law on the Foundations of Education, Lawon Prevention of Discrimination of invalisitetom, the Draft Law on Preschool Education, Poverty Reduction Strategy in Serbia

The inclusive education model there are to improve the educational system, enhance the coverage of students and introduce changes that will benefit both the individual and school and society: -Students feel accepted, build self-esteem,-They learn though interaction with others, - Increasing the ability of children to care for themselves,-Parents of students with disabilities have the sense of community, -Increase the competence of teachers and parents (in education),-The school establishes an atmosphere of cooperation and team work, which includes parents and other professionals, -The Company better use of human resources, -Respect the rights of children,-Students are better prepared for real life.

The introduction of inclusion is observed leaving the medical model which assesses the student and includes the educational system, which rests on the observation of a child with developmental disabilities as a patient who is dependent on others and who has a problem. All decisions made are based on the difficulty and there are to "fix the child" and it conform to society. This model is based on the idea of mercy and charity, and exclusion from typical school, even if it is not in accordance with the needs of the child. The introduction of the social model we start from different assumptions: that the person's social position depends, in learning defects are attributed to the limitations of the surrounding ones, respecting human rights, a person is seen as a whole, and proceeds from its needs, not weaknesses, emphasize the skills and strengths hand, the model leaves off, gives priority to inclusion and individualized approach. The person is no longer adjusts the environment, but her environment. Thus creating conditions for successful in order for a student with peers and adults in the community. In order for a student with disabilities could be successfully involved in the education system needs to provide his support.

Support can be provided in different ways. Through the adjustment: a) methods, materials and teaching aids (visual aids, recording lectures, extra time to work, reducing materials, etc.), b)space and conditions for learning (remove physical barriers, lightring marks, learning at home via the internet, placing handrails in the hallways, ramps…), c) change the content of learning and achievement standards (reduction or increase in the content of one or more cases, reducingrequired). There are other types of support: -customization of textbooks,-adapted teaching resources (adjusted schedules, records, computers…),-engaging pedagogical or personal assistant, -provision of transport in special-education group, or department, -training of employees.

When we talk about the additional we have in mind, for children who have previously estimated the need for it. These are primarily children with: disabilities in the physical, mental and sensory development, with behavioral disorders, with emotional disturbances, the depressing families without parents, abused children, refugee children, gifted children. Before we proceed to determine the need for additional support and making a IOP, require the school to comply with the established order of activity:-each student is monitored and determined whether there are difficulties in the educational process,-If problems are identified, access to the individualization of the teaching process, which requires an adjustment programs, methods, content…,-If a student does not improve even after the individualization of the measures taken, shall be produced IOP.

To access the general development of IOP, require that the school has expert team for inclusive education that serves to: identify vulnerable children, conceived measures for the implementation of inclusion, take of teaching competence, care of the cooperation with parents, suggests teams support (IEP teams), the College proposes to create IEP's monitors its implementation, evaluate it, cooperating with the Interdepartmental Commission, the other teams in the school and school Collegium.

III. CONSTRUCTION PROFILES PEDAGOLOGICAL

Before –production IOP must be the elaboration of based on an exhaustive description of the situation of the child and after collecting data on pupils from different sources (student work, interviews, tests, observation of students, interviews with parents and all available documentation about the child). Pedagogical

profile contains information relating to four key area functioning students:

- learning (assessed achievements and their level, the pace of progress in relation to their peers opinions of skills, interests, special skills, attitudes and motivations in relation to school and support needs)
- communication skills, (estimated modes of communication, interference with the senses, vocabulary, speech understanding, the ability to express needs, wants and feelings and support needs)
- social skills (assess student concerns, and respect the general rules, the ability to adapt, the specific reaction, the game play, the way of greeting and suggest the need for support)
- independence and self-care (estimated to be the way they perform their daily duties and activities in everyday situations, potential interference associated with self-service, mobility, overall health and suggests the need for support)

After that, the support team identifies strengths and weaknesses of students and proposes a strategy team for IO support in one or more of these areas.

IV. IOP

IEP team or support team consists of departmental officers, subject teachers, senior associate (in a special school tuition and teachers: speech therapy, psychomotor redactor, somatoped, social worker, special educator), the parent, as appropriate, pedagogical assistant, medical expert, or some other expert on the parents. IOP has the following elements: 1) personal data on student, 2) profile of Education with the current status of the child, 3) the priority areas where support is needed to achieve the objectives, 4) types and levels of support to operationalizing activities where specifically stated: who will work with the child, which activities, how many during the weekly schedule and duration in which, 5) time period of monitoring and the evaluation time.

IOP is made during the year depending on the needs of the fortress. Accordingly, it can be made at the beginning of the school year, when the child moves into a new environment when it is in the best interest parents prevented its implementation. It is therefore important a parent after receiving explanation is notified that he was part of the team for their support and suggestions and assists the activities of its implementation.

IEP is a written document and shall be for a period of one month, three months or six months. Regulations governing its production of determining the rights of the individual education plan [3].

There are three types of IOP-a:

IOP by a custom program-precisely the goal of providing support plans relating to customize and enhance the space and the conditions in which children learn, work methods, textbooks, activity schedules, the introduction of persons providing support, etc…,

- altered the IOP program-but the content is precisely planned and adjusted to the standards of achievement in relation to the prescribed one or more subjects,
- enriched and expanded IOP-for students with exceptional abilities.

If the use of IOP and requires additional funds, the institution sends a written request Interest Commission to assess the need for additional support. Commission established by the municipality and has three permanent and two temporary members who may be: educator, teacher, associate, representative of social protection. In accordance with the law, IRK proposed support from one of the following, the other or both of the following areas: immediate support, which requires additional financial resources: adaptive textbooks, assistive technology, engaging pedagogical assistant, providing training for students, teachers, parents (e.g. the use of alternative forms of communication), providing escort, in special education classes or groups for the education of students with disabilities development, engagement of professionals (psychologists, therapists…), health care services not otherwise covered by insurance, free participation in cultural, sporting and recreational activities.

Indirect support, which requires additional financial resources: adapting to the environment, make sure the professional development of teachers who work with children, educating their peers, families, counseling with parents in the educational, health, social institution, providing an extension of stay, living room, eating at school, shoes, clothing, transportation, legal aid….[4].

Success in learning students with individual education plan

Assessment of students is regulated by the Rulebook on evaluation, but we always start from the child's abilities, so that the individualization of the measures preventing bad success of students who invest the effort, but the goals and out comes in education cannot reach the objective and subjective constraints. [5]

Consequently, in relation to the assessment in typical schools, the average grade students were more, which is documented research, but it is known from practice (access to school reports on the implementation of the Annual Work Plan).

V. EXPERIENCE FOR STUDENTS WITH INCLUSIVE EDUCATION

Mentally retarded child is faced with frequent failures, sometimes from early childhood, it increases anxiety, fear of future failure and reduces the initiative for new types of activities. The child is unable to satisfy the many requests of the social environment and often react by pulling and insecurity, depression, aggressive or passive-dependent behavior. There is a superficial experience of serious life events, while the other, sometimes trivial little things that can provoke a strong excitation and emotionally draining.[5]

Because this operation is necessary to create conditions in which students feel comfortable and where they will deployed capabilities and features that will ensure success. This way of organizing and teaching, contributing to the development of self-esteem of students. The environment in which the student may fail to create resistance and there by block the stimulation of mental and physical functions.

VI. RESEARCH METHODOLOGY

A.Research problem

The picture that students have about themselves are often quite different from the objective situation, which is cased by numerous factors, both objective and subjective nature. Self-image is representative of significant figures in all conditions and situations. Numerous studies mentioned by Peter Mandic in view of their research indicate that the success of students associated with the experience of his own personality. Students who have high self-esteem are more successful that the students themselves poorly evaluated.

B. Objective and task of research

The task of our research is to investigate what kind of image that students with mild mental disabilities have about themselves and to explain what is its association with reported success in school. The goal we was to show that there is a correlation between academic achievement and the self pupil's self.

C. Methods and techniques

The study will use descriptive method and a questionnaire to assess the pupil's self-image and data on student performance. For our purposes, we used questions Revisk-existing with the school. "School Readiness Assessment", by Snow With and Alexander Tovilovic Baucal. It is the purpose of questions still lunch changed. Analyzing the responses of students glimpse the image quality that students have of themselves.[6]

D. Description of the situation of a child

The sample participating in this study was elementary school" Vuk Karadzic" in Konak. The school has 65 students from first to eighth grade with preschool tuition. The student is now the second grade and his work is monitored by school age. This research will continue in the elementary school " Stevan Aleksic" Konak primary residence and " Slavko Rodic" Krajisnik of 15th February 2012th- 1st March 2012th

Description of the child by trained school employees intellectual skills: Assessing Revisk puts him in a group of moderately mentally retarded children (IQ below 40). Results are consistent.

Emotional state: I am glad you approve of those present in the classroom. When he set a task that can not answer, he knows how to react with fear and distress (screaming, crying, throwing books and the like).

Social status: Other children in the classroom do not reject, tolerate his presence without signs of full acceptance. The girl was very interested in other children (like that in their company, to run with them, to imitate their actions). But I do not know to get in a conversation or equal to monitored chat and peers to fit in their game (i.e. understands and respects the complex rules). He likes to go school and show affection for the teacher who accepts it. In situations where it is not paying attention, he or siphoned anger or respond to other children in the classroom or the teachers. Pedagogical implications development status: in second grade came with minimal prior knowledge of program content in the first grade. The letters and recognize the great help of written words

(when the teacher dictated letter by letter). Messy and difficult to maintain written in red writing. I still cannot read, but with the help of (incentive issues) cn verbally speak about the next. Mastered the addition and subtraction.

Looking forward to stories in the picture, talking about them, his vocabularies still poor. He likes to draw and color with watercolors, but only used when drawing lines. Participate in games of elementary physical education classes. Accepts the invitation to play, but do not know how to follow complex rules. He likes to play with dough, kneading it or stress, cut a stock image (material) agrees or cubes.

Description of the child by the teacher recognizes and writes most of the printed letters, except for C,C,F and G… which replaces another. Word when he says the teacher dictated letter by letter. Words written outside the lines. He knows the numbers and knows how to count to ten, it is a difficult comparison numbers. With the help of a teacher who guides him step by step to a solution, using sets, fingers, sticks, drawings …adds and subtracts.

At first he refused offers no group activities (copying, writing, and listening). In the individual work with teacher acceptance activities. Relationship to other children in the classroom varies from withdrawal to anger. Sometimes they react to anxiety distinct physical education classes (group games, cheering, playing balloon), the musical culture (chorus), from games to PC (computer sound). The last two weeks we manager to reduce the frequency of these behaviors enabling him to exercise his activities that bring satisfaction (play-dogh, chopping, scarification, stacking blocks, suitcase …).

Description of the child by a parent. The boy spoke to the fourth year now, not even pronounce all the sounds clear and his speech is not easily understood persons unknown. He finished the first dismissal in the second elementary school, so they had less that 20% of classes, isolated from the department and attended classes in the Serbian language and mathematics in private with the teacher. At the beginning of second grade, new school, the teacher and the children saw him accepted. On the joy of going to school, I was asked to prepare the bag in time for school and participate in it. Accepts that doing homework with the necessary support of their parents, parents recounted what happens in school and looks forward to any progress that is praise. At home, self care of themselves (maintaining hygiene, dressing up, eating etc.). He has no best friend/friend or peer group to which he belongs and most of my free time is spent with family members.

VII. CONCLUSION

Based on interviews with decision makers and review of strategic documents it appears that there is a principled willing to work on inclusive education, but except for individual projects are not visible signs of systemic solutions that would lead to concrete changes at the school level. The experiences of children with PP which are already included in regular schools is generally positive. Most are happy and having fun playing with other children, they mean a lot to be accepted, the teacher treat them well and supportive and they fall hardest rejection and insults from other children.

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MULTIMEDIAL FOREIGN LANGUAGE ACQUISITION PROCESS BASED ON HINTS LEVERAGING SIDE-EFFECT

M. Tomášek, M. Čajkovský, M. Ennert, B. Madoš
Department of Computers and Informatics, Faculty of Electrical Engineering and Informatics,
Technical University of Košice, Košice, Slovakia
martin.tomasek@tuke.sk, marek.cajkovsky@tuke.sk, michal.ennert@tuke.sk, branislav.mados@tuke.sk

Abstract - This paper presents a novel approach in foreign language learning process presented in attractive manner using multimedia concept. Learning process is done rather by listening to foreign language, and spoken text understanding, than simple reading. Foreign language learning is conceived as a side-effect during other student's activity. Less known words are presented to students as hints. Those hints are laid directly into the context of appropriate problematic and are therefore helpful to better understanding and memorizing. This resulting in a process, where student is focusing on appropriate problematic and language learning is performed as a side-effect.

I. INTRODUCTION

When someone speaks by more languages he is able to learn new one easier, because of ability to compare newly learning language with already known languages. However as a child no one of us had this ability, there was no reference language that we could compare to language which we were trying to learn. When we ask our parents how we start speaking, probably the most frequently answer will be that we begun with sound mimicking and later trying to saying simple words. There was no teacher that forced us to memorize grammar or vocabulary nevertheless many of us was able to communicate after few years [1]. Very important thing is also fact that we did not know the meaning of words that we were saying, we were just repeating after a parent, which gives us hints in a context. Probably those parents' hints and context in which the words were presented helped us to learn language so fast. Another important factor is for sure that we start speaking in friendly, non-invasive, playful environment. During our early childhood we do not only start to learn language, we also begun with whole world exploring, the sun is warm, water is wet, dog is barking, banana is tasty, and many, many more little discoveries. In fact we can say that we have learnt our mother language as a side effect during other activities and learning. Our proposal solution leverages those discoveries and tries to turn them on in a manner that is attractive mostly among young people, to simple video watching.

II. DUBBING OR SUBTITLING

There are several studies which investigates influence to foreign language learning by watching not dubbed video (in original language) with translated subtitles [2][8]. Some of those studies show that this technique can improve language skills. Those studies also show that subtitles has not negative influence on video material and are not disturbing factor. According to [2] only less than 5 percent of whole time is spend on reading subtitles. Some people also prefer to watch video with original voice because of incorrect dubbing, also majority of (new) video materials simply are not available in dubbed form and subtitles is one possible option. In fact some countries can be classified according to if their TVs or cinemas prefers subtitling or dubbing, for example typical dubbing countries are: Austria, France, Germany, Italy, Spain and Slovakia, on the other hand typical subtitling countries are Belgium, Denmark, Finland, Greece, Luxembourg, Netherland, Portugal and Sweden [2][3][6][7]. Some of those countries are shown in Table 1. With appropriate EPI index which represents amount of English speaking people in particular country. Another equally significant part of this problem is fact that subtitles are much more cheaper, and easier to make than dubbing equivalent [2][3][6]. We all know the situation, when we are listening to music and did not understand lyrics very well, but when we read the lyrics we already know many of the words and also understand the song meaning. Thus people often argue that they have no problem with listening but only if they have written text also. But reading, listening and whole context understanding is three different things.

We decided to try little experiment in which we observed small group of native Slovak speaking people which watched video in English language

with English subtitles. Those people fell into B1 group according to CEFR. We asked them simple question: were you reading subtitles or not? Almost all people answered, yes. We've also convinced if the people were able to reproduce the plot seen on video. Thus we made conclusion that if there is possibility to read spoken text, the people utilizes it and rely on it, instead of trying to listen and deducting some not understood words from context. This can be caused by fact that people can read much faster than listen, [4] and thus they're reading forward and catch a video also.

III. PROPOSAL SOLUTION

The main challenge in developing the learning process was to properly combine resulting factors from the previous paragraphs. Main key features of proposed solution are followings:

- Lectures presented in playful, attractive manner
- Easy manageable and reparable learning resources and lectures by teacher or student
- Fast and easy preparation of lectures (within minutes, required basic computer skills)
- Focusing lectures rather on specific problems and leveraging foreign language learning as a side-effect
- Presenting foreign words in context, because of easier remembering
- Using hints to help understand problematic and learning foreign words
- Adding focus on foreign language listening and understanding rather than reading

After considering those factors we've infer that simple watching video with "special" type of subtitles fits to all key features of proposal solution. Several ideas were tried with subtitles dealing. First idea was the time adjustment of subtitles, so spoken language will outrun subtitles and therefore student should be able to firstly listen and after few milliseconds verify their assumption against read subtitles. However practical experiment shows that this was rather misleading than helping, probably the Stroop effect took place [5]. Another idea was to place foreign language subtitles to bottom of video and translated subtitles to upper of video (or vice-versa) (Fig. 1). Another experiment shows that bunch of text that user did not catch was also misleading. As a best approach we chose method where only unknown words with their translations are shown (Fig. 2). Finally we presented video with this type of subtitles to beholders and asks them the same questions. Observers were able to reproduce plot also if they watched the video with significantly reduced subtitles form. Therefore we inferred that students were indirectly forced to focusing on listening and trying to understand context rather than simple reading.

IV. TECHINCAL DETAILS

Whole solution is conceived as a simple cygwin script that will find most frequent words in subtitle file and simply get rid of them, because there is a high probability that those words are one of the most used words in English and students are already familiar with it. The script also removes commas, question marks, dashes and another non important character. Thus only less knows words are used as hints. The next step is translating remaining words with Google translate, to students native language and creating another subtitle file. The result are two subtitle files containing less frequent words translated into two languages, one in same language as video and another in mother language of student. Cygwin script can be easily replaced e.g. with ruby, python or perl. Our implementation is compatible also with Linux. As a video player was chosen KMPlayer, which is able to display two subtitles simultaneously. Unfortunately KMPlayer is only available on Windows and is not ported for Linux platform, however Wine emulator allows using KMPlayer also in Linux environment.

TABLE I. LIST OF DUBBING OR SUBTITLING COUNTRIES WITH EPI INDEX

Country	**DUB/SUB**	EPI
Austria	DUB	58.58
Germany	DUB	56.64
France	DUB	53.16
Slovakia	DUB	50.64
Italy	DUB	49.05
Spain	DUB	49.01
Netherland	SUB	67.93
Denmark	SUB	66.58
Sweden	SUB	66.26
Finland	SUB	61.25
Belgium	SUB	57.23
Portugal	SUB	53.62

* EPI = English Proficiency Index (Higher Better) [9]

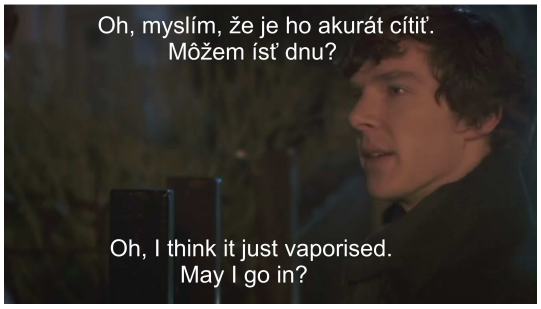

Figure 1. Original and transladed subtitles displayed simlutaneously

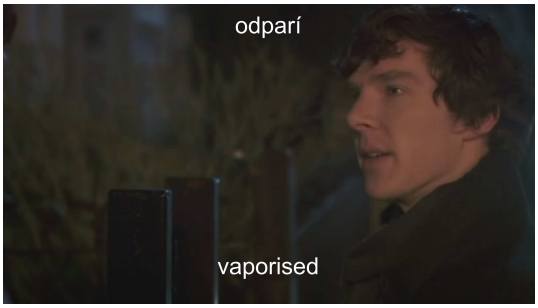

Figure 2. Original and transalted subtitles displayed simulteaneously after removing most frequent words

V. CONCLUSION

In this paper we presented solution that completely differs from traditional scholar methods. We presented learning of foreign languages as a side-effect of another learning or entertaining activity. Our little experiments show that learning and mostly listening and understanding foreign language can be achieved with this non invasive, attractive form. Feature is also that students are able to prepare lessons on their own, just using internet and basic computer skills, this rapidly unload the teacher. Student is indirectly forced to learn foreign language with learning another material simultaneously. However we are recommending our technique as a supplementary to the traditional learning methods. Only the further experiencing with this technique will show that if is worth to deploy in larger spectrum. We presented also some innovative ideas that we will deploy in near future. Those solutions can help e.g. to deaf people to learn foreign language. By expanding widespread broadband multimedia and internet our solution can deployed basically anytime and anywhere.

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DATA ACQUISITION TECHNIQUES IN BRAIN-COMPUTER INTERFACES DESIGNED FOR EDUCATIONAL APPLICATIONS

L. Vokorokos, B. Madoš, N. Ádám, M. Čajkovský
Department of Computers and Informatics, Faculty of Electrical Engineering and Informatics,
Technical University of Košice, Košice, Slovakia
liberios.vokorokos@tuke.sk, branislav.mados@tuke.sk, norbert.adam@tuke.sk,
marek.cajkovsky@tuke.sk

Abstract – This paper deals with the issue of the brain-computer interface (BCI), the kind of the human-machine interface (HMI) that is based on the process of acquisition, analysis and transformation of signals generated by the Central Nervous System (CNS) as the manifestation of its normal function. Paper introduces various structural and functional brain imaging techniques that are more or less suitable for the realization of the process of data acquisition in building of invasive, partially invasive and non-invasive brain-computer interfaces and introduces our initial experience with the low-cost commercially available brain-computer interface equipment Emotiv EPOC Neuroheadset, which is based on the multi-channel electroencephalography (EEG). Described equipment can be used in building of non-invasive brain-computer interface, which can be used as the user interface in various forms of educational equipment and computer applications, especially those that are intended for use by people with different motor or voice communication disabilities or with completely paralyzed voluntary muscles.

I. INTRODUCTION

Brain-computer interface (BCI) research, as the interdisciplinary field that lies on the frontiers of the biology, medicine and informatics, has attracted a lot of attention of scientific community in the recent years.

Brain-computer interface is often evaluated as the potential part of the equipment that is able to improve life of the significant number of people with different motor or voice communication disabilities or with completely paralyzed voluntary muscles, which are often caused by degenerative diseases or accidents.

Brain-computer interfaces have the potential to build up the new communication interface for many kinds of assistive technologies, which are including wheelchair control, environment control, various smart home assistive applications or control of personal computers and other hardware and also software applications including web browsers, typewriters, computer spellers or computer games [1][2][3].

It is possible to use non-invasive brain-computer interface in various forms of educational equipment and computer applications, especially intended for use by people with different motor or voice communication disabilities or with completely paralyzed voluntary muscles. BCI can be seen as the assistive technology that is improving educational process conditions.

BCIs are often focused on neuroprosthetics applications that are aimed at repair and restoration of damaged hearing, sight or movement. It can be seen as the part of the narrower class of neuroprosthetics, because of the brain-computer interface definition, based on the requisite of the direct connection between the neuroprosthesis and the central nervous system (CNS). Brain computer interfaces can be considered as the part of neurorehabilitation tools because of the neural plasticity of human brain [4].

Crossing the boundaries of medical applications, brain-computer interfaces can be used for smart home applications intended as the enhancements of lifestyle and quality of life and have been evaluated as the interfaces that allow control of various equipments including mobile robots, robotic arms, flying drones or as the interfaces that allows driving a car [5].

Attention is paid to the possibility to use brain-computer interface as the new user interface of personal computer in general and entertainment industry is evaluating the potential of the use of the BCI in recreational applications that are including various forms of computer games, augmented reality and virtual reality applications [6].

Brain-computer interface or mind-machine interface (MMI) or brain-machine interface (BMI) is the human-machine interface (HMI) that can be defined as the system that is able to translate subject's intent or thoughts into the technical control signals without the use of the communication channel based on the use of the speech or any other neuromuscular activity.

Brain computer is building direct communication pathway between the human brain and the computer or external technical device in general with aim to build the one-way or two-way communication interface.

The key components of brain-computer interface systems are data acquisition hardware based on the monitoring of signals produced as the manifestation of normal activity of the central nervous system and software component that is analyzing acquired signals and is extracting features that can be translated into the technical control signals appropriate for the use in control of the external technical device.

Brain-computer interfaces are, according to the invasivity to the body of users, forming three main groups - invasive brain-computer interfaces, partially invasive brain-computer interfaces and non-invasive brain-computer interfaces.

Invasive brain-computer interfaces are surgically implanted directly into the brain, and are often based on the use of arrays of microelectrodes implanted into the motor or visual cortex. Invasive brain-computer interfaces are able to provide best temporal and spatial resolution of signals.

Partially invasive brain-computer interfaces are locating arrays of microelectrodes inside the skull but not inside the brain. Electrocorticography (ECoG) is the example of the technique used in this kind of BCIs.

Non-invasive brain-computer interfaces are based on the functional brain imaging techniques, mostly on multi-channel electroencephalography (EEG) technique.

Although non-invasive brain-computer interfaces are providing the lowest accuracy in the signal acquisition, because of the deflection caused by the skull, there is advantage because there is no need of modification of the human body and brain-computer interfaces provide possibility of building interface with minimal discomfort for the user.

It is possible to implement non-invasive brain-computer interfaces under the most naturalistic conditions of use with minimal need of the wearable hardware and with advantage of wireless connection to the host computer that is analyzing and transforming signals or to the technical device that is controlled with the use of the brain-computer interface.

II. BRAIN IMAGING TECHNIQUES

The key component of the brain-computer interface is the data acquisition hardware intended for monitoring of the manifestation of normal neural activity of the central nervous system. Data acquisition in non-invasive brain-computer interface is based on the brain imaging and this category includes various techniques that are capable directly or indirectly image the structure (structural brain imaging) and function (functional brain imaging) of the brain.

A. Structural Brain Imaging

Structural brain imaging deals with the imaging of the brain structure and there is possibility to use it for diagnostic purpose in the case of intracranial diseases including tumours and in case of various injuries.

Computed Tomography (CT) or Computerized Axial Tomography (CAT) uses series of x-ray images of head taken from various directions and creates cross-sectional images of the brain. Magnetic Resonance Imaging (MRI) uses magnetic fields and radio waves to acquire data for formation of two- or three-dimensional images of the brain. MRI has advantage in no use of ionizing radiation or radioactive tracers.

B. Functional Braing Imaging

Functional imaging of the brain is used for diagnostic purpose in case of metabolic diseases and lesions and it is also suitable group of techniques that can be used for neurological and cognitive psychology and for the creation of brain-computer interfaces.

Positron Emission Tomography (PET), using trace amounts of short-lived radioactive materials, Single Photon Emission Computed Tomography (SPECT), using gama-ray emitting radioisotopes, functional Magnetic Resonance Imaging (fMRI) and Near Infrared Spectroscopic Imaging (NIRSI) are techniques that measure and localise changes in cerebral blood flow, which are related to the neural activity and it is possible to use it for identification of regions of the brain, which are activated when subject is performing particular tasks.

Other imaging techniques, including the magnetoencephalography (MEG) used for both research and clinical purpose, electrocorticography (ECoG) and electroencephalography (EEG) are suitable techniques for recording of changes in

electrical currents and magnetic fields, which are produced as the manifestation of the normal function of the brain.

Electroencephalography (EEG) can be defined as the measurement of the electrical activity of the brain, realized by recording of electrical signals scanned by electrodes, which are placed on the subjects scalp.

The result of measurement, which is called electroencephalogram (EEG), represents the set of electrical signals scanned from large groups of neurons. This technique is frequently used in research and development aimed at creation of the BCI, because the process of its use is non-invasive for the user. Another advantage is that the EEG is capable of high temporal resolution with measurement of electrical activity of the brain on the level of milliseconds.

All of described techniques have its limitations and differ in advantages and disadvantages. For example MEG, or EEG, which measure neural activity of the brain with high temporal resolution, are limited in ability of spatial resolution and fMRI with its high capability of the localization of neural activity has disadvantage because of its lower temporal resolution.

III. EMOTIVE EPOC NEUROHEADSET

In our effort to build novel application of the brain-computer interface we are using low-cost commercially available 14 channel EEG hardware Emotiv EPOC Neuroheadset (Fig.1), which is used for acquisition of raw data from electrodes that are positioned at AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8 and AF4 positions, according to the international 10-20 system.

Figure 1. Low-cost EEG signal acquisition hardware Emotiv EPOC Neuroheadset

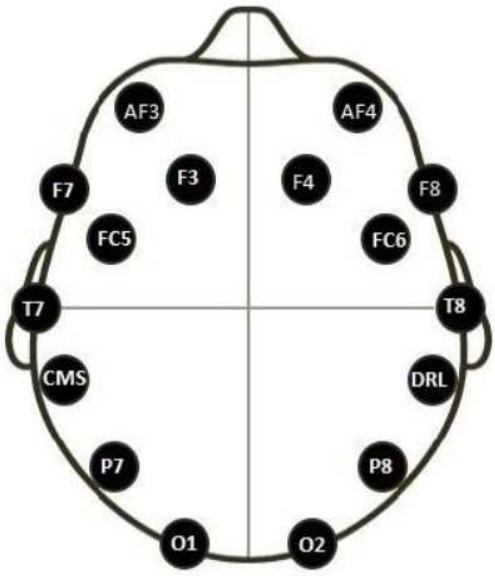

Figure 2. Electrodes acquiring signals of neural activity of the brain are positioned according to the 10-20 model

Odd numbers of electrodes are reserved for the left hemisphere of the brain; even numbers of electrodes are reserved for the right hemisphere of the brain.

Electrodes AF3, AF4, F3, F4, F7 and F8 are used for imaging of the neural activity of the lobus frontalis of the subject's brain. Electrodes FC5, FC6, T7 and T8 are scanning the lobus temporalis of the brain.

TABLE I. RECOGNISABILITY OF CHARACTERISTIC PATTERNS OF FACIAL EXPRESSIONS IN EEG SIGNALS

	Smile	Left smirk	Right smirk	Laugh	Teeth Clench	Look left	Look right	Blink	Left wink	Right wink	Furrow of brow	Rise of brow
AF3	√		√	√	√			√	√	√	√	√
F7	√		√	√	√	√	√	√	√	√	√	√
F3				√	√			√		√	√	√
FC5				√	√	√	√	√	√		√	√
T7	√	√		√	√				√		√	√
P7		√		√	√				√		√	√
O1				√	√							√
O2	√			√	√	√	√					√
P8	√			√	√	√	√					√
T8	√		√	√	√	√	√					
FC6	√		√	√	√	√	√	√		√	√	√
F4	√			√	√			√		√		√
F8	√		√	√	√	√	√	√		√	√	√
AF4	√		√	√	√	√	√	√	√	√	√	√

The lobus parietalis is scanned by the P7 and the P8 electrodes. Neural activity of the lobus occipitalis is scanned with use of the O1 and O2 electrodes (Fig. 2).

Two referencing electrodes CMS (on the left side) and DRL (on the right side) are used for the reduction of the noise in the signal.

Signals are sampled with 128 Hz sampling rate and are sent through the wireless connection to the dongle, which is used as the receiver connected to the USB port of the personal computer. Host computer is used to perform computationally expensive analysis of acquired data and transformation into the control signals for software applications.

There is possibility to find characteristic patterns in EEG signals that are connected with facial expressions including blink, right or left wink, right or left look, raise or furrow of brow, smile, teeth clench, right or left smirk and laugh and those patterns are, according to tests provided as the part of our research, recognizable in signals from respective electrodes.

For example, look left or right is manifesting mostly in signals from F7 and F8 electrodes and also in signals from FC5, O2, P8, FC6 and AF4 as shown in Table.1.

Affections of the subject are also manifesting in EEG signals and there is possibility to detect characteristic patterns for engagement, boredom, frustration, meditation, instantaneous excitement or long term excitement, which are connected to the vigilance, alertness, concentration, stimulation, interest, contemplation, expectation or negative feelings.

Intentions of the subject to push, pull, move left, right, up and down and to rotate clockwise, counterclockwise, left, right, forward and backward are detectable. Intents are connected with real life or virtual objects. In case of virtual objects there is possibility to detect intent of the subject to let those objects disappear.

The ability to control external technical device is determined by the capability of proper level of concentration of the subject during the process of signal scanning.

IV. CONCLUSION

The paper introduced brain-computer interface as the technology that is capable of building the communication bridge between central nervous system and external computer or other technical device and allows one-way or two-way communication.

Techniques of the structural and functional brain imaging with emphasis on the functional brain imaging techniques and especially the technique of the multi-channel electroencephalography (EEG) were introduced. Our initial experience with use of commercially available low-cost multi-channel EEG hardware Emotiv EPOC Neuroheadset was described.

New forms of brain-computer interfaces and their applications will be evaluated in the future work with the strong emphasize on the assistive technologies for use by people with different motor or voice communication disabilities or with completely paralyzed voluntary muscles and part of this effort will be aimed at the area of educational process.

V. ACKNOWLEDGEMENT

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CHILDREN SECURITY AND SAFETY ON THE INTERNET

M. Rašitović, B. Markov, M. Pardanjac
Technical Faculty „Mihajlo Pupin“, Zrenjanin, Srbija
maya_0014@hotmail.com, b.markov1989@gmail.com, marjana.pardanjac@tfzr.rs

Abstract -Tracking children's activities on websites is a very challenging task for parents, caregivers and instructional teachers. They made all the more difficult by modern children who are Internet safety may have knowledge as to how they can mask their identity. The parents and others must introduce children and students about the benefits of the Internet, but also the dangers it brings. They must be familiar with how to protect themselves. The paper will be given a few examples of the negative consequences of use by Internet without proper parental supervision.

I. INTRODUCTION

As most people know the internet can be an amazing resource and provide hours of fun for kids, but there is a side to the internet that can be worrying for any parent. Rooms have been a main cause of concern Chat for years, with adults posing as young children and chatting to unsuspecting kids and in extreme cases trying to organise secret meetings with the child.

Websites with explicit images are another problem that children may be exposed to. A few of these websites have a warning on their homepage alerting the user to the fact that the site contains this sort of material, but unfortunately not all of them.

Another major worry for a parent is spam email containing explicit images. The majority of this type of spam gets sent from countries where any type of law is not easily enforced and therefore the culprits can go on sending. Hopefully one day we will see the end of this type of marketing, but unfortunately, at the moment, it is here to stay.

II. WHAT PARENTS AND CAREGIVERS NEED TO KNOW

Children are small and are not aware of any potential dangers from the Internet, so parents and caregivers need to take care of the benefits and activities that can help in the development of children, but also the dangers that children may be exposed while on the Internet.

The positive side of the Internet are:

- The Internet can help with research and homework;
- The Internet can facilitate easy communications with family members and friends;
- Appropriate Internet activities for children should be age related. Teenage activities may not be appropriate for a young child;
- Although the Internet can be educational and entertaining, children should spend time offline.

Parents and caregivers must understand potential Internet dangers and prepare their children:

- Information provided over the Internet—by children and adults—can be used for identity theft;
- Internet communication often is anonymous, especially in chat rooms or blogs. Asexual predator may pose as a friend to lure a child away from his or her family's protection. Cyber bullies may target a child for harassment;
- The Internet contains inappropriate information for children, such as pornography, hate literature, aggressive advertising, and violent images;
- Using e-mail or downloading files can lead to viruses or hidden spyware, which endanger a family's privacy and computer.

Talking with children about important topics can sometimes be difficult, but it is very important to have conversations about difficult topics. Depending on their developmental stage, they may have very different levels of understanding and also different attitudes about what they claim they want to hear from parents. Children need to hear from their parents about matters that relate to their safety.

III. WHAT INSTRUCTIONAL TEACHERS AND RESOURCE OFFICERS NEED TO KNOW

As parents and guardians must take into account the content of Internet sites where children

are accessing, as well resource officers and teachers in educational institutions must take account of the amenities and activities that students will have the sites, provide access to certain sites and monitoring of student activities. As much as possible, they should go into history and examine the pages students have viewed.

Classroom Internet use can be exciting, rewarding and challenging. Students' Internet use should be tailored to their ages.

- Teachers should create age-appropriate activities for students.
- Educators should maintain open communication with parents about students' academic Internet use—in guided classroom settings and independently.
- Students' varying developmental stages and Internet skills will produce different issues and problems for each age group.
- Computer labs may be configured to assist with this supervision.
- Schools must be consistent and fair in enforcing classroom rules and the division's acceptable use policy.

Classroom and library rules must comply with the division' acceptable use policy regarding the steps students should take after accidentally accessing an inappropriate site. Technical staff needs to utilize the division's network tracking controls and study the generated reports, which may identify patterns of inappropriate use. Because of that monitoring is crucial:

- Filters are not failing proof. Teachers and librarians must watch where students go on the Internet—just as they would keep an eye on them during a field trip.
- Teachers need to acquaint themselves with new tools that allow students to visit protected sites.
- Teachers need to keep up-to-date on Internet safety issues and provide accurate, timely information to students.
- Teachers should establish and post rules for safe Internet use near computers in class rooms, libraries, and labs.
- Teachers should go over the rules with students periodically. As a result, the students—even when excited or upset—will be more likely to remember the rules.
- Educators must keep the lines of communication open with students and parents.
- Teachers must provide an academic purpose before allowing students to go online.

IV. WHAT STUDENTS NEED TO KNOW

The Internet is a powerful tool that should be used wisely. Some advantages of the Internet are:

- Allows students access to a vast library of previously unavailable resources,
- Enables students to communicate with people around the world,
- Provides a creative outlet for students skilled in writing, art enables students to communicate with people around the world.
- Provides a creative outlet for students skilled in writing, art, music, science, mathematics, and other topics.

Students need to know that not all Internet information is valid or appropriate. But to come expressed the positive side of the Internet, students must be trained to identify appropriate content sites. They must also recognize the border between the virtual and the real world. The facts with which the student must be familiar are:

- Internet information may promote negative attitudes, such as hate or intolerance, and dangerous or illegal activities, such as self-injuring behaviour, gambling, and illegal drug use.
- Student technological interactions in the virtual world can be negative and spill over into the real world.
- Students should be reminded regularly that the rules are intended to ensure their safety.
- Students should not be allowed to wander aimlessly on the Internet.
- Sexually explicit material or violent images can affect students negatively.
- Sexual predators will try to convince students to trust them.

Students should be taught specifically how to maximize the Internet's potential while protecting them from potential abuse.

- The critical-thinking skills students learn in the classroom, library, and lab should be applied to Internet resources and Web searching.
- Students need to know what to do and who to ask for help when they encounter a person or site on the Internet that is offensive or threatening to them.
- Students and adults are strongly encouraged to be responsible citizens. Report illegal Internet communications and activities to

Internet. Service Providers and local law enforcement authorities.

Internet messages and the people who send them are not always what or who they seem.

- People in chat rooms, instant message "buddies," or those who visit a blog may not be who they appear to be. Students should learn to recognize when someone is potentially dangerous.
- E-mail can cause malicious code-infection problems for a computer or network. Students should not open e-mail or attachments from unknown sources.
- Students need to be aware their electronic messages, even those with known friends, can leave electronic footprints that can be misused by others.
- Students need to know which information is safe to share with others online, which should never be shared, and why sharing it could put the mat risk.
- Students never should reveal online any information about where they live or attend school.
- Students need to realize when an Internet encounter may be questionable and how to protect themselves when this occurs.

V. TALKING TO TEENS

Parents also have to teach children about Internet safety before they let them surf the web unmonitored. A major difference between hopping in a car and hopping on the Internet is that there are no real "rules of the road" on the Internet. This makes it both a very powerful and very dangerous vehicle. So, to avoid computer crashes or worse, you need to make the rules and enforce them. The goal here is to teach teens common sense to steer clear of online dangers.

Talk to them about why it's important to be safe online. Parents must be sure to cover the following points:

- Discuss viruses, spyware, and hackers and how they operate
- Discuss how predators like to lure vulnerable young people into talking about themselves
- Explain why it's important to be safe online because the computer can be an open door to all of your important personal information
- Discuss how identity theft occurs
- Discuss the fact that you or a computer expert (if you're not one) can track every single thing that is done on your computer
- Talk about how criminals can take control of your PC and break it, so that you have to buy a new one

VI. UNSUPERVISED ACCESS TO CHILDREN AND TEENS

When it comes to finding and luring potential victims, the Internet provides numerous opportunities and advantages for predators.

Chat rooms, role playing games (e.g. World of Warcraft), virtual worlds (e.g. Second Life), and social networking sites (e.g. Facebook), facilitate predators' agendas by allowing participants to remain anonymous or create false identities. By disguising their true identity and motives, predators are able to build long-term online relationships with their targeted victims prior to any attempt to promote physical contact. More recently, varying forms of harassment have become a more prominent issue for children and teens.

A child or teenager having unsupervised access to the Internet is open to a world of harmful risks that can be both psychologically damaging and/or physically abusive.

Chat rooms have been the area of focus and research in Internet safety for children. In recent months, cases of abduction and/or murder of children has awakened society to the realities of promiscuous matters such as peadophilia. The Internet has been found to facilitate such conditions. Several arrests have been made recently, including celebrities who visit sites and download indecent pictures.

Chat rooms are used to lure children into offline meetings, which are extremely dangerous. The victims of this type of abuse are usually tricked into these meetings by building up a false sense of security with the offender through online conversation. The following are some of the notable cases of Internet chat rooms abuses:

"Case 1**:** In October 2001, a paediatrician pled guilty to 11 felony counts of attempted child molestation and sending pornographic pictures to a minor via the Internet. The doctor preyed online for a young girl to train as a sex slave and said he knew how to torture a child without leaving marks. The doctor received a year in jail." [5]

"Case 2**:** In January 2002, a 16 year-old girl was found tied up in the home of a Virginia man. The girl met her abductor on the Internet. Investigators report the man kidnapped the girl so he could have sex with her." [5]

"Case 3**:** In July 2003, former US Marine Toby Studebaker, 31, ran away to France with a 12-year-old British schoolgirl. Evidence shows that they had been in touch with each other for some time via email after making contact through an Internet chat room. This case received huge media coverage in Britain and rekindled concern about so-called "grooming" by adults who contact children via Internet chat rooms." [5]

Children and teens are using their online access without restriction and can be unaware they are putting themselves into compromising situations. The content of the Internet and its capabilities arguably possess much greater risk and danger to children than that of television, movies and music. The primary reason for this is that these other influential media are often subjected to rigorous censorship legislation before they are in the grasp of children. The content of the Internet is widely unrestricted in what it offers or consists of. There is no age certification advertised on Websites and there is no prior deletion or censorship of information or material before it is published as a page. In essence any person can create a page and publish it immediately without any intermediary checks. The interactive nature of the Internet also distinguishes its dangers from traditional media. Communications can be held with different people from all walks of life, whether it is ethical or unethical.

VII. THE LINK BETWEEN CHILDREN ONLINE AND CHILD PORNOGRAPHY

With children accessing the Internet unsupervised and engaging in discussions and pictures of a sexual nature, it is unfortunate, but unsurprising, that they would be highly susceptible to targeting by paedophiles and child pornographers. With little research being done concerning the numbers of children abused by child pornographers online, it is difficult to get a clear picture on the severity of this risk. There is also a lack of a consensus regarding an association between predilections to commit real-life offenses and collecting child pornography that may have slowed responses to this issue. Hence, the extent and magnitude of children targeted by online child pornographers and sexual predators is unknown. Based on the evaluation of this literature review concerning the online safety of children, this age group can be characterized as at-risk when online.

Although there are many benefits to children using the Internet for learning or improving skills, there is obviously a need for regulation or restrictions on the sites they are accessing and the amount of personal information they are providing to 'friends' or 'relationships' forged online. Without cautionary guidelines for children who go online, there is an increased probability that they will experience exposure to some sort of exploitation during their usage. With children accessing the Internet unsupervised for lengthy periods of time every day , further research needs to be conducted on how many children are actually aware of the dangers of sexual predators online or are aware of the consequences of sending sexually explicit photographs of themselves via the World Wide Web.

VIII. ILLICIT ONLINE DRUG SALES

Online sales of pharmaceuticals are a rapidly growing phenomenon. Yet despite the dangers of purchasing drugs over the Internet, sales continue to escalate. These dangers include patient harm from fake or tainted drugs, lack of clinical oversight, and financial loss. Patients, and in particular vulnerable groups such as adults, seniors, kids and minorities, purchase drugs online either naively or because they lack the ability to access medications from other sources due to price considerations. Unfortunately, high risk online drug sources dominate the Internet, and virtually no accountability exists to ensure safety of purchased products.

The dangers these websites pose are numerous and rather self-evident or deliberate use of drugs for fun. All implicate consumer safety as well as financial security, self health.

These dangers include:

- the delivery of drugs or active pharmaceutical ingredients without a valid prescription;
- lack of professional oversight;
- the risk of questionable quality, counterfeit or substandard product;
- poor or lack of medication instructions;
- failure to provide adequate independent information to patients on possible adverse reaction and drug interactions;
- fraud;
- inability for consumers to be reimbursed by health insurance programs;

- end lack of confidentiality of personal medical data.

Importantly, the uninsured and underinsured populations represent a significant at-risk group purchasing from these sites. These patients do not have access to or often cannot afford to see a physician and may instead elect to purchase drugs and seek treatment online.

Also, spam e-mail and other electronic solicitations are something every e-mail user is familiar with and have the potential to entice individuals who may not have had the original intention of purchasing online. Large scale criminal operations may be behind spam e-mails that promote the illegal sales of counterfeit and poor quality drugs as well as those that infect purchaser computers with viruses.

These dangers, together with a number of well documented patient tragedies where patients have died because of drugs purchased online, indicate the absolute need to address this growing phenomenon. Of course, as noted previously, many websites simply do not require a prescription at all, allowing the unfettered purchase of drug materials over the Internet. Clearly, greater risk of harm is associated with transactions that result in fake or substandard materials being ingested by patients. Profits from advertisements incentivize search engines to maximize their numbers of online advertisers.

Although Internet search engines purportedly "verify" the legitimacy of Internet drug sellers through PharmacyChecker.com, in fact, little verification of the potential advertisers actually takes place. "Verified" pharmacies sell fake drugs and do not fulfil the supposed verification "requirements." Both the pharmacy and the Internet search engine profit from the advertisements of non verified pharmacies.

A child or a teenager, who having unsupervised access to the Internet, is open to a world of unsecured, lack of accountability and oversight of Internet search engines. They find them by advertisements, unsecured search engines or other way.

"In April 2005, the DEA, FDA, and CBP announced the results of the year-long Operation Cyber Chase, which the DEA had implemented with the help of several foreign governments, to crack down on illegal online drug sellers distributing controlled substances without a prescription. As a result of this operation, twenty individuals in eight U.S. cities and four foreign countries, who were members of an Internet drug trafficking organization that used 200 websites to sell millions of pills globally, forfeited over $6 million of illicit proceeds." [6]

IX. CONCLUSION

Based on the evaluation of this literature review concerning the online safety of children, group can be characterized as at-risk when online. Although there are many benefits to children and adolescents using the Internet for learning or improving skills, there is obviously a need for regulation or restrictions on the sites they are accessing and the amount of personal information they are providing to 'friends' or 'relationships' forged online. Without cautionary guidelines for children who go online, there is an increased probability that they will experience exposure to some sort of exploitation during their usage.

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FACEBOOK AS A FUNCTION OF TEACHING

M. Čeke, V. Grbić, S. Milenković, M. Pardanjac and S. Jokić
Tehnički Fakultet „Mihajlo Pupin“, Zrenjanin, Srbija
marinalukmark@gmail.com, grbicvladimir89@gmail.com, slobodan141089@yahoo.com,
marjana.pardanjac@tfzr.rs, smaletin@tfzr.uns.ac.rs

Abstract - Social networks are an increasingly popular way to communicate over the Internet, and increasingly replaced by writing emails. In addition to global social networks, there are also smaller networks of local or national character, as those are basically musical contents are intended for maintaining or business contacts to those used exclusively publish short messages, where users write about what they think now, what they do or feel. Currently the most popular social network is Facebook with 200 million users. Most beneficiaries are those with less than 30 years, although the mass use of specially recorded among persons aged 35 to 49 years. Recently, social networks are also applied in the teaching process. This paper will give some basic information about social networks, as well as some examples of application in the teaching process.

I. SOCIAL NETWORK

Social network is a social structure made of individuals or organizations that are called "nodes" which are associated with one or more specific types of interdependency. These networks are connected to people looking for new friends, want to get in touch with people who are far away from them, who wish to express their views, participate in discussions with other people on a particular topic

The nodes are the actors within the network, and relationships are the connections between nodes, and so does social network. Social networks can be established on or off depending on need. It is displayed as a diagram, where the lines are shown as links and nodes as a great big point.

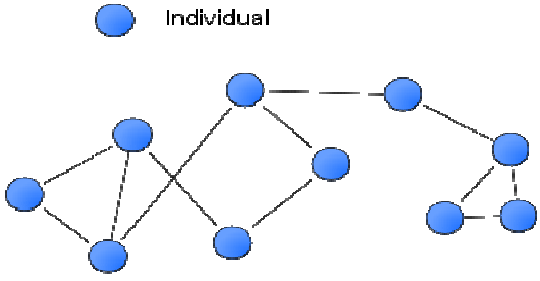

Figure 1. Example diagrams of social networks [4]

The research in the academic environment has shown that social networks operate on many levels, from families up to the level of the nation, and play a key role in determining how to solve some problems, how organizations work, and the degree to which an individual will succeed in achieving individual goals.

A few years later, in 2002 and 2004 created the currently most popular networks MySpace and Facebook. Regular users of global networks are surprisingly quickly accepted mode of operation of these sites and social networks in general.

Virtual teams within social networks are associated with individual networks, which together achieve their goals, and that only a few times can be found in person.

The ten most used social networks in Serbia:

- FACEBOOK
- MYSPACE
- FLICKR
- HI5
- TAGGED
- KARIKE
- NEOGEN
- POZNANICI
- FURKA
- DODIRNI ME

II. FUNCTIONING, ADVANTAGES AND DISADVANTAGES OF SOCIAL NETWORKS

Every registered user gets his station or profile. Settings and options for improving their profile is growing. For example including services from other sites, chat with those friends who are online.

The massive use of My Space and Facebook is the ease of use. When someone is register as a new member, I can decide who will be on his list of friends. Then has the option of inviting other members through their profiles, acceptance or rejection of one's call to be his friend, making a variety of groups and group members in a throw.

Great interest and motivation inspire comments. Any registered user may comment on the image, status, or if it is a group of every group member can post video, status, pictures on the wall of the group and comment on the status of installed video and image from another group member.

The appearance of social networks had a great influence on society and drastically changed the way of communication between people. While older people refuse to accept such a way to communicate because they believe that this way of communication brainless, young people would rather say that social networks are extremely useful and easier to establish contacts and improve.

Social networks allow users to make new friendships, maintain communication with their friends from other places, other countries or even from another continent, connecting people with the same interests, allow business people to promote their own or another organization. Offer developers a set of APIs (Application Programming Interface) and tools that allows third-party developers to integrate with "open graph"-either through the application of social web site or through external sites and devices.

Despite the great benefits of social networks, there are **serious problems** they bring. **Addiction** is very prevalent problem among users of social sites. Such dependence was not included in the official list of mental disorders and illnesses, but some analysts believe that soon could be found in a medical publication. User **privacy** is compromised. All information users share on the social web site automatically belong to the company and are stored on their servers even when you close your account. Extremely big problem is the **abuse of children** for pornographic purposes. Social networks are an important segment, not only in the world of information, but also in everyday life for us.

III. FACEBOOK

Facebook is a website that serves as a social service network. Since September 2006, anyone who has over 13 years and have a valid e-mail address can become a facebook user. People use Facebook to communicate with their loved ones, with my friends, share pictures and videos and many life situations. It was founded by Mark Zuckerberg while he was a student at Harvard University, with his college roommates Saverino, Hughes and Moskovitz. Initially it was used only by students at Harvard, but later spread to Boston University, and now the whole world. Facebook now has 400 million users worldwide, and was banned for a time in some countries - Syria, Iran, China, Vietnam. Major drawback of Facebook is that people spend much time on it, and so many employees who work in firms were denied access to the social network.

In March 2006, the founder of Facebook Mark Zuckerberg offered $ 750 million for the sale of their site, which he refused, and later the price climbed to $ 2 billion from an unknown bidder. Microsoft bought 1.6 shares of Facebook for $ 240 million. This offer to buy Facebook speak only how much his popularity. Many companies advertise on it, and therefore pay large sums. Another advantage is that it is free for its users. Today we can go on Facebook and via mobile, which is also a great advantage of social networks - the so-called smart phones the first in a series was the Motorola Baya.

Figure 2. Facebook beginning page [5]

IV. FACEBOOK AS A FUNCTION OF TEACHING

Arrival information and communication technology in the classroom is an inevitable thing that happens. Most of the teachers is ready for this innovation, but like all technology news, application of modern technology in the classroom from day to day changes.

“In addition to the incredible usage rate among students, there are a number of unique features that make it amenable to educational pursuits. For example, Facebook is equipped with bulletin boards, instant messaging, email, and the ability to post videos and pictures. Most notably, anyone can post information and collaborate within the system.”[2]

Pilot project on the use of Facebook for educational purposes in Serbia was first applied in the Fifth Belgrade High School, the teaching of literature, so they made profiles Serbian romantic poets, whose works are taught in second grade in the Serbian language and literature in high schools and vocational schools. According to Jasna Matić, Minister of Telecommunications, profiles of poets other than basic information, include and descriptions of their lives, works and achievements.

"The project has met with great interest from representatives of youth in UNESCO because there is no additional cost, and motivate students to free time and as you spend on the Internet use in the teaching process," said Matić. [1]

Technical Faculty "Mihajlo Pupin" has opened a profile on facebook, where students have the opportunity to be informed about the examinations, teaching, library work, seminars are held at the Faculty, the work of lecture notes, teaching staff. Profile of the Faculty, students can communicate with each other and share information, ask questions.

Faculty profile is also set video for future students (Figure 3).

There are also information on the exams in French and Italian languages, and also set a photo album with Promotions 2012th (Figure 4)

Also, the profile can be found and information about the entrance exam and e-learning introduced by faculty to students who are unable to come to prepare for the entrance exam, to be able to follow lessons and working procedures of the task (Figure 5).

Figure 3. Video for future students [6]

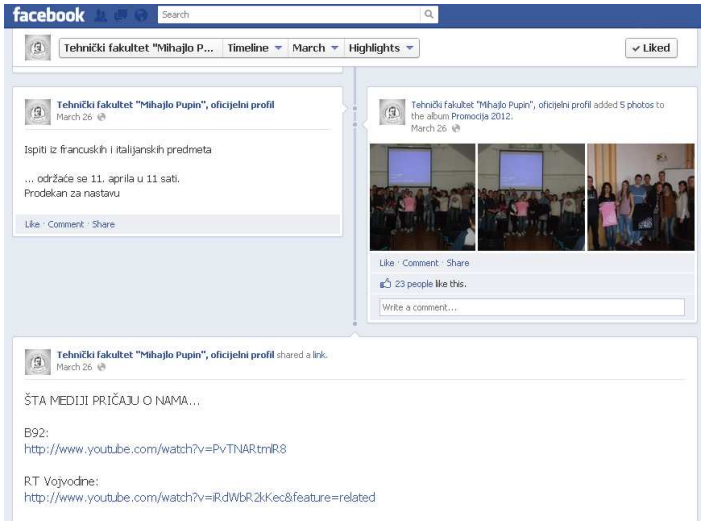

Figure 4. Information on the exams and a photo album with Promotions 2012th [6]

Figure 5. Information about the entrance exam and e-learning [6]

V. CONCLUSIONS

The benefits of using Facebook and social networks are great. Increase the opportunities for communication to teachers and students, because in this way increases the number of learning styles, providing an alternative to the traditional lecture format, creating opportunities for online classrooms and increase student-teacher interaction and student-student.

Teachers should be able to expand your portfolio, promote active learning through learning communities, and to test the effectiveness of on-line learning through social networks like Facebook. In addition, the preparation of teachers can create opportunities for teachers who are prepared to work through Facebook to get opinions about the experience with Facebook networks and to create more effective lessons to Facebook for their future classrooms.

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EDUCATION IN THE FUNCTION OF ACQUIRING APPLICABLE KNOWLEDGE AS A RESPONSE TO THE GLOBAL CRISIS

G. Sučić*, Ž. Požega** and B. Crnković**
*University of Split, Faculty of Philosophy, Split
**University of Osijek, Faculty of Economics, Osijek
goran.sucic@ffst.hr zpozega@efos.hr bcrnko@efos.hr

Abstract - This paper particularly points out the complex problems of the contemporary world that demand of education to abandon a form of stereotype way of transferring and using the acquired knowledge with the aim of training for the responsible and competent behaviour and problem solving. This requires radical changes in the coordination of education, what is reflected primarily in abandonment of the former traditional model of teaching and introduction of integrated developmental curriculum as well as abandonment of rigid programmes which reproduce inapplicable knowledge. By introducing open flexible model based on the interest and motivation of individuals and the community, and more contemporary methods of teaching, development of cooperative relations and team work followed by the greater investment in science and education, the result will be a production of the qualitative applicable knowledge that will ensure changes in the domain of educational practice thus creating perspective and alternative to the existing knowledge that led up to the certain crisis.

In the 21st century the illiterate will not be those who don't know how to read or write but those who cannot learn, discard the learned and learn again.

Alvin Tofler

I. INTRODUCTION

Teaching process implies the activity of an individual resulting in acquisition of certain knowledge, skills and manners, attitudes and system of values. In the developed societies main developmental resource is knowledge which is called the human capital in the context of value itself, and its level is greatly influenced by the quality of education from which the competences derive. Education should contribute to the general increase through continual development of an individual. That is why in all developed countries knowledge is considered a national priority and many strategies of development of education that contribute to the economic, social and cultural development of the society as well to the personal development of its members are implemented.

„Do we learn for the school or for the life?“

Knowledge is exactly what it makes a value different from any other resource over the history defined as the most important means of the production of irreplaceable values of the contemporary society. Weaknesses that appear in the process of acquiring knowledge are ceartainly a quick obsolescence and inability of knowledge inheritance; everyone starts from the same level of ignorance and has to acquire the knowledge for himself and use it selflessly and share it with the others.

In the period of time when labour markets are more and more competitive, investment in the new applicable knowledges will become a priority in order to attract and maintain necessary talents, and train them effectively for high-technology.

Globalisation is often perceived as a great achievement in the contemporary world. But it can generate global crisis that warns us and asks for new requirements, new knowledges and skills compatible with the challenges of the contemporary world.

Actually, the goal of intellectual capital is to emphasize those knowledges that are in the function of development. The value of intellectual capital is equal to the future conversion of that impalpable or virtual value in relation to an individual as carrier of this intellectual capital. In this way the value of subject that learns is more widely and precisely shown, and is manifested trough the need for more investment in the new knowledges. Intellectual capital implies the ability of turning the knowledge into a value.

Participation of everyone or the majority of those in the process of learning with the aim of creating values that will be estimated by the future knowledge market is inevitable in the creation of

intellectual capital, where the investments in knowledge are not perceived as the expense but rather as an investment in the developmental component. (Human Resources Accounting).

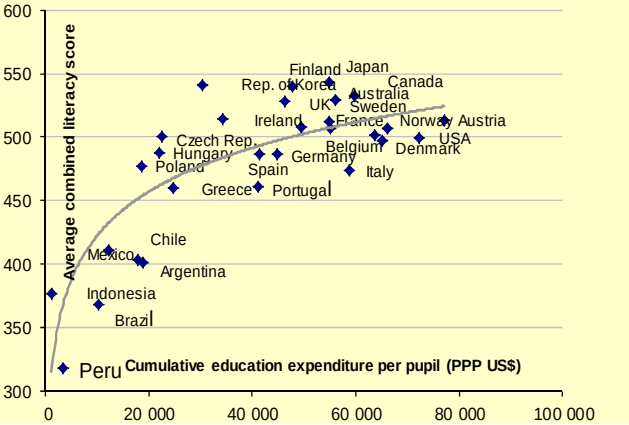

Figure 1. Achieved results and accomplishments of the quality of education in the countries that invested heavily in science and education

In today's economy (Knowledge Economy) or economy based on knowledge (Knowledge Based Economy) it is pointless to talk about the importance of learning and knowledge as in the institutions of formal learning so as in the informal learning (Long Life Learning) which is more and more present today.

Whereas today's society and technologies are developing rapidly, it is impossible to keep up to date with the new trends, systems and innovations without life long learning, and an individual as such is not in the position to rise to the challenges that are set up as an imperative reguirement of the modern individual. Thus, the responsibility of the academic community is greater if it fails to find a modality of permanent training of the employees as well as the preparation of the students for the process of accumulated problems that are inflicted upon by the system of wrongly set priorities.

When it comes to education, we are witnesses to many unsuccessful reforms that recur from time to time, and it is promoted pronuncedly and usually by the change of government when discontinuity of necessary changes happen, thus creating incalculable consequences for an individual and the community. The emphasis in life long learning should be placed on acquiring applicable knowledges, specialisation, improvement and training. The average time period of obsolescence of certain knowledges has never been so short so it is clear why such an emphasis is placed on the permanent training and specialisation within a framework of continuing education and life long learning.

Hence we confirm the already known conclusion that life long learning is of a crucial importance, and we substantiate it with the statistic data and studies from the most developed countries of the world, which show that organisations spend up to ten thousand dollars per year on education of their employees, up to 5% of the institution's income per year, and 5% of their working time (approximately 30 minutes) the employees have for their education per day.

The most common reasons for changes in the education system are first of all, an unstoppable progress of technology, a need for the new skills that are required nowadays and that are necessary for competitiveness and formal education that is rigid and inflexible and as such condemned to decadence and failure in relation to the alternative that starts from the need for the new competences.

The need for additional education can be analysed from the aspects of: analysis on the level of the learning organisation, necessary competences for specific professions and analysis on the level of an individual (what one lacks in order to be more successful).

General goals of permanent education should primarily be increasing their competitiveness and work success, their promotion to the complex professions in the hierarchy. Special goals of additional educational cycle are undoubtedly, among others, improvement of the team work, efficient time management, improvement of the work safety, increasing the level of motivation and creative way of thinking etc.

II. TEAM WORK AND DEVELOPMENT OF COOPERATIVE RELATIONS AS A PRECONDITION OF THE QUALITATIVE PROCESS OF KNOWLEDGE MANAGEMENT

As a value category, knowledge comprises of all existing patents, processes and technology, competences, skills and experiences of everyone involved in the process as well as the information exclusively related to a person. Time management, which implies the process of gathering, organising and transferring knowledge with the aim of the effective and qualitative living is an equally important part.

The goals of time management are surely provision of reguired knowledges, development and transfer of the available knowledge, the use of

existing knowledge and its further development. Obstacles to the effective process of time management can be ineffective and vertical organisational structure from the seat of learning to the organisations that are the users of acquired knowledges, insufficient IT education, non-existence of the adequate informational-technical support etc. Preconditions of establishing a team work system as a result of the qualitative individual accomplishments with which a team is improved and trained in the process of creating data bank and knowledge that will be at everyone's service for browsing and learning. By using such approach and method, formal and informal learning are being integrated.

Theoreticaly set knowledge is evolved by the information networking and their shaping and connection with the related context, experience and/or expectations. Competitiveness and complementarity evolve on the pyramid of acquiring competences and skills in achieving uniqueness and comparability of quantity and quality of knowledge.

Let us remind us of the division of knowledge made by Earl, Scott, Nonaka i Takeuchi that is based on the following activities:

- identification, spreading, using and protecting the existing knowledge,
- discovering informal or implicit knowledge,
- transforming implicit knowledge into explicit knowledge,
- rising knowledge from an individual level to the level of team and organisation,
- integrating knowledge management with other activities.

Knowledge system consists of:

- bank of knowledge (knowledge based or knowledge warehouse),
- information-telecommunication team and time management team,
- means and persons that possess knowledge (logistical support team and knowledge carriers),
- knowledge transfer systems (videoconferences, teleconferences, presentations, Intranet, Extranet, publications, workshops, seminars and alike.)

If the afore-mentioned division of knowledge is set in the context of human values and capital, according to Lauc, it will be divided into a moral, an intellectual and a social capital, what gives a new human and cultural dimension of the process of acquiring and using knowledge together with the developmental communication component thus making new teams and knowledge networks. In keeping accordance with the development equating, Lauc from the human capital derives equating of the development of society (country)

$$Y=ax1+bx2+cx3+dx4+ex5+fx6$$

where Y is=term of complete development, a-f= weight with argument, x1=motivation, x2= competences, x3=mutual communication, x4=equipment, x5=money and x6=environment of the observed system. Relation of coefficients (arguments) is: a > b > c > d > e > f. (Ž.Požega, 2012, 243.)

Pupils and students should be given an option of choice and responsibility for their own education whenever it is possible.

Elizabeth Schulz

III. TEAMS AND THEIR MULTIDIMENSIONALITY

Business Process Reengineering- philosophy that brings business processes to the fore has transformed the way of forming teams and their structure. Today's teams are multifunctional, i.e. multidimensional and their authority and influence are not restricted only in the domain of one function. Competences from various domains create conditions for achieving developmental concept with the purpose of accomplishing better results.

Teams that are regarded as the process of development of cooperative relations are in the function of determining clear settings of constant improvement of basic processes (value stream).

Fast, reliable and qualitative information and communication technology ensure radical improvements of the performance of those teams that are competent enough to get acquainted with them and use them. Advantages that this technology brings along are:

- Abandoning the functional organisational obstacles-information exchange;

- Abandoning the spatial organisational obstacles- members of the dislocated subjects can also be a part of the team;
- Cooperation, communication and coordination of activities are being set on the significantly higher level;
- The team possesses all the necessary information for independent decision making in due time.

The new category of software- groupware has been of great importance recently. This kind of a software is self-oriented to team work. Usually they integrate multimedia database, automatisation of workflow, e-mail, electronic meetings, conferencing and scheduling. The automatisation of the workflow has been given a special attention because it improves the level of harmony of activities within a specific process.

IV. HOW TO REFORM EDUCATIONAL PRACTICE

Similarly, Stoll (1999) clarifies how real improvements and qualitative changes as in education process so as in other institutions can be realised only if they come from the inside, what implies active cooperation of the team experts from different domains, i.e. from the network of common acquired values, trust, norms, social and emotional relations, all of which form the culture of an educational institution.

In the domain of organisational theory, which is more and more illustrated by the examples in education, Senge (2002) emphasises the fact that every organisation is essentially a product of thinking and interaction of its members. "So the strongest lever for any kind of the organisational learning project is not in the hands of policies, budget or organisational diagrammes but in our own hands" (Senge, 36).

In other words, every individual should be trained for learning during his/her life in order to be able to adapt continuosly to changeable, complex and interdependent world. Senge (2003) claims that learning means increasing the ability by experience: "Learning is a longlasting process that develops in "the real life", and not in the classrooms and on the training classes (so called: "experience-based teaching"). This kind of learning could be difficult to control but it makes more permanent knowledges: an increased ability for the effective influence in the surroundings that are important and vital." In line with the definition of an organisation that learns and explores, it is important to point out that is a permanent process. In fact, since the changes in the surrounding never cease to exist, so the process of organisational learning is continually in progress. It is a kind of a "lifelong journey" towards the desirable and never completely accomplished goal (Senge, 2001, 10).

Practice is the best theory.

Einstein

Harmut von Hentig, a renowned pedagogue has turned this into a slogan: "Clarify matters-empower people!" (Hentig, 1987); and continued that by clarifing professional issues we grow up as people, and if we are being supported and empowered it will be easier for us to deal with many other issues. Meyer (2002) adds that the development and the investment in the educational system are not by themselves a goal and a purpose. Its sole justification lies in the fact that learning and teaching should be made more human and efficient for all participants in the educational process.

Mention should be made of the efforts of Fullan (1993, 1999), one of the first authors who explored the process of implementation of the reforms in the educational practice (in the 70ies and the 80ies) and implemented these discoveries on the institute of teacher training in Canada. Furthermore, (Leithwood, 2002, 101). Fullan (1999, 44) clarifies expediency of planning development of the school system in accordance with the development of the society as a whole. Many contemporary authors (Prosser, 1999, Bascia, Hargreaves, 2000, Kinsler, Gamble, 2001, Dantow and others, 2002) consider the unpredictability, complexity and multidemensionality to be the basic characteristics of the educational system instead of linearity and predictability. They call our attention to the fact that the teacher is focused only on the predictable and expected phenomena in the educational practice and in this way could become more and more insensitive to the phenomena of unexpected, unpredicted, unplanned and sometimes illogical situations which are very common in the educational practice (Fullan, 1993, 1999, Hopkins, 2001, Filippini, 2001). Meyer (2002, 163) clarifies that " students should be prepared for the future whose contours we can only flair", (...) as opposed to today's absurd that young people are educated for the professions that no longer exist."

New social relations as on the global so as on the national, local and family level put the teachers in the new position that they can deal with only by

means of possessing new knowledges (new assignments but also new roles) and new competences (documents of the European Commission, 2002, 2004, 2005). The teacher is regarded, first of all, as an initiator of changes, promoter of learning that takes care of his/her personal and professional development and who is a part of the system and the organisation that is developing and learning.

However, there should be a reason why a teacher should consent to such professional training. The frequent and imposed compulsion and obligations are the main reasons of discontent with the pre-existing condition in the educational practice. Our experience has shown the need for the regular inclusion and training of teachers for research as a way to the qualitative professional training, experience-based and creative learning that develops reflexive and self-reflexive practice thus increasing capacities for the change in the educational practice and new paradigms of the culture of the educational institution. (Miljak, Vujičić, 2002).

„Knowledge is what unites us, and finally becomes more important than what separates us.“

V. INSTEAD OF CONCLUSION

What is important for the improvement of the quality in education?

- Quality of the teaching profession-competence
- Quality of the management on the national level-funding
- Quality of the management in the educational institutions (open and flexible model)
- Social projects for improving education
- Continuity of the education policies
- Comparability, competitiveness, complementarity, monitoring and evaluation.

Education for the competences in the 21st century

- Key competences for everyone
- Preparation for lifelong learning
- Contribution to the economic and the cultural development
- Response to the social challenges
- Education for everyone
- Preparation of the young people for active citizenship
- Teachers-the key carriers of changes
- Support and greater investments in development of the school and the academic communities

(Commission staff working paper: Schools for the 21st Century)

Learning how to learn

Learning how to learn is an ability of performing and preserving in learning, organising one's own learning, including effective time-, space- and information-management as an individual so as a part of the group. This competence implies the awareness of the process of learning as well as the needs for effective learning, identification of available possibilities and capability of overcoming obstacles for making the learning process more effective. Such competence induces an individual to upgrade the previous learning and life experiences in order to use knowledge and skills in different contexts. Motivation and self-confidence are the key pre-conditions for the overall process of education.

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MACHINE PERCEPTION AS INTERFACE PARADIGM

N. Đurić, D. Karuović
University of Novi Sad, Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
ndjuric@gimelnet.rs, aruena1@open.telekom.rs

Abstract - Analyzing the concept of interface in relation to human evolution in order to understand better what potential effects could the emerging trends of building diverse types of interfaces have on us. Trying to extract a model that would make it easier to grasp the short and productive path for building interfaces and machines more suitable and easy to use.

I. INTRODUCTION

In order to gain a more detailed insight to the origin of the term interface, therefore understanding how it fits into a potential perception model, while having in mind the interdisciplinary nature of the concept, the need arises to analyze it from multiple points of view.

First an overview of the general definition of interface is needed, and of its current usage in different fields, as well as the relation between them and our field of interest.

Since any concept is a learned representation of a category [1] -- a set of objects that share some features in common, stored in human memory and distinct from objects in other categories, it is necessary to try to relate the concept of interface with what we know about our senses, perception and perceptive apparatus – in general, try to relate it with similar ideas in other categories.

Following this trace it is possible to relate the notion of interface to Jakob von Uexkull's idea of Umwelt and draw parallels between user interfaces and Umwelten. Namely Umwelt, German for environment, is a subjective spatio-temporal world distinct from what Uexkull labeled as umgebung, which denotes an objective reality. Further on, analysis of human Umwelten is needed as to gain insight on how humans perceive the world, and how perception is in relation with interfaces and the Umwelten.

Finally, agreeing upon relation between interfaces and the model that Uexkull offers us, by further rethinking the interface in relation with memory and Umwelten we can compare them to ideas of Donald Hoffman about interfaces and perception and finally try to analyze the potential effects interfaces can have on their users.

II. GENERAL NOTION OF INTERFACE

In the field of study of human-computer interaction we often come across the concept of interface, which is generally represented as a mediator of interaction.

The notion of interface appears in everyday usage during the seventies, following the rise in digital technology usage and the appearance of first computers. Worldwide, in theoretical literature, this concept appears only recently.[2]

When we rethink the meanings and usage of the term, its interdisciplinary nature becomes obvious. The term has many different connotations, depending on the field of study within which it is used, which implies that the differences in connotations themselves are as big as the problems aforementioned fields deal with, for example, differences in natural and humanist 'interface'.

One useful translation of the word 'interface' is to Russian, where it is translated as поверхность стыка, the surface of contact or touching. Following this, while agreeing that it is only possible to perceive each artificial object from the outside, by interacting with its surface, for we cannot enter the inside of the object, we could conclude that the surface of every artificial object is an interface [3].

It carries a similar meaning in communication systems, in this area, interface is an element which, in general sense, has a function to make the information available to knowledge, therefore it often carries a connotation of something that, conditionally said, is between or on the border. Often examples are technical communication systems directed to user senses, where interface makes the information **perceptible.** In this light, the term receives a connotation of an instance that allows us to perceive the world, which makes

information available as object of knowledge – accessible to observe, therefore, by allowing perception it allows perceiving knowledge.

So, an outside such as this, that allows us to perceive something for what we otherwise don't have perceptive apparatus brings us to the thesis of Donald Hoffman, who claims that perception has, similarly to GUI simplified the world, allowing us to function more easily.

Also, to fill in the definition of the concept of interface, it is necessary to define another term, medium. In Greek, the word medium is derived from the word 'metaxu', meaning 'in between'.

The existance of medium (alongside with subject and object) is a condition for existance of interface – that which is in between the medium and subject. So it becomes clearer: in order for information or datum to become understandable for subjects, betwen the subject and that information there has to be a medium to make it available.

Finally, alongside the existence of interface, between subject and medium, in objective reality – if such thing exists, following previosly presented ideas between the medium and message there is also an interface, on the surface – our organism.

III. HUMAN INTERFACE

Input to human brain is basically always the same, visual information from the outside are transferred to the brain via millions of fibers in the optic nerve, after a short passage through the thalamus it arrives to primary visual zone of the cortex.

Sound is carried in via over 30.000 fibers of auditory nerve, passes through some older parts of the brain and arrives at primary auditory cortex.

Spinal cord caries information about touch and internal sensations to the brain via another million fibers. They are received by the primary somatosensory cortex.

What these fibres actually transfer is called *action potentials*, patterns of electro chemical impulses. So, finally, all that arrives to the brain is actually a group of patterns which are again, further divided into spatial and temporal.

This division is the foundation upon which Jeff Hawkins, researcher in the field of neural networks, developed a memory-prediction framework and later the hierarchical temporal memory model of machine learning. When explaining the function of these models, Hawkins also gives examples of the function of these patterns:[4]

Spatial patterns are coincident patterns in time, created when multiple receptors in the same sense organ are stimulated simultaneously, at the same time. For example in the case of seeing, light carries an image to our pupils, after being inverted by the lens, image hits the retina, our sensory organ, and created a spatial pattern. This pattern is what actually comes to the brain, not the image.

Temporal patterns are groups of patterns changing over time, so, to use the previous example, eyes move every second 3 times and catch a new image, this movement is called a saccade. Each time eye moves, image on the retina is changed, which implies that by changing the image, the patterns entering the brain are changed too. Saccade is the reason why we see changes outside what we perceive as line of sight.

With his research Hawkins built upon the work of Vernon Mountcastle [5] who points out that neocortex is uniform in its structure and appearance. All the regions of cortex are the same, the ones handling auditory input, touch, muscles and all the rest. Following this lead, Mountcastle suggests that if all of these regions look the same, it is possible that they actually do the same thing, that cortex uses the same computational model to accomplish everything it does.

Following the fact that human senses translate all outer sensation to action potential it becomes clear that brain, more precisely neocortex doesn't actually see the images, nor does it hear sound.

These sensations are groups of spatio-temporal patterns created by human perceptive apparatus, which are the only input to the brain, and also the way humans perceive the world around them.

This does support the claim that our senses actually make surroundings accessible to knowledge but also raises some questions. What arrives in human brain essentially is a group of patterns, but what 'we' as persons experience are actually sounds, images and sensations.

This raises the question of where and how does the 'self' actually occur inside the brain?

Assuming that one accepts the definition of intelligence as an ability to predict future events based on existing memory, it is necessary to define the memory. If memory is actually stored in neural

synapses, by following Hebb's rule [6] – neurons that fire together wire together, we could agree that repeating patterns of impulses, action potential, stimulate neural networks inside the cortex and go on to form neural synapses or – memory, which is ever changing depending on the use or recall, so if patterns are not repeated for a prolonged period of time memory fades away. This also raises another important question about memory, its representation, or, how is it stored. Seemingly, when memorizing anything, we 'automatically' place the objects into certain categories, this is how we can recognize that any dog is a dog no matter the race, or our close friends, from whichever angle we're experiencing their presence. Hawkins argues that this is because brain stores invariant representations of memory, implying that there is a mechanism – perhaps an extension of sense-interface that processes patterns coming from the outside and turns them to invariant representations. This is not an entirely new idea, Plato pondered a similar question 2300 years ago in his Theory of Forms. He concluded that our higher minds are bound to a transcendent plane where perfect Forms (ideas) exist, a rather methaphysical explanation but still the same idea.

In the same manner, the question of 'self' has been posed many times throughout history, for us, most notably by John Locke in his „Essay Concerning Human Understanding“ [7] where he identifies the self - sameness of identity, to memory – how far backwards does consciousness extend to any past action or thought.

IV. UMWELTEN AND INTERFACES

When Jakob von Uexkull did research on behaviour of some organisms, the most notable one being about three functional cycles of a tick, he went to point out how these, and all other organisms exist as subjects that use perceptual and effector tools conected by an integrating apparatus capable of fulfilling life functions [8].

While arguing that there is nothing mechanic about the existence of organisms in general, Uexkull turns to the 'subject' which actually uses those tools and points out how, aside from the mechanical structure, in each organism an operator is obvious. Further on, from a biologist viewpoint, he explains that any individual as a subject can only be compared to an engineer operating the machine, an organism.

Concerning the viewpoint of this engineer manipulating the machine, Uexkull gives a picturesque example of a soap bubble around each creature that represents its own world, filled only with sensations or perceptions which the creature alone is capable of perceiving. When we would step into one of those bubbles, a new world would come to being. This way we would be able to experience worlds of other species, heightened or lower hearing or sight, different abilities for pattern and relation insight and so on. We would be able to experience worlds of a butterfly, a dog or a mouse, how it appears to them and not us. This is what Uexkull called the phenomenal world or the Umwelt of the animal, a species wide subjective bubble floating in shared objective environment.

Of course, this raises the question, related to the engineer operating the machinery-organism. Does changing the machine that is operated essentially affect the operator, is the operator as a subject, an individual, changed in the process?

Existence of interface in this operator-machine notion is obvious. Indeed, the interface in this case is of perceptual nature, a perceptual tool. Group of these tools, our senses, are the only way subject can experience the world and therefore store memories. If we would agree that self arises from memory reinterpreted by aforementioned 'integrating apparatus' for these interfaces, the question becomes, if interfaces of a subject are changed, does this affect the integrating apparatus?

V. INTERFACE PERCEPTION

This leads us to the work of Donald Hoffman who also claims that perceptions of an organism are a user interface between that organism and the objective world [9]. He goes on to claim that our perceptions are a species-specific user interface, a notion similar to Uexkull's notion of Umwelt as a species wide subjective bubble.

As there are differences in Umwelten for different species, there are also differences in interfaces, but, due to variations normal in evolution Hoffman proposes there are differences in interfaces among humans.

Claim such as this does also raise a question of subjectivitiy and therefore accuracy of perception of umgebung, or objective reality. The question is, what good are perceptions if they are not accurate?

An answer to this question would require a good definition of 'accuracy' of anything labeled as 'reality' but it is not given, instead an example is provided, an icon on the computer desktop.

Namely, we can perceive this icon as being a fox with a tail of fire, but it would be rather ludicrous to assume that there is actually a burning fox somewhere inside our hard drive.

Interface in this case was made by us, so to simplify the vast complexity of having to comprehend raw physical reality of an everyday tool such as web browser, and to provide us with means to use such a tool, albeit we don't have the 'natural' means of using it.

Hoffman then presumes that interfaces, our senses, perception – the umwelten are designed to guide adaptive behaviour in a certain niche and that accuracy of reconstruction of objective reality is irrelevant and that by understanding evolutionary problems that we as species have solved, we can better understand properties of our own interfaces.

Following this he presumes that much of the competition between and within species exploits the strenghts and weaknesses of interfaces and that this competition leads to arms races between those interfaces thus influencing adaptive evolution.

VI. CONCLUSION

So, in a way, history really has shown that after we shape our tools they shape us [10] and it also seems that with advances in computer science we tend to shape our tools more and more in our own image, by our own designs, perhaps signifying the species wide tendency to recreate and merge ourselves with our tools thus expanding our perception beyond current reality and accelerating evolution.

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MODELING SNA RESULTS WITH A BAYESIAN NETWORK

I. Hamulic*, N. Bijedic*, D. Radosav**, E. Junuz*
*Faculty of Information Technologies, University "Dzemal Bijedic", M. Tita bb, Mostar, Bosnia & Herzegovina
**Technical faculty Mihailo Pupin, University of Novi Sad, Serbia
indira@fit.ba, nbijedic@fit.ba, radosav@tf.zr.ac.rs, emina@fit.ba

Abstract - In this paper we present a Bayesian network (BN) model in which the prediction of students' success at the final exam is based on students' activity in online learning community and on success at the midterm exam. This particular research is a part of a long term project related to quality improvement of distance learning at the Faculty of information technologies of the University "Dzemal Bijedic" of Mostar, Bosnia and Herzegovina.

Indicators for students' activity are based on characteristics of ego networks, such as the size of ego network, density and the broker property. In order to choose Bayesian network predictors, we first conducted statistical analysis of the available data. Then we modeled a naive Bayesian network in open source software MSNBX.

I. INTRODUCTION

In the past years, we were involved in analysis of a large-scale online learning community at FIT Mostar. We investigated the topology of the communication, and it turned out to be a scale-free, small world network (Bijedic and Burak, 2006). Investigating the network properties, we proved that parts of FITCS (Faculty of Information Technologies Community Server) provide knowledge sharing (Hamulic and Bijedic, 2009, Bijedic and Hamulic, 2009). In addition to this, we recently presented a semi-adaptive e-learning model suited for the limiting environment of Bosnia and Herzegovina (Radosav et al., 2010).

FITCS exists for more than five years now. It was originally designed for distance learning students, but in time, it became the most popular way of communication for all FIT students. FITCS consists of several units, and one of them is reserved for communication on curriculum subjects. That part was designed for knowledge and information sharing. FITCS is now numbering around 800 active students. Their communication is grouped by the semester of study, where students can exchange experience on subjects, and personal interests, such as computer networks, security, etc. For the purpose of this research we used the data from FITCS concerning the communication on topics related to Programming 1 from the academic year 2010/1.

We will here briefly revise the basic characteristics of ego networks that we used in creation of Bayesian network model. Size is the number of alters then that an ego is directly connected to, possibly weighted by strength of tie (Burt & Minor, 1983).

Density is the ratio of observed ties in a network to the maximum number of possible ties (Barry, 1983).

A broker, linking two network clusters, takes a share of the resources passing through that position. Indeed, a canny broker may impede transitivity by working to prevent the formation of other direct links between these clusters. Brokers, by their very structural position, cannot be full members of any network cluster. Often their marginal nature means they are not fully trusted because no single cluster ran exercise total social control over them (Goffman, 1963).

A Bayesian Network consists of a set of variables and a set of dependency arcs which are connecting some of the variables. As it is well known that BN models should not have too great number of categories, we grouped data as much as possible taking into account the specific aspects of each variable. The other reason for using as little categories per variable as possible is the number of data in each of them. We chose naive Bayesian approach since some recent researches indicate it is sufficiently good as well as easy to model (Cheng & Greiner, 1999).

We decided to analyze properties of students ego networks obtained using Ucinet 6.1. List of all available variables of ego network is presented in Table 1. In order to choose meaningful predictors, we calculated the correlation coefficients, and chose variables as representatives of highly correlated clusters.

II. BAYESIAN NETWORK MODEL

A. Choice of predictors

In order to select predictors for Bayesian network model, we preformed basic statistical analysis, but more importantly, we kept in mind relevant properties of ego networks. For example, we are interested if a student is broker in own ego network so we decided to select that property regardless of the results of analysis. Furthermore, at this moment we are not interested in number of connected components so we chose not select any of the related properties as BN predictors.

Statistical analysis consisted of two phases: preparatory analysis, and probability calculation. It was performed in MS Excel.

The purpose of preparatory analysis was to choose the best predictors for students' success at the final exam. For all numerical data we calculated the correlation matrix (Table 1). From Table 1 is obvious that Size, Ties and Pairs all significantly correlated so we decided that Size is representative of that group of ego network characteristic. Furthermore, Density is mildly negatively correlated with Size so we decided to choose Density as a dependent predictor. At the moment we were more interested in the broker property then the number of connected components or average distance and diameter, so regardless of the high correlation coefficient we decided to select Broker anther dependant predictor.

	Size	*Ties*	*Pairs*	*Densit*	*AvgDis*	*Diamet*	*nWeakC*	*pWeakC*	*TwoStepR*	*ReachE*	*Broker*	*nBroke*	*EgoBet*	*nEgoBe*
Size	1													
Ties	0,99	1												
Pairs	0,94	0,96	1											
Densit	-0,45	-0,47	-0,47	1										
AvgDis	0,72	0,63	0,55	-0,04	1									
Diamet	0,71	0,63	0,55	-0,35	0,89	1								
nWeakC	0,27	0,19	0,12	0,63	0,75	0,46	1							
pWeakC	-0,53	-0,52	-0,40	0,67	-0,14	-0,36	0,32	1						
TwoStepR	0,52	0,44	0,31	0,30	0,82	0,64	0,84	-0,15	1					
ReachE	-0,52	-0,53	-0,41	0,66	-0,06	-0,28	-0,38	0,94	-0,10	1				
Broker	0,90	0,91	0,99	-0,46	0,51	0,50	0,09	-0,35	0,25	-0,36	1			
nBroke	0,83	0,78	0,72	-0,63	0,80	0,90	0,21	-0,52	0,46	-0,45	0,67	1		
EgoBet	0,87	0,88	0,97	-0,45	0,50	0,49	0,09	-0,33	0,24	-0,34	0,99	0,65	1	
nEgoBe	0,68	0,61	0,60	-0,59	0,75	0,87	0,19	-0,41	0,39	-0,32	0,58	0,92	0,60	1

Table 1: Correlation matrix for ego network characteristics

B. Modeling Bayesian network

After selecting predictors we modeled the Bayesian network with dependences showed in Figure 1. Since one cannot bee broker in a small-sized network we say that Broker depends on Size. The similar stands for Density. Success at the partial exam is an independent predictor, for it is also a control variable for determining if ones behavior in ego network is proportional to learning

effort.

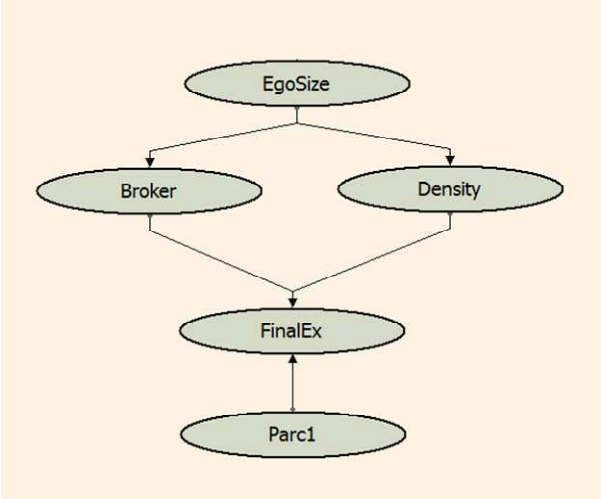

Figure 1: Bayesian Network Model (source MSBNX)

Since Bayesian networks demand rather small number of categories for predictors, we grouped all numerical data into three categories: Ego Size and Density have categories 0, small, medium-large, Broker has categories no, small, medium-large while success at midterm and final exam (Parc1, FinalEx, respectively) have categories unsuccessful, satisfactory and very good to excellent. The final step was calculation of probabilities and conditional probabilities. Those calculations were performed in MS Excel.

III. DISCUSSION

From the described model it is obvious that some students using FITCS as regular chat forum while others are actually exchanging knowledge, witch is in line our previous findings (Bijedic & Hamulic, 2009). Therefore, our decision to include success from the midterm exam is completely justified. On the other hand, if a student is dedicated to learning, network characteristics are useful in prediction of success at the final exam. For example, if student was successful at the midterm exam, from our model it follows that if student is a broker has medium density and size of ego network that student will certainly be successful at the final exam. On the other hand, if a student was unsuccessful at midterm exam but he/she was a broker they have 25% chances of success at the final exam. Furthermore, if student had medium-large Density they have greater chances (35%) of succeeding at final exam even if they are unsuccessful at the midterm.

IV. CONCLUSION

The goal of this Bayesian network model is to improve the possibility of students' final exam success prediction. The necessity for prediction is driven by the obligation to provide adequate and timely help to students who need it. It is in line with our ultimate goal: enhancement of students' performance at the final exam. The predictive model should be a part of an interactive learning environment.

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USE OF SOCIAL NETWORKS IN CLASS - ADVANTAGES AND DISADVANTAGES

A. Đeneš, A. Ambruš, E. Sakač, E. Eleven
Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
child_of_ki_arpee@yahoo.com, ambrush98@gmail.com, szakacs@sezampro.rs, erikae@tfzr.uns.ac.rs

Abstract – This paper shows a brief description of social networks and their use in education. Along with the basic conceptions of studying social networks, both positive and negative sides of their use in class are shown.

I. INTRODUCTION

Social media are the everyday reality of our society and a result of technologies that are affecting the way the information is gathered and shared, and the way the people communicate. In such a way, they are also changing the way people study and teach. As the students, parents, teachers and administrators are being more involved in social networks such as Facebook, MySpace, Twitter and YouTube; in educational, school related communication and other purposes, the line drawn between educational and personal networking is becoming more blurred.

Social networking is becoming a hit in education, which is shown through the following numbers:

- 96% of students that have access to the Internet are creating their social network
- 50% of teenagers say that they are talking to other students of the same age online (via IM, blogs or social networks) or by SMS
- 60% of subjects say that they have been using the social networks to talk about educational topics such as faculty discussions and career planning [2].

II. WHAT IS SOCIAL NETWORKING?

Social networking is, to put it simply, joining individuals, with cultural and other similarities or common interests, into certain groups [2].

Internet social networks are based on web pages known as social websites. Their goal is to unite as much users as possible in one place. People who are seeking new acquaintances, who wish to reach others that are far away, or the ones that are just looking to express themselves and to take part in discussions, are joining these social networks. With that being said, we have websites that are focused on certain interests on one side, and, on the other- those that are not about anything in particular - but anyone can join them [1].

III. ADVANTAGES AND DISADVANTAGES OF SOCIAL NETWORKS

Many schools in Serbia are forbidding the access to social networks from the school computers. Some pedagogues claim that, should the students be allowed to access Facebook, it would be against their policy – “Stop violence amongst the children”, because Facebook does have lots of displays of violence.

And they are right, from a certain point of view. Social networks have their down sides by which some children can fall prey to people with ill intensions. But if the children are allowed to access the social networks under the teacher's supervision who is also educating them about protection against such threats, is more effective than banning the access [4].

The children can either way access the social networks at home, from their friend’s computers, cell phones, and if prone to violence, they can still molest their victim. They don’t need a school computer to do that. On the other side, the social networks can be nicely used for education. There were a couple of experiments in Serbia, but that was about it. Beyond our borders many educational institutions are using social networks as one of the educational tools [2].

IV. SOCIAL NETWORKS IN CLASS

Different schools use social networks in different ways. Some are using them to communicate with parents and students, or to enhance learning because social networks connect students, organizing the virtual community.

The question that is often raised is what will happen to the traditional education. It should not come as a surprise if in ten years from now or even sooner, 70% of future generations learn in virtual schools, with the classes held on the web. The

teachers will use the social web places such as Facebook, Twitter, and YouTube to engage students in class [3].

In the text below, some possible ways of utilization of the social networks will be mentioned, in order for them to be partially used for studying even today, or so as to introduce some positive changes in the field of education.

It is presumed that these methods will be more satisfactory for the students, their motivation, cooperation and creativity [2].

The best known social networks that are usable in education are:

- Facebook
- Twitter
- YouTube
- Blogs
- Wiki systems…

A few years ago, the most famous and most popular social networks were made, in 2002 MySpace and in 2004 Facebook, to be more accurate. Regular users of the global network have, surprisingly fast, accepted the way these websites work and the social networks in general. The facts that Facebook has reached the figure of one million members in less than a year, and that today around 500 million people have their profile on this website, are the greatest confirmations. Social networks are growing each day; Twitter has made a 664% growth in the last year alone [1].

The social networks are becoming the most popular way of communication over the internet and are increasingly replacing writing e-mails. The Nielsen Company from the USA has done a research on the subject, and the results have shown that 67% of internet users regularly visit the social networks, and that 65.1% of them have a regular e-mail correspondence [1].

V. FACEBOOK

Facebook can become an excellent e-learning platform. The teachers can publish their PowerPoint slides and a lot more of their multimedia content for classes. Besides that, the teachers or students can make different trivia that can encourage other students to participate the trivia or to debate the answers.

The other option is, if they possess basic programming skills, the creation of useful Facebook applications using state of the art technologies. For instance, an application that would enable the students to consult their teachers more directly could be developed, which would increase the efficiency of educators in solving problems [2].

VI. TWITTER

Twitter is not so popular in Serbia as Facebook is, and the number of Twitter users will not top the number of Facebook users in the near future. Sadly, what many do not realize is that Twitter is offering fantastic but not fully utilized possibilities to every user, especially those who work in educational system.

Twitter is an excellent base for a life-long learning and abundant source of material which can be used to enrich an every-day work in class, make it more contemporary or change it for the better.

Twitter is actually a very simple platform that enables large possibilities for idea realization. Students and the teachers can send answers and ask questions, which means that they are having a two-way communication in real time. As a protocol, an online quiz application can be created based on “Twitting”. In simple terms, a teacher could send quiz questions and students could answer them through this service. Besides that, virtual classrooms bring discussions; Twitter can be used for research, and as a reminder to a student that a certain task should be performed. Twitter proved to be an efficient tool for professional development and cooperation with students [2].

VII. YOUTUBE

As the greatest social web page in the world that’s intended for video sharing, it can help a lot in education. Typical use of video has enabled the teachers to record their educational contents and post them on YouTube, so that the students can observe them as many times they want, whenever they want or as long as the content isn’t perfectly comprehended.

One of the examples is YouTube EDU, which contains materials and lectures in the fields of mathematics, chemistry, physics, literature, art etc., and the TeacherTube.

In Serbia, posting their materials and lectures on YouTube is not yet a popular practice for the teachers, but in other countries it’s becoming more frequent [2].

VIII. BLOGS

Blogs can be considered collaborative and interactive tools enabling the teachers and students to exchange their thoughts and develop discussions on a posted subject. The teachers can use them in order for their students to develop the sense for writing, thoughts exchange about a topic they were learning about in class etc.

Regular blogging is encouraging development of writing and researching skills. Blogging is also enabling the students to learn how to make critical assessments and evaluate different online resources.

One of the advantages of blogging is that it enables contact with other bloggers.

Harvard and Stanford are the examples of American faculties which enable their students and teachers to create blogs within their own blogging systems. One of them is Edublogs where the teachers and students can create blogs with ease, include videos, pictures and other multimedia content; the design is simple, and most importantly, they are secure and protected [2].

Edublogs is being used by the leading faculties, secondary schools, even governments from all over the world.

"The Strength of Week Ties" is an example of educational blog where an American professor David Jake is explaining his experience about using social media in class.

By blogging, a new circle of acquaintances is opened and another dimension is added in the lecture flow, and in the participation with their students or teachers.

Here is a list of some educational blogs: TeacherMagazine, EduBlogAwards, The Top 50 Blogs by Teachers, Scholastic's TeacherBlogs [5].

IX. WIKIPEDIA

Wikipedia is a cluster of systems for group work which enables the simple creation and modification of content. Wiki systems in their closed form can be useful in teaching when creating teachers' own manuals (presentations, seminars, multimedia, etc.), or sharing useful resources relevant for the subject. At least, they can encourage writing an article on Wikipedia, the best known wiki system, after the teacher revises the article. By doing so, it is contributed to Wikipedia's development and the accuracy of thedata. The most common three Wiki systems for education are [2]:

- wikispace
- wetpaint
- pbwiki

X. CONCLUSION

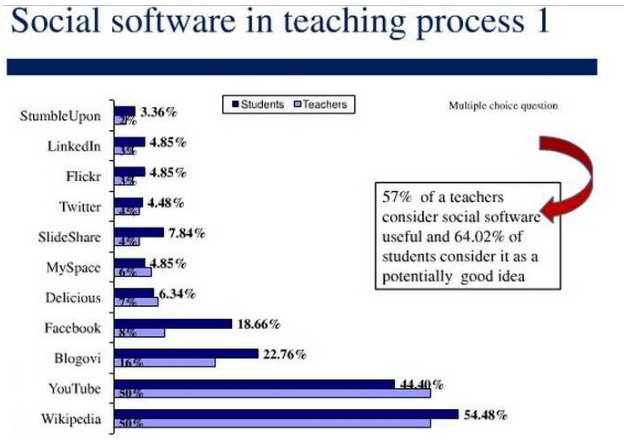
The traditional way of teaching is not interesting at all to newer generations, which causes turmoil in the classroom, disobedience, and disinterest for the subject being lectured. The use of the new technologies such as the social networks, refreshes the teaching process and brings it closer to the students.

Instead of just listening the lecture and occasionally reacting on the teacher's questions, access to the knowledge content is possible in several ways – by listening, watching and reading, along with fulfilling obligations that include working on tasks and tests. When full support by the teacher is added, it becomes clearer how to gain real skills [1].

The nature of the social networks is allowing the users to communicate, to exchange ideas and cooperate, which is an excellent media for students to learn from and to be trained on. That being said, it's very important that the students recognize the potential of utilization of social networks for easier learning. Social networks encourage students to become involved in discussions, to learn how to search for quality information, to develop skills in writing, and to accept the others. These are some of the key factors that students will need not only during their schooling, but also in everyday life, later on [3].

Will we see the use of such tools in teaching soon in the region?

Research results from the "Social software: teaching tool or not?" are indicating that the teachers are open to utilization of social networks in educational procedures in faculties. The following picture is showing some of the results:



Picture No.1: Research results display

Accessing the knowledge content is done from home or work, in real time over the Internet; collaboration among the teachers and colleagues can be done more actively by regular question posting and chatting; through discussions on forums opened for students, teachers and consultants; by giving ideas, advices, examples etc [2].

Unfortunately, one question remains: which methods, or methodologies should be used?

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PROPOSAL OF METHODOLOGY FOR CREATING DOMAIN ONTOLOGY AND ITS APPLICATION AT FIT

S. Rodriguez Domingo*, E. Junuz**, I. Hamulic**, N. Bijedic**
*Escuela Técnica Superior de Ingenierias Informatica y de Telecomunicación, Universidad de Granada, Spain
**Faculty of Information Technologies, University "Dzemal Bijedic", Mostar, Bosnia & Herzegovina
zandri@gmail.com,emina@fit.ba, indira@fit.ba, nbijedic@fit.ba

Abstract - This paper proposes methodology for half-automatic creating of domain ontology on basis of the existing state and content of the e-learning system repository, as well as the possible upgrade of the ontology with the new teaching content. The goal of the proposed methodology is to optimize human intervention in the process of creating domain ontologies and to prepare the data layer for the semantic environment of e-learning.

I. INTRODUCTION

Faculty of Information Technology (FIT) Mostar uses web-based distance learning system (DLWMS 2). The data layer of DLWMS2 stores a significant number of electronic teaching materials in text format created by the teachers and associates during the teaching process and used by the students during the learning process. For the teaching materials repository adapted to the semantic environment of e-learning, it's necessary to structure content of the existing materials and to create domain ontologies for the each scientific field. Organizing data into ontologies is complex and often a long process and thus it is necessary to automate, a much as possible, the process of creating teaching material ontologies. Structuring of data into ontologies will decrease redundancy and inconsistency of data from heterogeneous data sources. Domain ontologies are adequate for scientific fields because it was proved that ontologies are useful for well defined domains. In the field of e-learning, domain ontologies are of special importance because they can be reused for all subjects in the curriculum that belong to a certain scientific field. Source of data for domain ontologies learning used at FIT is unstructured and made of existing text documents and multimedia content (teaching materials) relevant for the domain. Unstructured data sources are the most complex for the process of ontologies learning and active participation of domain experts is necessary.

Ontology learning for a specific domain is a half-automatized process of identifying structure and rules between data in the existing documents. Structured data in ontologies are more understandable and can be used for semantic processing of data as well as in the process of making conclusions (identifying new knowledge) and predicting.

In the available literature, there are a few proposed methodologies for creating ontologies. DILIGENT methodology supports half-automatic process of creating ontologies and interaction with domain experts is necessary [1]. This methodology is directed towards knowledge management and it is not suitable for adapting the existing teaching content repository of DLWMS2 to the semantic environment of e-learning.

ROD (Rapid ontology development) methodology accepts structured and unstructured data sources, but the process of automatization is complicated [2], and thus it is not suitable for application in the existing state of the DLWMS2 repository.

Methodology On-To-Knowledge [3] and METHONTOLOGY [4] are well defined but don't provide a possibility for ontology learning, which is unacceptable for the quantity of data in the teaching content repository.

In the case of teaching content repository of DLWMS2, for each domain there are several authors of the teaching content documents and it is necessary to harmonize the terminology and approaches of all authors for description of the domain. Participation of more than one domain expert is good for the process of creating ontologies because that will improve the process of creating domain ontologies. Ontologies will enable conceptual vision of heterogeneous data sources.

Methodology for adapting the teaching content repository to semantic environment needs to be automatized as much as possible, considering a large quantity of existing documents for the each scientific field included in the curriculum of FIT, as well as the complex process of creating ontologies. ***Process of ontology learning*** refers to the (half)automatized process of creating ontologies based on induction and making general conclusions.

Based on the existing state of the teaching content repository at FIT and efforts to create repository for semantic environment of e-learning, the author of this paper analyzed methodologies for ontology learning in the available literature ([1], [2], [3], [4] etc.).

The existing methodologies are not widely accepted, nor adapted to the state of teaching content repository of DLWMS2 or other e-learning systems delivering teaching content in the form of documents and multimedia content.

II. METHODOLOGY FOR CREATING DOMAIN ONTOLOGY

This paper proposes methodology for half-automatic creating of domain ontologies based on the existing state and content of the teaching materials repository of e-learning system, as well as the possible upgrade of ontology with new teaching content (Figure 1). The goal of proposed methodology is to optimize human intervention in the process of creating domain ontologies and to prepare data layer for semantic environment of e-learning.

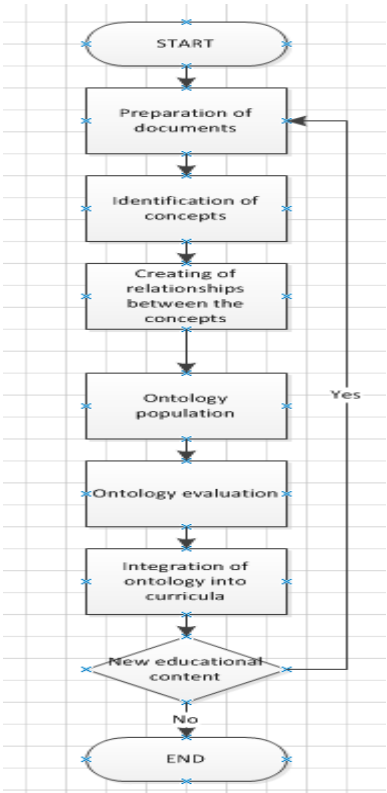

Figure 1: Proposed methodology for creating domain ontologies

Basic steps of the proposed methodology for creating domain ontologies based on the existing resources in data repository of e-learning system:

1. *preparation of documents* for processing during creating domain ontology
2. *identification of the relevant domain concepts* based on known instances (content of the teaching materials repository)
3. *creating relations between known concepts*
4. *ontology population*
5. *ontology evaluation (tool and domain experts)*
6. *integration of ontology in the context of curriculum for e-learning*
7. *upgrade of ontology with the new teaching content*

Preparation of documents is done by the team of domain experts in cooperation with the knowledge engineers. In the methodology itself, it is necessary to precisely define which documents are used by the knowledge engineer in the process of creating ontology. It is recommended to use the documents the content of which is organized by the teaching terms and learning activities. Contribution of each activity to achievement of the specific objective (goal) is defined.

Identification of the relevant domain concepts will be automatized as much as possible. Free software tool Text2Onto is used for automatization

of the process of creating ontologies (ontology learning). Text2Onto uses statistical method based on common occurrence of two terms. In the process of concept identification, domain experts will have intensive interaction with the software tool for ontology learning. Methodology needs to have harmonized terms for description of a certain domain.

Identification of the relevant concepts (OWL class) can be considered also as *segmenting of* instances using LSI method (Latent Semantic Indexing). LSI method monitors instances, documents and presents them as word vectors. Each word is assigned with weight (formula 1) equal to the number of times a word occurs in the document. According to LSI method, two words are connected if they often occur in the documents of a certain domain. Output results of this method are *fuzzy clusters* of the words describing the domain [5].

$$d(i) = TF(W_i, d)IDF(W_i),\ gdje\ je\ IDF(W_i) = log\frac{D}{DF(W_i)},$$

(1) Formula of word weight

d(i) – word weight,

D – document number,

DF(W) – number of the document where the word W occurs and

TF(W,d) – number of times the word W occurs in the document d.

In the different approaches, formula of word weight (1) can vary, but it always determines the number of times a certain word appears in the document and the collection of documents.

Creating of relations between ontology concepts is also partly automatized. Domain experts will participate in the process of creating relations, giving input information that are not explicitly shown in the data source or are redundantly defined.

Ontology population refers to assigning the existing instances to ontology concepts. In the process of assigning the instances to concepts, it is necessary to create representative group of instances (relevant number of documents and relevant content of documents) and to make comparison between instances in order to make a correct decision about assigning the instance to the concept. In the process of comparing instances, it is necessary to use similarity measures. Based on similarity measures, algorithm for segmenting assigns instances to concepts. Each new document is grouped with the most similar document that already exists in the ontology. Similarity between documents is usually calculated by the formula 2.

$$\cos(d_i, d_j) = \frac{\sum_k d_{ik} d_{jk}}{\sqrt{\sum_i d^2_{ik} \sum_j d^2_{jk}}} \quad (2)$$

Formula of documents similarity measures [5]

d_i i d_j – documents for which similarity is measured,

d_{ik} – word weight k in the document d_i and

d_{jk} – word weight k in the document d_j.

Each newly created ontology needs *to be integrated into the context of the curriculum*. It is also important to methodologically determine the way of integrating the ontologies into the existing system used as the means for realization and support for the teaching process and to consider the way of presenting data to the user and to optimize the use of such system.

Ontology upgrade is necessary, taking into consideration that the teaching process of higher education is dynamical and that the teaching materials must be improved with the content that is the result of current research in the field. The process of ontology upgrading is complicated and also needs to be automatized as much as possible. The following steps are proposed for upgrading the teaching content repository.

- assigning instances to concepts of the existing ontology (mapping) or applying application of TABLEAU algorithm [6] for making conclusions, to create the new ontology concept,
- if the new ontology concept is created, it needs to be connected to the existing ontology,
- check if the existing ontology integration is consistent,
- if necessary, apply the process of integrating ontology in the ontology of context or general ontology.

Proposed methodology for creating domain ontologies for the teaching content repositories is an interactive process between the domain experts and ontology learning tools.

The ontology that will enable transfer of stored data from the existing relational scheme of DLWMS2 database into data repository for the semantic environment of e-learning, consists of the following concepts: material, subject, field and type of material (Figure 2).

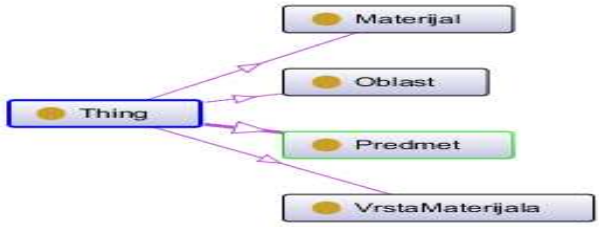

Figure 2: Basic concepts of ontology for storing of teaching content

The following relations between the ontology concepts are defined:

- Field consists of subject, i.e. subject belongs to a certain field
- Subject consists of materials, i.e. each material belongs to a certain subject and
- For each material, the type of material is defined (lecture, practice, workshop etc.)

Relations between basic concepts of ontology proposed by the author in the third step of applying the proposed methodology for storing of the teaching content can be defined by the formalism of descriptive logic in the following way:

$$Predmet \cap \forall hasOblast.Oblast;$$
$$Materijal \cap \exists hasPredmet.Predmet;$$
$$Materijal \cap \forall hasVrstaMaterijal.VrstaMaterijal$$

By presenting ontology relations by descriptive logic, the author gives formal foundation for implementation of the proposed ontology by using any tool or development environment.

Graph of the teaching content ontology, made by applying the methodology proposed in the paper, is shown on Figure 3. Graph nodes present ontology concepts and arcs are relations between ontology concepts.

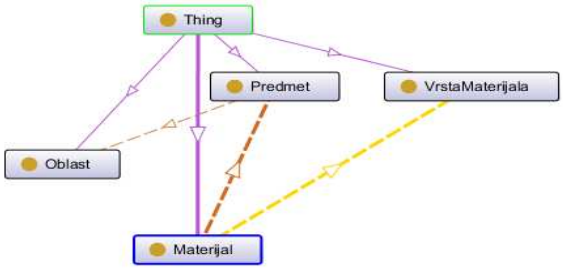

Figure 3: Graph of the teaching content ontology made by applying the proposed methodology at FIT

The rules of association and techniques of segmenting for grouping instances into concepts and hierarchical ordering of words were used for identifying relations between ontology concepts. Ontology population that was the result of applying the proposed methodology and teaching content at FIT had to be started with inputting data about specific scientific fields taught at FIT.

Specific scientific fields are instances of the concept field and will be connected by data type attributes with the instances of teaching subjects and learning objects. Connecting of subjects with scientific fields represents integration of the subject into the curriculum.

Ontology population is continued by assigning of instances to the concept Subject and connecting instances. Instances of the concept Subject are connected to the scientific field i.e. the concept of ontology Field.

The object attribute *hasPredmet* was created between the concepts Field and Subject in the step 3 of the proposed methodology for creating domain ontology. Object attribute *hasPredmet* connects the teaching subjects with the relevant scientific field. On basis of the book of regulations of FIT, data on scientific fields and subjects that are taught were entered.

In the proposed ontology, the learning objects are presented with the concept "LearningObject". Learning objects are parts of the teaching content and the concept LearningObject is connected to the concept Material (Figure 4.) by the object attribute "isPartOf". Connections between the concepts Material and Subject already exist in the ontology and once created learning object can be reused for the different subjects that are taught.

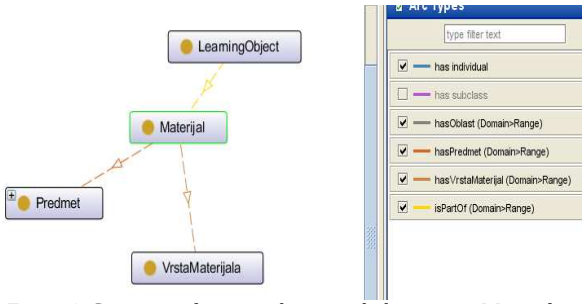

Figure 4: Connecting learning objects with the concept Material, based on the example of FIT

Nodes of ontology graph shown on Figure 4 are ontology concepts and the object attributes are: hasOblast, hasPredmet, hasVrstaMaterijala and isPartOf.

The user makes all decisions in the process of ontology population (inputting concepts instances into data repository) and computer supports the

process automatically by assigning relevant documents to the specific concept. Based on the group of documents, system suggest to the user possible concepts, instances and relations between ontology concepts. User (domain expert) can but doesn't have to accept the suggestions or can improve or reorganize them. Suggesting of concepts is based on determining the weight of word in the document.

Instances of learning object in DLWMS2 are also inter-related.

Created ontology for structuring and storing of teaching content has not shown contradictions in the process of evaluating and making conclusions using the reasoner FaCT++.

III. DISCUSSION

Domain ontologies on the data layer need to be connected to the ontology of student Model. LearningObject concept is the most suitable for connecting these ontologies and for integration of ontologies in the e-learning system. LearningObject was the most adequate for connecting the proposed ontologies considering that student is interacting with the learning object during the process of learning. This connection makes preconditions for optimization of learning process results, supervising, motivating and guiding of a student through the teaching process.

IV. CONCLUSION

The result of the proposed methodology for creating repository for the semantic environment of the e-learning system are domain ontologies for scientific fields. For creating ontologies, the proposed methodology can use data stored in the relational database and identify and introduce new data necessary for semantic environment of e-learning and process of adaptation. Data from the relational data model used for ontology learning have been marked in accordance with the requirements of the semantic environment and organized in ontologies.

By connecting ontology of student model and ontology of teaching content model, the preconditions for semantic and adaptive environment of e-learning as well as the preconditions for delivery of teaching materials adapted to the student have been made. Connection between these two ontologies enables structured storing of feedback data about interaction of student with the teaching content. Feedback data create preconditions for making conclusions about student's characteristics, to be used for guidance and counselling of students, which significantly increases student’s motivation.

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THE NECESSITY AND THE NEED FOR VISUALIZING THE EDUCATIONAL CONTENT AIMED AT INCREASING THE QUALITY AND EFFICIENCY OF THE PROCESS OF LEARNING AND ACQUIRING KNOWLEDGE

M. Danilović*, P. Danilović**
*Srpska akademija obrazovanja, Institut za pedagoška istraživanja, Beograd, Srbija
**Radio Televizija Srbije, Beograd
mircheta@yahoo.com

Abstract - This paper investigates the process of perception as a basis for human understanding of the world, because the things that can be seen are often equated to something that really exists, something real, objective, reliable, believable, clear, impressive and easier to understand. People understand the notion "picturesque" as a synonym for the notion of "visual", i.e. something obvious, clear and understandable, because the visualization completes the description, perception and comprehension of an object, phenomenon, process, event, etc. The paper explains the difference between the observation (i.e. the things we see) and the perception process (i.e. the physical, physiological and psychological way of perceiving things), between the process of "looking" and the result of "seeing", because looking and seeing are not synonymous. We are showing and emphasizing the role and the importance of visualization within the process of learning and acquiring knowledge, as well as the way this process can be influenced by information-communication education technology.

I. INTRODUCTION

Today's civilization is a civilization of visually presented reality, civilization of pictures, civilization of visual signs and symbols. Today people talk to each other less and they have little time for direct communication. On the other hand, the picture that is something visual becomes base of our knowledge. Today knowledge is obtained more and more by watching than reading for the new digital technologies that are permanently developing and improving have created to people complete multimedia learning environment from communication, informing, education till free time, etc.

Just in this entire learning environment people (starting from their flats and houses till their schools, faculties, business spaces, various public institutions and pen space, entire public city and intercity transportation and stations, various places for amusement, etc,) the visual component of information is dominant, that is, the visual, more exactly video presentation of something, in the frame of video information, video announcement, video games, video presentations, video communication, video teaching, video simulation, etc.

Besides, the visual relations themselves that is video contents may have various shapes of their presentation, for example: 2D and 3D video presentations, various computer-animated presentations, computer-television generated presentations from virtual studios, holographic presentations, etc.

Due to their enormous importance in the entire life of people, especially in learning, obtaining knwoledge and information, numerous digital technologies have been developed and they have been constantly improving (micro electronics, information-communicational, computer, television, etc.) For creating, collecting, distributing, storing and presenting first of all video but any other multimedia digital contents.

Their further development and improvement move towards completing one another, enabling solution of some of their faults and defects, easy and simple use, enabling compactness, integrity, multi functionality, reliability, miniaturizing and portability of their devices and creating new qualities, especially more high-grade digital multimedia and audio visual contents. With such reciprocal performance multifunctional devices are

obtained that are more accessible, more simple and easy for use (although they include a series of complex technology), very often with very intuitive and clear graphic interfaces. In that way spreading of the application and use of such devices as in educational process as in general in order to get necessary information, as well as in other areas of life and work, because demand for digital multimedia contents and information, and especially TV and video contents is enormous, and its further growth is expected.

Because of the above noted and repeatedly stressed value of information visualization in every field of human life, and especially in learning and education, the processes of visual perception, visualization, perception, observation, etc. are explained.

The importance of visualization is present from prehistoric time up to now as in everyday life as in training-education process. The path of reality visualization has been moving from the cave drawings and pictures, through artistic pictures and photos, film, press, computer, classic analogue television to today's digital television in various formats (SDTV (Standard Definition TV – television of standard resolution), HDTV (High Definition TV – television of high resolution), UHDTV (Ultra HDTV – television of ultra high resolution), 3DTV (three dimensional television), specialized computer systems for virtual reality and virtual studies, various video presentation systems (form different projectors, video walls, displays of different technologies) to multimedia home platforms that unite any services of digital television and the Internet, so called digital poster or info-communication newsstand, etc.

Although, beside the wealth and divesity of technical possibilities of reality visualization realization, nevertheless greater necessity can be felt for it, especially in education process in order to overcome the difficulties in understanding verbal symbols that are always present and with which every teacher faces when he tries to present visually any phenomenon, process and event from the teaching process.

The visible world can be found out only and correspondingly only through the sense of sight and thus more and more importance is given to visual forms of learning, visual perception, thinking and learning, that is visualization. When a human sees the visual world for the first time, it has no sense, no meaning, and importance. The integral parts of the visual world (surface, colours, edges, spaces) alone do not mean anything. Their meaning gives their sense, while meaning is obtained exclusively by learning. The human being's learning perceives the meaning (of things, phenomena, objects, events, processes, etc.). The meaning is the essence of sight, while visualization is a way that abstract information (sensual stimulation, sensations) are transformed into concrete that is appropriate meanings. There is no meaning that has not been learnt.

People are different among themselves by meaning they give to the visual world, the world they perceive. It is formed on the base of education level, different interests and beliefs, profession, comprehending the surrounding environment, tradition, culture, customs, stereotypes, etc. Every human being learns independently the meaning of the surrounding world in the frame of his environment and society.

Visualization (lat. visus – sight, look, glance; videre – see) represents obvious presentation of information; combination of video recordings, multimedia effects, images, drafts, schemes, graphs, diagrams, music, sounds, models and original objects, and it enables the visual presentation to point to what it needs to mean that is it is almost completely similar to reality. Objects in visual presentation may be enlarged, reduced, accelerated, movable, static, given in a whole or in parts, in appropriate relations and ties, etc. all with the aim to be comprehend easily and to be learnt efficiently. Objects and events that visually experienced are regarded real if they fit into the existing experience. It is not necessary to explain them a lot. Only by seeing then they are clear and real in global and they can be decoded easily. Various technologies and suitable media can conjure up different movements, processes, actions, and objects. They can be shown in various components and causal resultant relations that can be "seen", and the human being believes most in what he sees.

Visual perception represents immediate knowledge of object, events, and various data in the shape of picture. The phrases or questions like "do you see" of "do you understand" (comprehend) can be heard very often. These two questions are frequently understood as synonyms that are as same. The first question is comprehended not as keenness of sight but most of them interpret it as a question if something is understood or comprehended. As it can be "seen", the similarity is obvious in interpreting what is

"seen" with what is "understood-comprehended". What can be seem is clear and given with all details and features. From the previously stated comes out that sight – perception is base of our comprehending that understands.

But, beside this there is a great difference between "perception" as a process of receiving stimulation and "understanding" that is comprehending what is perceived. Understanding is a matter of learning, while observation is a reaction of sense cells on to internal energy effects. The sense that is the meaning stimulation depends on the previous experience in connection with the observed.

Visual observation otherwise represents immediate knowledge of object, occurrence and various data by the sense of sight. Although visualization is connected first with the sense of sight, we can visualize knowledge obtained by other senses making them spiritually or visibly that is more obvious. Visual perception is one of basic factors of learning the world. Although it depends on other cognitive processes, previous experiences, motivation, visual literacy and visual manner of learning, physiological state such as hunger, sleepiness, physical and psychic fatigue, student's existing psychological state, level (quality) of attention, motivation, emotions, etc. emotional attitudes, heritage, etc.

Data and messages that are obtained by perception that is visual review make the essence of knowledge, its base, and starting point. Thoughtful processing of he observed the students form concepts, and they are more precise and general if the visual data are more accurate and complete.

Visual creativity that is visualization of information represents the form of expression of human consciousness and its achievements, and powerful means to materialize ideas and express the existing reality.

Beside motivation, experience that cause manner of interpretation of the arrived stimuli and give it meaning influences most the quality of perception. In most cases, immediate experience that is what happened previously in consciousness, determines perceptions and observation, and defines which meaning will be given to stimuli. Because of that, visual and auditive abilities have to be developed at students and give them during the process of obtaining knowledge that is process of learning, more and more such types of information, especially chosen for them about their intellectual possibilities, previous knowledge, and age. Perceived data are remembered and accumulated lifelong and make base of experience, while various perceptive skills and strategies are still developing and improving.

II. ROLE AND IMPORTANCE OF VISUALIYATION THAT IS VISUALITY IN TEACHING PROCESS, LEARNING

Objects and events that are visually experienced are regarded real if they fit into the existing experience. It is not necessarz to explain than a lot. Only by looking at them they are globally clear and real. Coupling of film, video, TV, computer, and telecommunication technologies offers until now not comprehensible possibilities of visualization, interpreting and learning of the existing reality.

The process of learning is made quicker by visualization. Seeing the picture of any object, phenomenon, event, a series of details is seized, data that enable their quick perceiving, comprehending and creating corresponding idea.

It is regarded that if only part of those information that are delivered orally, will be visualized, the learning process will be quicker and easier, and thus it will rationalize the educational process. Verbal teaching presenting of reality is analytical for reality is described by words, and students should synthesize the meaning of all pronounced words in order to get a whole, that is a whole picture of events, phenomena, and processes. Although, when information are visualized, the student gets the impression of reality more plastic and concrete with the possibility of an insight into cause-effect relation and other features of the presented phenomena, events and processes, etc. Visualization ca be realized by multimedia that s video-media in education on any education level and educational institutes especially at technical, medical, mining, agricultural, veterinary, civil engineering, architecture, art schools and faculties, and present reality of great number of processes, phenomena, events in the most possible extent, on the most skilled and adequate manner, in the shortest possible time and in the most adaptable conditions of place, time and psychological state of students.

With information visualization, the teacher increases: 1. Accuracy level of transmitted symbols and sings that make up the messages. 2.

Preciseness level of transmitted signs and symbols that carry meaning and sense of messages. 3. Effect level of transmitted message that is meaning of message by which users', students' behaviour is being directed and changed.

The student can use numerous kinds and forms of visual means, symbols, languages in order to build his own sense about what he studies. All forms presenting reality are accessible to him that can or could be applied in teaching practice and studying process, that is in various forms such as video, movable and static pictures, photos, graphic presentation, drawing, schemes, diagrams, with or without sound in two dimensional of three dimensional space, animation, simulation, modeling, etc. In learning with information communication and computer multimedia systems such and intellectual environment has been created for learning that student can get any necessary information on the most top quality level and the quickest way and in the right time in order to understand and adopt quickly some teaching material.

Observation and learning permeate mutually. Observation is not the same as a common sensual experience for it always pulls the interpretation and understanding what has been seen or heard in accordance with previous experience. It is hard to study for we are not sure if an object really exists in the visual space, it will be seen. An object to be seen, beside physiological conditions psychological conditions are necessary such attention and motivation in the right time are needed.

The process of perception (observation) encompasses not only registration but also interpretation of sensual and input signals. It gives the possibility to understand how human beings collect information about external and internal world. Perception is an active process of selection and construction. It is not a product but an interactive two-way process. The processes of perception that has physiological character in their base are interwoven with cognitive processes.

Teaching is not visualiyed only by pictures that is figurative presentation. Pictures are surrogate of reality although they are the most important elements for its knowledge and understanding especially for knowledge of unreachable reality that is incomprehensible to student's perception. Recognizing the real world through personal experience that is its experience, independently or with someone's help makes the base of visualization. Although visualization is not tied only to artificial audio video presentation of the world and its processes, events, objects, etc. but it is real, direct, without audio video intermediary, student's experience by personal insight, perceiving, experiencing, and recognizing cause effect connections. Thus, it is necessary to enable students to have more and more chances for real experience of the reality and obtaining various types of knowledge and idea through personal experience.

The advantage of visualization is that the student can learn something independently from his vocabulary development and that seeing anything is clearer by itself than words used to describe it. Even if the student has weak vocabulary that is he has not developed his vocabulary abilities that is if he has any speaking problems, difficulties, he can easily receive some information if they have given in a visual way. Thus, the first children's dictionaries are made in picture vocabulary, for picture give complete and whole picture of reality by which comprehending the whole is made easier.

III. THE ROLE OF CONTEMPORARY INFORMATION COMMUNICATION EDUCATIONAL TECHNOLOGY IN VISUALIZATION OF EDUCATIONAL AND TEACHING CONTENTS

The notions "visual", "visualization", "visualizing" were been accepted in computer technology around 1980 and they meant "computer graphics". Today, they are accepted in computer technique under various titles, such as "computer graphics", "computer vision", "image processing", "computer aided design", "signal processing", "scientific visualisation", etc.

Numerous visual means, visual perception, visual signs, symbols and words make possible visualization of teaching contents. Books, dinamic and static pictures, photos, various video and audio recordings, various multimedia presentations, graphic representations, diagrams, drawings, maps, drafts, cartoons, cartographs, psoters, diapositives, diafilms, applications, virtual reality and reviews, natural and artificial objects, exhibitions, collections, remedies, models, apparatus, machines, textbooks, handbooks, articles, anthologies, "visual" encyclopedia, scientific and professional papers, can be used in visualization of various teaching contents and bringing closer the existing reality to students.

Application, use, and further improvement of the following technologies make enormous possibilities of reality visualization and its quick and more effective learning that comprehends:

- Telecommunication technology in combination with computer and so called broadcasting technologies that is technologies of satellite, earthly, cable and wireless digital content and information transmission.
- Various technologies of reliable computer networks of high capacity such as wire, optic, wireless, local – LAN (Local Area Network), wide – WAN (Wide Area Network), city,
- MAN (Metropolitan Area Network),
- Quick Internet and Intranet,
- Digital television and radio (satellite (DVB-S), cable (DVB-C), earthly (DVB-T), DAB (Digital Audio Broadcasting) DRM (Digital Radio Mondiale)),
- HDTV (High Definition TV – television of high resolution),
- UHDTV (Ultra High Definition TV – television of ultra high resolution),
- Digital teletext,
- Mobile digital television (DVB-H (Digital Video Broadcasting - Handheld), DMB (Digital Multimedia Broadcasting), ISDB-T (Integrated Services Digital Broadcast - Terrestrial), Qualcomm MediaFLO, and their variants),
- Internet television (for example WebTV, EnhancedTV, etc.),
- IPTV (Internet Protocol Television),
- 3DTV (Three dimensional television, Holographic television),
- Different technologies of video presentations (projectors, displays, video walls, video or image processors, etc.),
- Different digital formats of media for recording, storing and transmitting multimedia contents and information based on magnetic, magnetic-optic and optic technologies (various tapes, CD and DVD discs, Blu-Ray discs, etc.), computer technologies for storing data on great capacity hard disc drives (HDD), etc.,
- High reliable disc networks for storing (SAN – Storage Area Network),
- Great capacity video servers,
- Great capacity flesh memories, P2, MMC (MultiMedia Card), SD and other memory cards, etc.

Different multimedia system based on these technologies offer students authency that is realy and naturally presentation and working of various processes, situations, events and human behaviour and act.

Video computer systems for information transmission enable presentation of any type of information in the form that are natural in educational process that is in the form of audio and video information, text and graphics, in movable and static manner. They make enable presenting processes, events, demonstrations, simulations in a way they occur in reality and real life or animated through graphic presentation and images. Students can learn in different ways for they can use various kinds and forms of information.

During computer aided teaching process it is possible to manipulate, present according to need the visual means and symbols, they can also be adopted to the age and intellectual possibilities of students, combine and adopt to their former knowledge and learning abilities. They can be used to achieve various educational aims, in any time and space conditions, applying various teaching forms and parts of lecture and lessons. Their use flexibility and application enables greater efficiency, rationality and optimal teaching and learning process.

Manners of visual presentation such as video recordings, video computer animation, static images (photos), various graphic presentations and reviews, icons, pictons, pictographs, acronyms, signs, symbols, trade marks and any other various shapes of info-graphy represent today's reality that is reality of visually presented information.Today the idea of picture as a visual presentation of reality has undergone essential changes. Today's picture seen by the student is not a framed moment of reality with single enlarged details, elements, but media that can report about itself by its movements in any possible ways, shapes and manners, its space three-dimensional characteristics, its manipulating and studying flexibility, its possibilities to change, complete, widen, increase, decrease, quick and slow movement, combination, separating and connecting with other media. Obviousness has experienced perhaps its utmost possibilities, while visuality that is clearness and understandableness

(that is presenting) are enabled in every moment. Virtual that is artificial reality today can be more real than natural reality.

Media aided learning depends on the assumption that students learn on the base what they have perceived, and what they have perceived will be determined in a great instant by the teacher during training educational process, and thus he has a great responsibility regarding the choice of teaching content and manner of presentation. Visual perception is connected to the teaching and learning process for student's comprehension is 80% connection to the accurate sense of sight and his possibilities. Thus, the teaching design itself that is the above noted technology aided manner of teaching and learning realization is tightly connected to the possibilities of various form and manners of visualization as well as to the student's work and manner, methods and forms of teaching process that have to be adopted in the greatest extent to his psychological characteristics of knowledge.

IV. CONCLUSION

Development of digital television and digital video and their connectivity with technology that develops fastest and changes that is computer technology, enables most continuous increasing trend to use, exchange and process video (visual) contents generally, and especially in teaching.

The students need to be taught how and what to look at and what meaning to give to the seen. They have to perceive besides appearing aspect the essence of what they perceive that is to notice what is essence and what makes the meaning they have perceived, and the teacher helps and can help a lot.

The complete perception is connected with the development of thinking ability. Thinking makes sense of what has been perceived. Perceiving single objects and ideas, the student arranges them into certain groups or categories of objects, comprehends the single as well as the special part of general.

This generalization of the perceived is materialized by words that are by the name of the appropriate object, event, and their characteristics. By visualization, students see information and what they see is real for them.

The student is a witness of event, occurrence, phenomena, and processes.

By visual thinking one manipulate with visual presentations and their transformations in order to get new meanings, relations, forms, etc., a mostly in fine arts, architecture, technique, etc. It uses visual means that can be: natural objects, objects about life in the past, objects about life in the present, models, printed materials, exhibitions, applicators, dia-films, video materials, TV materials, multimedia materials, virtual presentations, computer animations, objects, photos, dia-pictures, drawings, maps schemes, graphic presentation, diagrams, that enable students to experience more really and plastically objects and phenomena and to find out reality more accurately. Their flexibility of use and application enables greater efficiency, rationality, and optimal realization of teaching and learning process.

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MODERN SCHOOL IN THE DIGITAL ENVIRONMENT

I. Tasic*, A. Radic*, J. Tasić**, T. Mitić**
Novi Sad University, Technical Faculty "Mihajlo Pupin", Zrenjanin
Informatics teacher, Primary School "Mihajlo Pupin" ,Veternik
tasici@tfzr.uns.ac.rs, jeca25000@gmail.com

Abstract - Modern life entails modernity in all its segments. Starting from the innovations in science, engineering and technology, it is necessary to strive for a modern school, which should keep what is traditionally proved as valuable and important. With this aim, the theory and practice should be united and strengthen as a path to a new modern school debt, ranging from basic traditional values, the achievements of science, educational technology to practical conduct and behavior in specific circumstances. Fundamental transformation of the school, which would have a scientific basis and practical justification, is required.

I. INTRODUCTION

Knowledge is the most important human resource and capital of 21st century. Because of that, today's society is called knowledge society, in which the educated person is in the spotlight. It is important to acquire certain knowledge necessary to that education. Education is a continuous process that aims to transfer knowledge and skills, and develop skills necessary for participation in social processes, and functioning within the human community. Knowledge and education as a process, significantly impact on raising the quality of life, improve living standards, and today there it is at every turn. Since knowledge today can be acquired by a large number of media, individually or in groups, almost without limit, it is necessary to adapt the education that children acquire at school to all this, and have a modern school. The goal is not to only restructure existing components that make up the school but to transform school into a learning environment and the broader framework of "learning society", in which both teachers and students will be able together to develop their potentials and its structures to facilitate and promote the needs of learning and to encourage and nurture the energy and inventiveness of the appropriate environment.

II. CONTEMPORARY AND MODERN SCHOOL

When we talk about contemporary and modern school it must be clear what it is. Therefore, Nedeljkovic M., in his work" Elementary school in changes" made a preview to what contemporary and modern schools are:

- School is a modern, if there are necessary conditions for its work: normative-legal, financial and human resources;
- The school is modern if its activities are in accordance with his nature;
- The school is modern if it is expedient in a desirable manner; it is the role of achieving significant individual and social goals;
- -School is advanced to the extent that the positive functional performance against targets and objectives;
- School is a modern, if meaningful human value, contributes to the maintenance and development of man and society.

From all this it is clear that taking into account the fact that the school is still very modern is a complex task, because the school is good and effective only in the well-conceived and rationally driven developmental changes. However, it is not always easy to implement changes to something that is deeply rooted, such as traditional schools.

Theoretically and empirically it is confirmed that innovation in schools face many obstacles, among which are the most common: [1]

- lack of time for thinking about innovation
- lack of the necessary resources
- restraint of individual teachers in adopting developmental changes
- Lack of common decisions
- inability of individual directors to provide the necessary support for innovation
- Some specifications of the teachers' call
- Lack of knowledge and skills

– Misunderstandings of responsible for national and local policy for specific operating conditions in which each school is

III. THE CURRENT SCHOOL VERSUS MODERN SCHOOL

We need to invest a lot of effort to make progress in the field of education. The good cooperation of all involved in the project of creating a modern is of great importance. Responsibilities for the introduction of modern schools are: the central government, including those whose task is to determine the educational policies and the adoption of measures for its implementation; individuals and bodies responsible for education policy in local level, the body responsible for school management, teachers, and parents. In order to know which way to go is necessary to consider the characteristics of the current school and future features - modern school. Comparative review of the school we know today, and schools which gave contemporary Suzić N., As shown in Table 1[2]

TABLE 1. THE CURRENT SCHOOL AS A MIRROR FOR CONTEMPORARY SCHOOL

The current school	**Modern school**
The school children have to go	The school children want to go
Repressive	Motivational
Knowledge as the goal of education, forcing the memorization of facts	Enables your child to navigate the abundance of information
Normative	Democratic
The teaching dominates	Dominates the study of learning
Qualifying child for purposes of the society	Qualifying child for his own use
Dominates the front work and lecturing classes	Polyvalent application forms and methods of teaching: interaction, individualization, and plenary sessions
Train the child to the profession	Train the child to the profession and leisure, healthy living
Dominated by verbosity	Multimedia, active and verbal learning in combination
Education ends with education, graduation	School open index, lifelong training and certification

IV. DIGITAL LITERACY - THE MODERN TENDENCY IN SCHOOLS

Digital literacy has become necessary to fit a man in contemporary society, because it represents a person's ability to effectively use computers in their work and outside the workplace. Therefore, it tends to encourage students to be digitally literate. Digital literacy is necessary for the wide range of occupations in order to perform professional duties, but the digital literacy has become an important factor in the socialization of every man and child too. Therefore, the school insists on the digital literacy of teachers, with emphasis on the skills teachers need to improve by Internet searching knowledge, exchange experiences with their colleagues, create multimedia lecture preparations and carry out the hour in class, or "in distance". With the help of computers, it is possible to systematize and reduce the job of keeping school records at the school level, but to the entire educational system. Messaging and Internet communication can be useful for communicating with parents or students who are temporarily prevented from coming to school and with the offices of the Ministry of Education, which are the daily needs of the schools, and what is done via the Internet quickly and efficiently with arbitrary number of participants in communication, leaving the paper trail.

Digital literacy of students is planned through curriculum in our schools:

- electives "From toys to computers" from first to fourth graders and "Informatics and Computer Science" from the fifth to eighth grade elementary school
- a regular subject "Computer Science" in high schools and vocational subjects which are processed through the use of computers in specialized branches of science and technology in secondary schools, general and specialized secondary schools. New computer is a powerful teaching tool, that with the right accessories, software and connection to the internet, can replace many other teaching aids.

Representative equipment for teaching i the interactive table, that is to replace the traditional blackboard that is used for more than 100 years. It provides multimedia display and interaction of students with displayed content, and therefore represents an example of the easy transition from frontal type of collaborative teaching and learning, which supports the active role of students. Use of electronic boards, with the use of multimedia and interaction, enhances learning, demonstration classes in schools and in the most direct way the of use multimedia technologies applied to different target groups of students. The use the multimedia

panel is required to develop new professional skills of teachers [3]

Modern school should provide opportunities for lifelong learning in which a person will be able to gain diplomas, certificates, licenses and other formal and informal verification of competence. Education and learning in this way will not stop with the completion of elementary, high school or college. Using the so-called distance learning is a good example of that in the future will be possible for life to learn and improve knowledge, if you wish so. E-learning is a new branch of the pedagogical use of computers and the Internet to redefine the theory and practice of teaching and learning. Greater willingness of students to adopt new knowledge using multimedia educational technology, better teachers' preparation for the presentation of subject, which reorganized the situation and learning methods, using the new interactive tools to improve the learning process, setting the school web site, electronic diaries and establish regular electronic communication between the school and parents are just some of the impact of digital environment on the modern school.

V. THE GOALS OF MODERN SCHOOL

The main feature of the new quality of education is a transition from the reproductive to the productive education, from static to dynamic, from the invariant toward operational. An important feature of the new, democratic and modern education is the quality of education and its evolving functions. Primary aim of modern education consists in acquiring basic educational competencies that provide the basic formation of habits, learning and cognitive development and communication skills and acquire cultural basis of behavior. The goal is not only to restructure existing components that make up the school but to transform school into a learning environment and the broader framework of "learning society", in which both teachers and students will be able together to develop their potentials and its structures to facilitate and promote the needs of learning and to encourage and nurture the energy and inventiveness of the appropriate environment. [4].

If you would like to make a review of the key goal that one school should have, it would include the following:

- Education of creative people who think independently
- Ability to make decisions
- Preparing people for happy and productive life
- Training students for productive use of labor and leisure
- Developing a desire for learning and productive work
- Broad humanistic education that teaches people a lifetime and adapt to a variety of professional challenges
- To enable people not to depend on money, but to be able to cope with the challenges.

To achieve these goals the school should change and be more flexible and more lifelike. It is necessary to direct the content of education so that the minimum facts develop in students the most skills and ideas. It is impossible to achieve with traditional frontal form of work with students because the classes are focused on individual work and work in small groups. More space is allocated for teaching aids and materials for individual work and thus produce rich and technological base of teaching and learning. The modern school requires modern ways of working; in teaching active methods should be dominated, students' activities directed towards the investigation, trial, reasoning and self-learning, learning is dominated by seeing, problem solving and creative learning. To achieve a modern way of education the function of teachers must be changed. It is necessary to monitor individually students and those teachers recognize and respect their individual differences and developmental needs. This of course requires greater involvement of teachers as the only monitoring and evaluation processes and outcomes of work done continuously. Another goal is to develop modern school of competencies that a child will use in life that will enable the practical application of learned and still learning. This means that the material that adopts a child in school should enable him to s use knowledge further in life. Modern school should provide opportunities for lifelong learning in which a person will be able to gain diplomas, certificates, licenses and other formal and informal verification of competence. Education and learning in this way will not stop with the completion of elementary, high school or college. Using the so-called distance learning is a good example of that in the future it will be possible for life to learn and improve knowledge, if you wish so.

One overarching goal of the modern school is the education of the child according to his needs, emotions and cognition.

VI. THE TASKS OF MODERN SCHOOL

The main task of the modern school is to provide a new approach to the student, and that is that : anyone can be creative, that everyone has and can develop their own creative power, that anyone can in a creative way solve their environmental problems, that anyone can train, educate and bring up to daily use of their creative powers in a proper way, that everyone can and must create an image of himself as a creative person and that in each can and must cultivate and develop a creative attitude toward life. This can be achieved only if every school access to one, individually.

Further tasks of the modern school are reflected in the fact that schools should provide knowledge, skills, habits and the ability of young people to learn permanently. Because today there is a large amount of new knowledge and students can not adopt, remember and save it all, it is significant to enable students to acquire the ability to independently seek information, tolerance and flexibility in communication. Modern schools, in addition to core business of education, should also be an organizer, coordinator and initiator of activities to achieve the goal of education. Also, it is important to actualizing organizational learning, as well as social, cultural and educational action in the community where it is located. This is the time and manner of integration of schools to the community to the unique pedagogical influence. In this way, the school is an important factor of education in cooperation with other factors including: libraries, museums, galleries, associations... It means that school and social environment are interdependent, updated, share information and coordinate many and varied activities.

Modern schools need to bring young together during the whole year, and it can be effective if they provide the conditions for the school to become a pedagogical, cultural, social, sports and recreation center for the environment in which the school is [6]. Another important task is moral development of students in schools . According to Kovacevic B., bringing about positive effects in the formation of the moral development of students assumed the modern school that will be:

- to encourage critical thinking and independent behavior of students,
- to train students to evaluate, compare and fulfill obligations without conflict,
- to train students in understanding social relationships,
- develop students' interpersonal skills that include positive behavior toward others, active participation in activities and to support others,
- to develop students' moral independence,
- to develop students' morally responsible behavior - respect the rules,
- to train students to control their own behavior, which includes tolerance for frustration and compromises in conflict situations,
- to train students for social cooperation,
- train students to assertive social skills such as initiating communication and taking leadership in the activities.

VII. THE DEMANDS PLACED UPON MODERN SCHOOL

Among the first priorities is the universal literacy of a very high order. It is the foundation. Without it no society can hope to be able to function effectively in the amount of post capitalist world and his knowledge society [7]. Since the existing schools are facing huge development challenges, its opportunities to creatively respond to them depend on the ability to continuously improve its business. Numerous requests occur for a modern school that is Nedeljkovic, M, divided into three groups.

A. The first group of requirements for a modern school

- Schools should be thoroughly democratized, or change the position and relations of subjects of educational process.
- Provide direct contact with sources of knowledge to students who are now numerous.
- The teacher as a source of knowledge should be withdrawn into the background, but also to significantly increase its pedagogical role. It should be an organizer of learning at school (an instructor or tutor),

connoisseur of all sources of knowledge, a primarily pedagogical and methodological advisor to his students so they better enable them to continue to self-acceptance and social role (work, civil and family).

B. The second group of requirements for a modern school

A request to modernize the school stems from advances in the development of pedagogical theory. This theory has developed models of better schools, which are applied in developed countries. Our school is behind it, and this gap becomes dangerous because of the role of education / knowledge now plays in individual and social development. So that the school is developed in accordance with modern educational concepts, and proven practical solutions, the group must meet the following requirements:

- modernization of the school as a whole
- work on the quality of school
- school effectiveness

C. The third group requires the modern school

Another group of requests for school modernization stems from the need to close our schools and schools reach to the level of development of developed countries. These include:

- Education standard (school buildings, school equipment means of modern educational technology and teaching staff)
- Methods, forms and means of work
- Organization of the school
- Monitoring and evaluating the results linking schools with local community

Every school and every teacher who wants to modernize its operation must accept innovation and realize them deliberately and well organized.

VIII. CONCLUSION

The current school system and traditional teaching is outdated, education is too expensive and inefficient, and teachers are under-trained. Because the current school system and the necessary programming change, the internal organization of work changes as well. Teachers especially need to deal with the child, then with the subject. Modern school wants to keep up with the times, to rely on the latest achievements of science and technology. It is essential that schools provide individuals greater freedom of choice and take different actions. This contributes to training students for effective teaching and learning that fosters the harmonious development of personality. Every school and every teacher who wants to modernize its operation must accept innovation and realize them deliberately and well organized.

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PREVENTING A BAD INFLUENCE ON CHILDREN FROM THE INTERNET BY PARENTS

Đ. Novaković, M. Duvnjak, E. Brtka
Technical faculty "Mihajlo Pupin", Zrenjanin, Serbia
djordje.novkovic@tfzr.rs, miljan.duvnjak@tfzr.rs, norab@tfzr.uns.ac.rs

Abstract - The Internet today is a part of children's natural environment. Most children have access to the Internet at school and/or at home. Parents and teachers consider Internet to be a primarily educational/developmental tool. Children also go online for learning activities that are not connected directly with school. The absence of information filters, such as editors and peer reviewing, on the Internet presents a challenge to students, who are using the web to find information for their assignments. Children cannot properly estimate the validity of the information they find on the web. They rely upon search engines and accept information in visually appealing easily accessible pages. Given the enormous amount of web sites for children of all ages it is not easy to find a good or a useful one. There are some excellent starting points for parents and teachers to find appropriate sites. This composition describes threats that may occur due to lack of information related to Internet use. We have presented a few useful tips on how parents can have an influence on their children and their safety while spending time on the Internet.

I. INTRODUCTION

Although the internet is full of very useful information there are many of those who present a danger to children. Parents should have knowledge about the bad but also about good facilities that are located on the Internet and in accordance with that set norms of behavior that apply to the whole family. The most important thing is to establish a reasonable and healthy communication between parent-child interaction in order to protect children on the Internet and in the real world. The Internet provides opportunities for acquisition of new knowledge and for socializing and entertainment. Because of its availability to everybody, the Internet carries big risks, because there can be found content and facilities which are not provided for children. It is quite important that your computer is under constant protection from an antivirus program because that is the best way to save personal data.

The Internet is a social environment and there are acquaintances, but also a large number of unknown people. Most importantly, the children would be informed about risks and dangers that come with using of the Internet and their parents have to be available to talk about that topic.

II. INTERNET ABUSE

The main problem is in parents because they are not aware of the problems and dangers that are found on the Internet. Because of uninformed parents children easily become lightweight victims and offenders if they are exchanging illegal content.

The group of abuse and violence on the Internet contains Web content with inappropriate information and sharing of illegal material (a milder form: music, film, heavier: pornography, pedophilia, and communication with the aim of exploitation, harassment and abuse). The right to freedom of opinion allows the existence of Web-Portal with incorrect content. Web-portals with illegal content are functioning illegally (but public) and offer different forms of abuse (sectarian, Nazi, pornographic and similar facilities). Parents have no choice except to get used to the existence of such types of content, since the laws have no effect in the prevention of this kind of abuse, the rights to freedom of opinion and speech. No one visitor is forced to use illegal content, but he decides by himself, which automatically removes the responsibility of the authors of these Web portals.

A. Chat

Children are not able to know with whom to communicate via chat. In their ignorance and desire for companionship and making new friends with other children easily reveal personal information and become lightweight victims. Through this communication the attackers are able to learn all about his victim and start to interest, over what the victim likes and dislikes to the relationships within the family. The most common victims are children who grow up in dysfunctional families because they are not getting enough parental attention. Children at the age of 12 to 17 years are the most common target for attackers.

B. Virtual girl

A virtual girl spent a total of eighty hours a month in Internet chat rooms. Without any emphasis on its own personality, and without showing the pictures, she has managed to achieve over 412 contacts (not on its own initiative) with 398 males. What belongs to the sexual harassment occurred 162 times, 24 times was subjected to sexual fantasies, and six times it was openly offered money for sexual services [1].

On figure 1 [1] we can see the example of searching in chat room with virtual girl.

Cases like this clearly directed towards the trafficking chain. Individual measures must be applied because it is the only way to save your child or his partner or friend.

C. Human trafficking

Trafficking in human beings in modern times widespread and is in first place among the abuses of the Internet. The so-called trafficking skillfully infiltrated in all sphere of society and found a way to abuse the great opportunities of the Internet. Under the mask of good and well-paid business offers and opportunities to travel to various countries of Europe and the world there are people who are looking for victims. Mostly victims of this crime are children at the age of 12 to 22 years and usually come from dysfunctional and poor families. Deprived of all rights and documents, money and freedoms of victims of trafficking become slaves who were forced into prostitution and hard labor.

D. Illegal trade

A large number of criminal organizations deals with sale and purchase of prohibited items such as medicines, all kinds of drugs, weapons, etc.. Under the mask easy and quick profits of such groups exist on the Internet and can easily become a member. The problem starts after you have finished a first job or when a member wants to leave the organization. Then, there is blackmail, threats, and applying of a force in order to further continuation of the work. Many children are attracted of beautiful stories, but at the same time false, stories about the high earnings and they become easy victims of these criminal groups. The epilogue of this story is that these children quickly end up in prisons or correctional institutions for a longer or shorter time.

Figure 1: For eighty hours in chat rooms, fourteen years old virtual girl got 162 times sexual harassment, and invited to lewd acts

E. Violence between same age

This type of abuse of the Internet include: incitement of group hatred, harassment, monitoring, insults, threats etc. The most common forms of communication through which they perform this type of violence must possess sound, animation, photography and using this perpetrator are hidden and he is able to repeat the same attack, or perhaps on a new victim.

F. Facing with problems

As we have noted in the above cases the victims are children who willingly, but unaware of the consequences, put themselves in danger and the possible fatal outcome. Because of the freedom of the media can't be set more aggressive system that would provide greater protection for children on the Internet. Due to the fact that the law is powerless in some cases abuse the Internet parents must be prepared to react calmly, deliberately and without any hasty conclusions. In order to prevent misuse of the Internet primarily parents need to introduce their child.

III. IT IS VERY IMPORTANT TO ACHIEVE MUTUAL TRUST

Parents need to take care of their children regardless of whether if they are on the computer or play football. Therefore they should know what their children are doing, what they like to do, they should to criticize them or give the support. So be careful with children, without excessive strictness and weight, as this can lead only to the extent that the children will deliberately try to hide their activities from parents. The Internet would not prohibit, but it would be an excellent source of useful and exciting information. If you use the Internet, it will be easier to talk about it with children. Children are curious, exploring, try everything and thus make mistakes. A child may be talented in technology but has no experience of parents and it is often crucial in these situations

- We should all use a computer. If your PC is in a room where a whole family is, thus more people will use it and you'll have a

better view on the situation what your child is doing on the Internet.

- Conversation is the key. Keep a dialogue with children about having fun on and off the internet as well as the dangers and unpleasant situations that may arise.

- Learn more about computers and the Internet. As more as you learn about computers and the Internet, it will be easier to help your child and to make the line between bad and good content.

- Spend time online together with your child. During this time, find some interesting content tailored for children, useful information related to school, sport etc. Adjusted favorite pages as a bookmark in the browser so the next time it will be enough a few clicks.

- Children should be given time to use the Internet. Children do not have to spend all day at the computer, not only for safety but also because of health. Therefore, determine a time when children can access web content and web addresses they can visit. In talking to children may be adopted a common solution.
- Establishment of passwords. Passwords should be created as a set of characters that people find it difficult to guess. Using letters and numbers will create a secure password. Never create passwords that friends can easily detectable (names, dates of birth, etc.).
- Anti-virus and filtering software. These programs allow you to restrict access to Internet sites with unwanted content (pornography, violence, etc.). You need to check the history pages often, sent and received e-mails etc. Because it is easy to remove [3].

A. What to do if you suspect that your child follows the suspicious content on the Internet?

- There should be a peaceful solution through dialogue to reach a situation in order to build a normal relationship between parents and children that will be useful in the future.
- Prove to child that this was not his fault, simply a common thing on the Internet
- It is not bad to delete browsing history pages in the web browser, delete cookies and install an antivirus program.
- Emphasize your child not to open emails from unknown people, talk to him about some of the similar experiences of others etc.

Children's rights must be protected. Make use of laws relating to the Internet and contact the person responsible for the content that is placed on the site

B. It is important to remember

On the Internet are the same laws apply as in the real world. It is not allowed to insult or harass someone, violate someone's reputation etc. If this occurs, further proceedings may be transferred to the judicial process, penalties, damages and other sanctions. At the beginning you can call the police. So things should be taken seriously because anonymous users also can be detected. Children may not understand the seriousness of the situation and they are not aware that only a few clicks can change lives.

IV. LEAVING DATA ON THE INTERNET

Each of us was in a situation on web sites where you need to leave your information. It may be in some Internet shopping, contests or to participate in the forums and discussions. Different organizations may collect information from children, but they should do this in a lawful manner or with the approval of parents. Data protection act provides storage of personal data, although many Web administrators do not respect law. Children should be advised to be very cautious and careful when leaving their personal information

- There should be agreed with the children. Do not allow children to leave the data on unverified sites.
- Check guarantees of privacy data and for what purpose will the same be used.
- Leave the only required data. In most cases it is sufficient to leave only the required information [2].
- Do not store personal information to Web browsers and similar programs. It is not advisable to record data and passwords on sites that are connected to the Internet [2].
- Do not trust too many in social networks**.** Do not leave too much information on social networks because it is so easy to become prey for anyone looking for "victims" over the Internet.

V. CONCLUSION

Children must be aware of the threats on the Internet. Parents have to act before the sight of any danger and informed their children about these threats. It does not matter where kids are, the danger of the Internet is always there.

In our country there are different organizations and sects involved in trafficking of children. These organizations use the current situation of economic crisis that is present in our country and because of that they can find victims by offering "good" jobs, good wages and a better life.

Social networks such as Facebook, MySpace etc. are major threats. Still in elementary school children are beginning to make a private profiles and become members of these networks not knowing how the other side has a fake profile with which people are lurking and waiting for what they are interested.

However, the best protection is to rely on common sense. Organizing lectures and counseling on this topic could be of great benefit for both, children and parents.

Children may not understand the seriousness of the situation and they are not aware that only a few clicks can change lives.

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OUTCOME-BASED EDUCATION AT PRESCHOOL TEACHER TRAINING COLLEGE

M. Cvijetić*, D. Savičević* and Z. Ivanković**
*Preschool Teacher Training College, Sremska Mitrovica, Serbia
**University of Novi Sad, Technical Faculty "Mihajlo Pupin", Zrenjanin, Serbia
maja.cvijetic@gmail.com

Abstract - The authors of this paper recognize the immediate challenge of expressing modules and programmes in terms of learning outcomes since the adoption of the learning outcomes approach has the potential to help embrace a more systematic approach to the design of programmes and modules. Having considered learning outcomes to be the statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning, the authors of the paper applied learning outcome approach as a perspective mode of thinking in the process of developing valid programmes at Preschool Teacher Training in Sremska Mitrovica. Suggested model focuses on what the students are expected to be able to do at the end of the module or programme whilst Bloom's taxonomy was applied as starting point for learning outcomes definition. Outcome-based curriculum at preschool teachers colleges in Serbia would set precise criteria for knowledge acquisition and assessment among future preschool teachers and represents important part of future educational policy.

I. INTRODUCTION

Given that one of the main features of the Bologna process is the need to improve the traditional ways of describing qualifications and qualification structures, the authors of this paper suggest that modules and programmes at preschool teacher training colleges should be (re)written in terms of learning outcomes. The principal question asked of the student or the graduate should no longer be "what did you do to obtain your degree?" but rather "what can you do now that you have obtained your degree?" This approach is of relevance to the labour market and is certainly more flexible when taking into account issues of lifelong learning, non-traditional learning, and other forms of innformal educational experiences. The Bologna process spells out a number of "action lines" in which learning outcomes should play an important role [1,3]. Therefore, the authors of this paper think that programmes and significant constituent elements of programmes at preschool teacher training colleges in Serbia, as important representatives of third level institutions in Higher Education area should be based on the concept of learning outcomes, and that curriculum should be redesigned to reflect this. The international movement away from a "teacher-centred" approach to a more "outcome-based" approach to education has gained increased momentum from the Bologna process, with its emphasis on student-centred learning and the need to have more precision and clarity in the design and content of curricula. It is clear that learning outcomes play a key role in ensuring transparency of qualifications and of qualification frameworks. They are also central to contributing to the implementation of the various action lines of the Bologna process. The requirement to make the teaching and learning process more transparent and more explicit presents a challenge to all involved in education.

II. OUTCOME-BASED EDUCATION

The authors of this paper recognize the immediate challenge of expressing modules and programmes in terms of learning outcomes since the adoption of the learning outcomes approach has the potential to help embrace a more systematic approach to the design of programmes and modules. The traditional way of designing modules and programmes was to start from the content of the course. Teachers decided on the content that they intended to teach, planned how to teach this content and then assessed the content. This type of approach focussed on the teacher's input and on assessment in terms of how well the students absorbed the material taught. Course descriptions referred mainly to the content of the course that would be covered in lectures. This approach to teaching has been referred to as a teacher-centred approach. Among the criticisms of this type of approach in the literature [2] is that it can be difficult to identify precisely what the student has to be able to do in order to pass the module or programme. International trends in education show a shift from the traditional "teacher centred"

approach to a "student centred" approach. This alternative model focuses on what the students are expected to be able to do at the end of the module or programme. Hence, this approach is commonly referred to as an outcome-based approach. Statements called intended learning outcomes, commonly shortened to learning outcomes, are used to express what it is expected that students should be able to do at the end of the learning period. The outcome-based approach can be traced back to the work of the behavioural objectives movement of the 1960s and 1970s in the United States. One of the advocates of this type of teaching was Robert Mager, who proposed the idea of writing very specific statements about observable outcomes. Using these instructional objectives and performance outcomes, he attempted to define the type of learning that would occur at the conclusion of instruction and how that learning would be assessed. These instructional objectives later developed into more precisely defined learning outcomes. A survey of the literature on learning outcomes comes up with a number of similar definitions of the term:

- Learning outcomes are statements of what is expected that the student will be able to do as a result of learning the activity [3,8].
- Learning outcomes are an explicit description of what a learner should know, understand and be able to do as a result of learning [3].
- Learning outcome: a statement of what a learner is expected to know, understand and/or be able to demonstrate at the end of a period of learning"[8].
- A learning outcome is a statement of what the learner is expected to know, understand and/or be able to do at the end of a period of learning [7].
- A learning outcome is a statement of what a learner is expected to know, understand and be able to do at the end of a period of learning and of how that learning is to be demonstrated" [10].
- A learning outcome is a written statement of what the successful student/learner is expected to be able to do at the end of the module/course unit or qualification [1].

Thus, we can see that the various definitions of learning outcomes do not differ significantly from each other. From these definitions, it is clear that learning outcomes focus on what the learner has achieved rather than the intentions of the teacher, as well as that learning outcomes focus on what the learner can demonstrate at the end of a learning activity.

The authors of this paper consider learning outcomes to be the statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning. The process of learning could be, for example, a lecture, a module or an entire programme. We have also made a clear distinction between the terms of learning objectives, competencies and learning outcomes. One of the great advantages of learning outcomes is that they are clear statements of what the learner is expected to achieve and how he or she is expected to demonstrate that achievement. Thus, learning outcomes are more precise, easier to compose and far clearer than objectives. The term competence is quite difficult to define since different authors defined it in different ways (Adam comments that "some take a narrow view and associate competence just with skills acquired by training" , whereas ECTS Users' [9,11] describes competences as "a dynamic combination of attributes, abilities and attitudes". The authors of this paper consider the term learning outcomes to have become more commonly used than competences when describing what students are expected to know, understand and/or be able to demonstrate at the end of a module or programme.Learning outcome approach has been applied as a perspective mode of thinking in the process of developing valid programmes at Preschool Teacher Training in Sremska Mitrovica. The curriculum was designed so that the teaching activities, learning activities and assessment tasks were co-ordinated with the learning outcomes. This type of process could be labelled as involving constructive alignment [3] since the constructive part refers to the type of learning and what the learner does. The alignment part refers to what the teacher does. It is important to point out that in a good teaching system, the method of teaching, learning activities and method of assessment are all co-ordinated to support student learning.

III. LEARNING-OUTCOME MODEL AT SUBJECT LEVEL WITHIN THE MODULE

The learning outcomes are extremely important since they:

- Help teachers to tell students more precisely what is expected of them.
- Help students to learn more effectively: students know where they stand and the curriculum is made more open to them.
- Help teachers to design their materials more

effectively by acting as a template for them.

- Make it clear what students can hope to gain from following a particular course or lecture.
- Help teachers select the appropriate teaching strategy matched to the intended learning outcome, e.g. lecture, seminar, group work, tutorial, discussion, group presentation.
- Help teachers to tell their colleagues more precisely what a particular activity is designed to achieve.
- Assist in setting examinations based on the materials delivered.
- Ensure that appropriate teaching and assessment strategies are employed.

Referring to course and module design learning outcomes can:

- Help to ensure consistency of delivery across modules and programmes.
- Aid curriculum design by clarifying areas of overlap between modules and programmes.
- Help course designers to determine precisely the key purposes of a course and to see how components of the syllabus fit and how learning progression is incorporated.
- Highlight the relationship between teaching, learning and assessment and help improve course design and the student experience.
- Promote reflection on assessment and the development of assessment criteria and more effective and varied assessment.

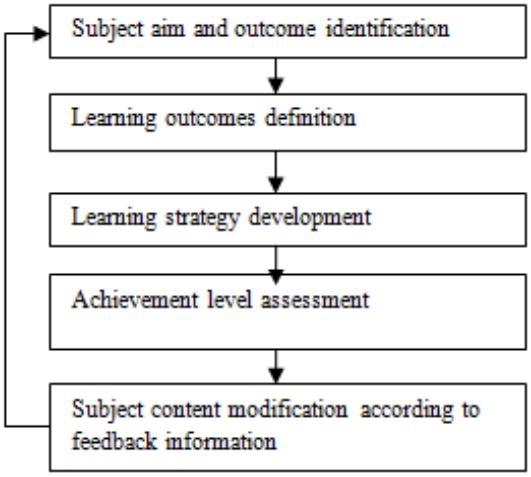

Figure 1. Learning outcome model

As far as quality assurance is concerned learning outcomes:

- Increase transparency and the comparability of standards between and within qualifications.
- Possess greater credibility and utility than traditional qualifications.
- Play a key role by acting as points of reference for establishing and assessing standards.

Learning outcomes also provide:

- Comprehensive sets of statements of exactly what the students will be able to achieve after successful study.
- Clear information to help students with their choice of module and programme. This can lead to more effective learning.
- Clear information to employers and higher education institutions on the achievements and characteristics associated with particular qualifications.

Learning outcomes ensure better mobility since they:

- Contribute to the mobility of students by facilitating the recognition of their qualifications.
- Improve the transparency of qualifications.
- Simplify credit transfer.
- Provide a common format that helps promote lifelong learning and can assist in creating multiple routes through and between different educations systems.

Having considered all these facts the authors of the text applied Bloom's taxonomy whilst writing learning outcomes for student module. Bloom identified three domains of learning – cognitive, affective and psycho-motor – and within each of these domains he recognised that there was an ascending order of complexity. His publication Taxonomy of Educational Objectives: Handbook 1, the Cognitive Domain [4] has become widely used throughout the world to assist in the preparation of curriculum and evaluation materials.

Bloom proposed that the cognitive or knowing domain is composed of six successive levels arranged in a hierarchy as shown in figure 2.

- Knowledge
- Comprehension
- Application

- Analysis
- Synthesis
- Evaluation.

Knowledge may be defined as the ability to recall or remember facts without necessarily understanding them. Comprehension represents the ability to understand and interpret learned information. Application may be defined as the ability to use learned material in new situations, e.g. put ideas and concepts to work in solving problems. Analysis represents s the ability to break down information into its components, e.g. look for inter-relationships and ideas (understanding of organisational structure). Synthesis may be defined as the ability to put parts together. Evaluation represents the ability to judge the value of material for a given purpose.

On the other hand affective domain is concerned with issues relating to the emotional component of learning and ranges from basic willingness to receive information to the integration of beliefs, ideas and attitudes. In order to describe the way in which we deal with things emotionally, Bloom and his colleagues developed five major categories:

1. Receiving. This refers to a willingness to receive information, e.g. the individual accepts the need for a commitment to service, listens to others with respect, shows sensitivity to social problems, etc.

2. Responding. This refers to the individual actively participating in his or her own learning, e.g. shows interest in the subject, is willing to give a presentation, participates in class discussions, enjoys helping others, etc.

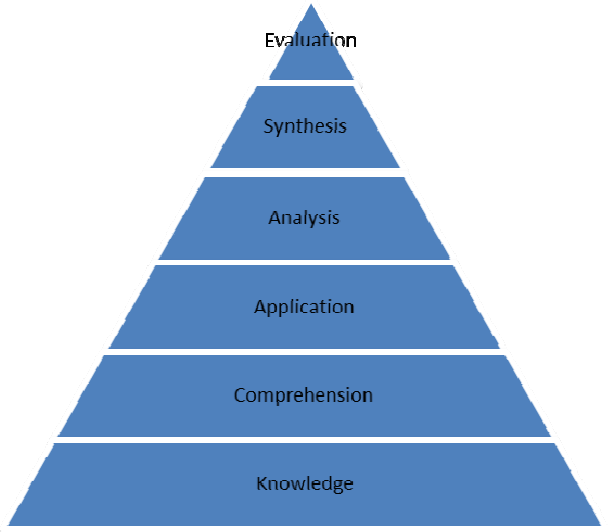

Figure 2. Hierarchy of cognitive domain

3. Valuing. This ranges from simple acceptance of a value to one of commitment, e.g. the individual demonstrates belief in democratic processes, appreciates the role of science in our everyday lives, shows concern for the welfare of others, shows sensitivity towards individual and cultural differences, etc.

4. Organisation. This refers to the process that individuals go through as they bring together different values, resolve conflicts among them and start to internalise the values, e.g. recognises the need for balance between freedom and responsibility in a democracy, accepts responsibility for his or her own behaviour, accepts professional ethical standards, adapts behaviour to a value system, etc.

5. Characterisation. At this level the individual has a value system in terms of their beliefs, ideas and attitudes that control their behaviour in a consistent and predictable manner, e.g. displays self reliance in working independently, displays a professional commitment to ethical practice, shows good personal, social and emotional adjustment, maintains good health habits, etc.

The psychomotor domain mainly emphasises physical skills involving co-ordination of the brain and muscular activity. From a study of the literature, it would appear that this domain has been less well developed in the field of education than either the cognitive or affective domain. The psychomotor domain is commonly used in areas like laboratory science subjects, health sciences, art, music, engineering, drama and physical education. Bloom and his research team did not complete detailed work on the psychomotor domain as they claimed lack of experience in teaching these skills. However, a number of authors have suggested various versions of taxonomies to describe the development of skills and co-ordination.For example, [6] proposed a hierarchy consisting of fivelevels:

1. Imitation: Observing the behaviour of another person and copying this behaviour. This is the first stage in learning a complex skill.

2. Manipulation: Ability to perform certain actions by following instructions and practicing skills.

3. Precision: At this level, the student has the ability to carry out a task with few errors and become more precise without the presence of the original source. The skill has been attained and proficiency is indicated by smooth and accurate performance.

4. Articulation: Ability to co-ordinate a series of actions by combining two or more skills. Patterns can be modified to fit special requirements or solve a problem.

5. Naturalisation: Displays a high level of performance naturally ("without thinking"). Skills are combined, sequenced and performed consistently with ease.

IV. CONCLUSION

The authors of this paper consider learning outcomes to reflect a nation's concern with the level of knowledge acquisition among its student population. Measuring learning outcomes provides information on what particular knowledge (cognitive), skill or behavior (affective) students have gained after instruction is completed. Bloom's taxonomy proved to be valid and justifiable in the process of curriculum writing since the latter evaluation process showed positive feedback on behalf of students who rated the way of subject presenting within (re)written module very high. If we consider educational need to be "something individuals should learn for their own good, for the good of their organization or profession, or for the good of society" learning outcomes represent the solution to the identified need or issue [10,13]. They help to focus on learner's behavior that is to be changed, serve as guidelines for content, instruction, and evaluation, identify specifically what should be learned and convey to learners exactly what is to be accomplished. Therefore, outcome-based curriculum at preschool teachers colleges in Serbia would set precise criteria for knowledge acquisition and assessment among future preschool teachers and represents important part of future educational policy.

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ASSEMBLING INTERACTIVE PANORAMA PICTURES FOR EDUCATIONAL PURPOSES INSTEAD OF STATIC PICTURES

Ž. Namestovski, A. Vinko
University of Novi Sad, Hungarian Language Teacher Training Faculty, Subotica
namesz@stcable.rs, palics@gmail.com

Abstract - The need for interactive educational materials impacts strongly and changes many parts of the entire educational process. The traditional way of presenting static pictures (individually or embedded in presentations) will develop to multimedia and interactive clips. This paper presents a method of assembling interactive panorama pictures from static pictures. It discusses many aspects from photography techniques, through software support, to the possibility of implementing these panorama pictures into education.

I. INTRODUCTION

The demonstration of pictures is present in education from the beginning. This method has become more intensively used since the influence of John Amos Comenius. During visual presentations, from all the senses, sight makes 83% of the information's impact on the brain. The sense of taste makes 1%, hearing 11%, smelling 3% and touch 2% (Pease B., Pease A., 2004).

Demonstration of pictures in education was facilitated by widespread use of printers and overhead projectors. With these tools teachers achieved low-cost interactivity in classroom. By the end of 20th century, multimedia projectors, document cameras and interactive whiteboards replaced overhead projectors.

Presentations of the new century were created in software tools like PowerPoint. This software allows using animated and interactive presentations, but most of the applied pictures are static. There are more opportunities in the implementation of multimedia in education to achieved multi-sensory influences, while the Internet, mobile technologies and cable TV raised a demand for interactivity among children. Panorama pictures are more effective in education than traditional pictures because they are interactive. On panorama pictures, students can look around, move and enlarge it.

II. TAKING PICTURES

Panorama pictures are created from a series of separate static pictures. These pictures can be taken with an ordinary digital or analogue camera, without special equipment. However, it is recommended to use a tripod because it results in input images, which can be transformed to panorama more easily than freehand photos. Furthermore, the angles are also marked on tripod, so the rotation of the camera will be more accurate. The tripod is especially important in creating multi-row panoramas.

Software for creating panorama pictures aligns the photos the way that they have to overlap. Software usually arranges the input pictures alphabetically or numerically in ascending order. In this case, it is advisable the input pictures to be taken clockwise. This can save time because the series should not be reordered.

For achieving the best results, overlapping should be approximately 30 percent. It might be helpful to memorise one object in the right third during taking the first picture. In the following picture, that object should appear in the left third. The number of pictures to be taken is determined by the range of objects, the lens, the percentage of overlapping and the angle of view. The average number of pictures for one panorama is from 9 to 11 photos.

Moving objects make a problem for panoramas because on images taken at different times, they will appear at different locations of the scene. It is always best to wait until no person or no car moves anymore before the shooting is started (Huellmandel T., 2012).

The picture quality and its resolution define the time of downloading panoramas and their zoom level. Using 1024*768 resolution photos will result in an appropriate combination of quality and

download speed (11 * 140 kb = 1540 kb).

III. IMAGE-STITCHING SOFTWARE

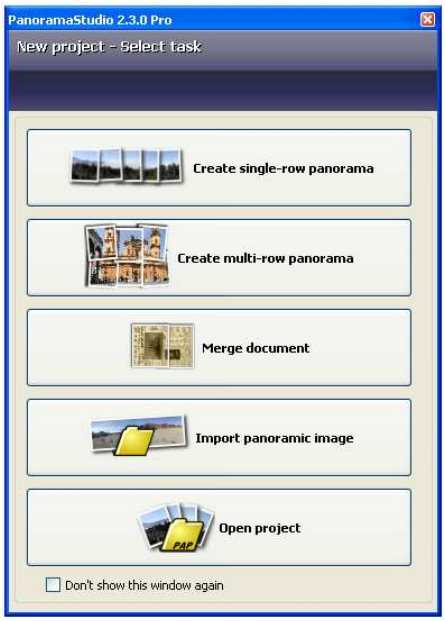
Using image-stitching software is an inexpensive way of creating interactive panorama pictures from separate static pictures. This method eliminates the need for expensive equipment, such as panoramic cameras or mirror lenses.

The most important characteristics of image-stitching software are: type of licence (price), quality of picture-editing tool, quality of aligning panoramas, and panorama output file types.

After trying several trial versions of stitching software (ArcSoft Panorama Maker 5, Hugin 2011.4.0, 360 Panorama Professional, PanoramaStudio) we decided to use PanoramaStudio 2.3.0 Pro. Although the full version of the software costs €69.90, this software has all tools for creating and publishing impressive panoramas.

IV. ASSEMBLING PANORAMA PICTURE IN PANORAMASTUDIO

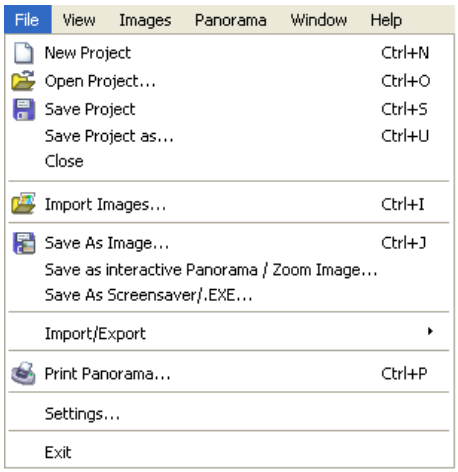
After starting PanoramaStudio, we can select the type of panorama: single-row or multi-row panorama, or opening an older project.



Picture 1. Auto run menu after starting program or creating new project

A. *Importing and editing pictures*

First of all, photos should be imported using the File menu or with the shortcut CTR+I. Through the File menu, the finished panorama project can be saved in a file with the extension *.pap, or another project can be opened.



Picture 2. File menu

After importing separate static pictures, they can be edited from local pictures menu (rotate, crop, mask etc.). The pictures can be moved with "drag and drop" method.

Before creating the panorama view, there are several options that should be set. The first task is to set the horizon on the photos (the line where the ground and sky hit at an even level). It can be determined pressing the Parameters button, through Set focal length and horizon panel. It can be set by dragging the red line on photos or by typing the value of the percentage of ground on photos.

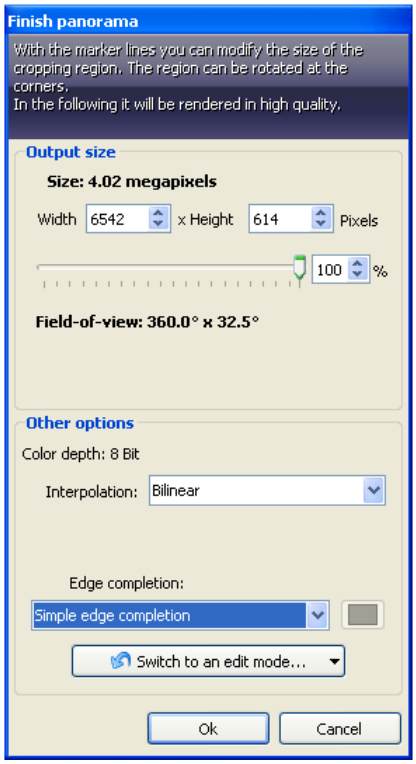
Picture 3. Setting up the horizon

The panorama is created by the Align function of the Toolbar. The drop down menu contains two functions: 1. Align (partial) panorama F3 2. Align a 360-degree panorama F4. A full, 360-degree panorama is more effective than a partial panorama, because full rotation is possible there, while in the first case it can be achieved only partially.

After selecting the suitable function, the software starts to process, blurs and blends the imported photos into one related photo.

B. *Rendering the panorama*

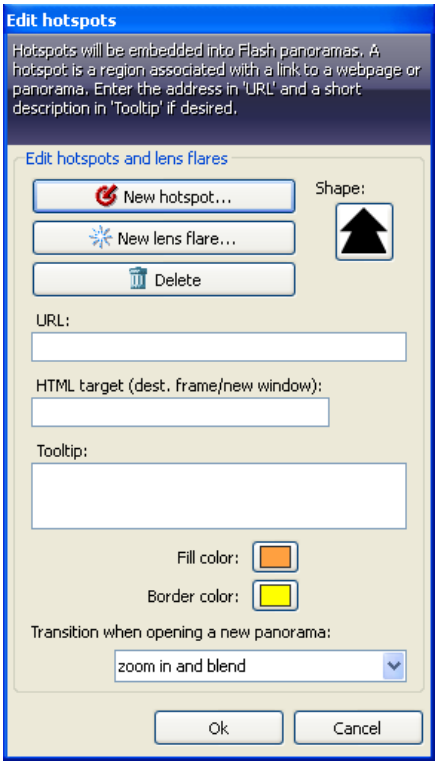
The Render function is the last function of the panorama picture assembling process. Here we can modify the size of the panorama through dragging the marker (red) line or typing values into the right field.



Picture 4. Render panel

C. *Additional options*

Addition options can be added to panorama pictures using Hotspots function. First of all we should select the shapes of hotspots (in most of the cases we used shapes), then set the URL address. In the Tool tip field we can enter the name of the related object (hyperlink). In the bottom of this window, we can select the fill colour and the border colour of the selected shape. Using this function, we can connect panorama pictures, achieving a virtual tour of a territory or building. In other cases, hotspots can be used for external links, connecting parts of our panorama with websites where we can provide additional information about the linked area (for example: Wikipedia). PanoramaStudio embeds hotspots into interactive panorama pictures, on mouse over action will show the tool tip and on mouse clicking will open the corresponding website or panorama.



Picture 5. Hotspots panel

Lens flare is a visual effect on panoramas, which appears just in PanoramaStudio viewer or in exported versions.

D. *Saving or exporting the panoramas*

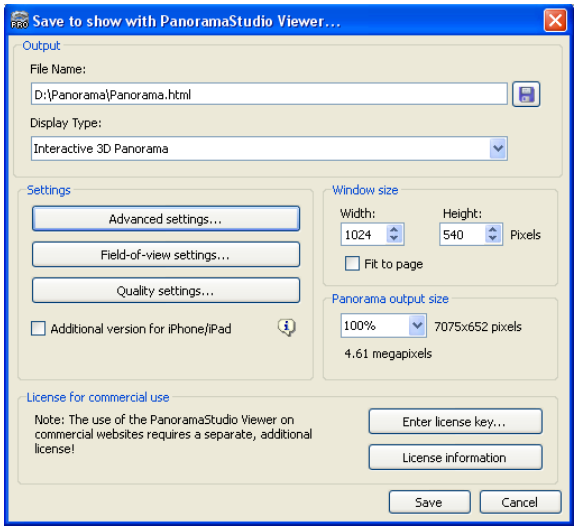
At the end of the process, panorama pictures should be saved. There are more options for saving, which depend on the usability of these interactive pictures.

Our work can be saved in a static-picture format though File menu with selecting Save as Image. We can choose from JPG, TIFF, BMP, PSD, PSB, PNG, TGA, PCX, and RAS extensions. For different file types there are option buttons to specify the compression, the image quality and the size of files.

The most powerful saving option is when our panorama picture is saved as an Interactive panorama / Zoom image. In this case PanoramaStudio creates a panorama, where viewers can scroll and enlarge the image of the specified location (File Name field).

The result of that saving will be an embedded panorama in html file, which can be displayed on local computer or can be uploaded to the Internet. The saved contents contain the photos of the panorama, the html file and the PanoramaStudio Viewer in popular Flash format. The

PanoramaStudio Viewer can show the panorama in 3D (the viewer is in the centre of the screen and can look around using mouse dragging or buttons) and 2D (flat enlargeable image).



Picture 6. Save to show with PanoramaStudio Viewer window

The Viewer is stand-alone software, which can be configured though the Advanced settings menu, where we can type the title, insert our logo, background music or sound, and configure the position and the skin of menu buttons.

V. POSSIBILITIES OF IMPLEMENTING INTERACTIVE PANORAMA PICTURES INTO THE EDUCATIONAL PROCESS

We can use interactive panorama pictures instead of static ones in the entire educational process. Students can create panorama pictures from pictures taken during trips. Through assembling panoramas, students develop their IT skills: take pictures, copy them, use panorama-creating software, import, edit, align, save, export and upload them to a web server. These skills are important in everyday life and in the IT sector as well.

Teachers can effectively motivate students with panorama pictures, can create or use some prepared panoramas from the Internet, such as Google Street View (http://maps.google.com/help/maps/streetview) or Treasures of Szeklerland (http://virtualisszekelyfold.ro/index_en.html).

Interactive educational material like panorama pictures can be presented most efficiently on interactive whiteboards.

Educational institutions have the opportunity to present their building and equipment though connected panorama pictures, developed into virtual tours.

Picture 7. Virtual tour of the Hungarian Language Teacher Training Faculty created by students, which consists of 37 connected panorama pictures

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