

# **IT Tools – Good Practice of Effective Use in Education**

**Scientific Editor  
Eugenia Smyrnova-Trybulska**



**Katowice – Cieszyn 2015**

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University of Silesia in Katowice,  
Faculty of Ethnology and Sciences  
of Education in Cieszyn

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**Monograph**

**Scientific Editor**

**Eugenia Smyrnova-Trybulska**

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# TABLE OF CONTENTS

<b>Introduction.....</b>	<b>9</b>
<b>Chapter I. IT Tools – Good Practice of Effective Use in Education:.....</b>	<b>13</b>
Kazimierz Wenta (Poland)	
<b>INNOVATION AND CREATIVITY IN E-LEARNING.....</b>	<b>13</b>
Tatiana Noskova, Tatiana Pavlova, Olga Yakovleva (Russian Federation), Natalia Morze (Ukraine), Eugenia Smyrnova-Trybulska (Poland), Peter Švec, Júlia Tomanová, Martin Drlík, Martin Cápaj (Slovakia)	
<b>IT TOOLS IN A UNIVERSITY – E-LEARNING ENVIRONMENT: STUDENTS’ OPINION SURVEY.....</b>	<b>27</b>
Nataliia Morze, Oksana Buinytska, Bohdan Hrytseliak (Ukraine)	
<b>IMPLEMENTATION OF CORPORATE STANDARDS OF ICT COMPETENCE – GUARANTEE QUALITATIVE OPEN ELECTRONIC ENVIRONMENT OF THE UNIVERSITY.....</b>	<b>41</b>
Barbara Kołodziejczak, Magdalena Roszak, Anna Ren-Kurc, Wojciech Kowalewski, Wiesław Półjanowicz (Poland)	
<b>COMMUNICATION TOOLS ON E-LEARNING PORTALS.....</b>	<b>63</b>
Iwona Mokwa-Tarnowska (Poland)	
<b>HOW TO ENGAGE STUDENTS IN ONLINE LEARNING – WEB-ENHANCED AND BLENDED ESP CLASSES.....</b>	<b>81</b>
Przemysław Żebrok, Eugenia Smyrnova-Trybulska (Poland)	
<b>ELECTRONIC REGISTERS IN THE SCHOOL AND DETERMINANTS OF THEIR EFFECTIVE IMPLEMENTATION....</b>	<b>89</b>
<b>Chapter II. E-learning and Intercultural Competences Development in Different Countries:.....</b>	<b>109</b>
Curaoğlu, O.,Yavuzalp, N., Gürer, M. D., Durmuş, S., Akayoğlu, S., Bahar, M., Kiliç, F., &Tekinarslan, E. (Turkey)	
<b>ICT EDUCATION IN TURKEY: NATIONAL ICT CURRICULUM TO IMPROVE TEACHING AND LEARNING.....</b>	<b>109</b>

Milena Janakova (Czech Republic) <b>INFORMATION TECHNOLOGY AND EDUCATION: DOES EDUCATION NEED EXAMPLES OF PRACTICE WITH POSITIVE AND NEGATIVE EFFECTS?.....</b>	119
Ewa Ogrodzka-Mazur, Anna Szafrńska-Gajdzica (Poland) <b>EDUCATIONAL POLITICS AND INTERCULTURAL EDUCATION – THE POLISH PERSPECTIVE.....</b>	125
Jerzy Kuck, Danuta Kaźmierczak (Poland) <b>BUSINESS PROCESS MANAGEMENT AS A SUPPORT FOR E- LEARNING DEVELOPMENT IN POLAND.....</b>	139
Josef Malach, Kateřina Kostolányová, Milan Chmura (Czech Republic) <b>ACADEMIC SCHOLARS‘ VIEW ON THE CONTRIBUTION OF ICT TO THE ENHANCEMENT OF DISTANCE LEARNING ELEMENTS OF UNIVERSITY STUDIES.....</b>	159
Irena Pulak (Poland) <b>PREPARING STUDENTS FOR THE USE OF E-LEARNING IN HIGHER EDUCATION.....</b>	189
Aldona Molesztak, Anna Pawiak (Poland) <b>INFORMATION SOCIETY AND THE NECESSARY DIGITAL SKILLS.....</b>	201
Gürer, M. D., Yavuzalp, N., Curaoglu, O., Durmuş, S., Akayoğlu, S., Bahar, M., Kiliç, F., Tekinarslan, E., and Demirel, M. (Turkey) <b>ONE YEAR EXPERIENCE OF DISTANCE EDUCATION AT ABANT IZZET BAYSAL UNIVERSITY.....</b>	211
<b>Chapter III. Theoretical, methodological and practical aspects of distance learning:.....</b>	219
Nataliia Morze, Olha Barna, Olena Kuzminska, Viktoriia Vember (Ukraine) <b>FORMATION OF ICT COMPETENCES THROUGH THE SYSTEM OF COMPETENCY TASKS: FROM IDEA TO PRACTICAL IMPLEMENTATION .....</b>	219

Magdalena Roszak, Barbara Kołodziejczak, Andrzej Bręborowicz, Wiesław Półjanowicz (Poland) <b>MEDICAL DISTANCE EDUCATION - GOOD PRACTICES.....</b>	235
Halina Widła, Aleksandra Serwotka (Poland) <b>TEACHING FRENCH AS A THIRD LANGUAGE: THEORETICAL ASPECTS AND A WEB-BASED COURSE REDUCING THE NEGATIVE TRANSFER OF SELECTED VERBAL CONSTRUCTIONS FROM ENGLISH TO FRENCH.....</b>	247
Sorokina Lyudmyla, Karimov Ivan, Karimov Gennadiy, Zayarna Iryna (Ukraine) <b>BASIC ASPECTS OF FORMING ICT-COMPETENCES OF SOCIOLOGISTS.....</b>	261
Anna Ślósarz (Poland) <b>MODELS OF SELF-PRESENTATION AS SUPPLIED BY UNIVERSITY STUDENTS IN REMOTE LECTURES.....</b>	271
<b>Chapter IV. Distance learning and lifelong learning:.....</b>	285
Roman Šperka (Czech Republic) <b>BUSINESS PROCESS MANAGEMENT SOFTWARE APPLICATION FOR ENHANCING COMPANIES' KEY PERFORMANCE INDICATORS: EDUCATION APPROACH.....</b>	285
Agnieszka Gadomska, Jarosław Krajka (Poland) <b>PEDAGOGICAL SOLUTIONS IN E-TEACHER TRAINING – TOWARDS EFFECTIVE TECHNOLOGY ADOPTION BY TEACHERS.....</b>	297
Pavel Kapoun (Czech Republic) <b>TAILORED COURSES FOR PROFESSIONAL LIFE.....</b>	313
Nadiya Balyk, Galina Shmyger (Ukraine) <b>PROFESSIONAL TRAINING TEACHERS UNIVERSITY IN E- LEARNING.....</b>	323
Piotr Jagodziński, Robert Wolski (Poland) <b>REMOTE LEARNING SYSTEM IN PREPARING STUDENTS TO BECOME TEACHERS.....</b>	335

Iryna Vorotnykova (Ukraine)	
<b>TEACHERS' PROFESSIONAL DEVELOPMENT NETWORKS.....</b>	<b>347</b>
 <b>Chapter V. Methods, forms and techniques in distance learning:</b>	<b>353</b>
Małgorzata Bartoszewicz (Poland)	
<b>E-LEARNING IN HIGHER EDUCATION IN PRACTICE.....</b>	<b>353</b>
Tatiana Prextová (Czech Republic)	
<b>ADAPTIVITY OF TESTING IN EDUCATION PROCESS.....</b>	<b>361</b>
Wojciech Malec (Poland)	
<b>FOSTERING AUTONOMOUS LEARNING WITH THE AID OF ONLINE TECHNOLOGY.....</b>	<b>371</b>
Miroslav Hrubý (Czech Republic)	
<b>THE IMPORTANCE OF STUDENTS' ALGORITHMIC THINKING SKILL IMPROVEMENT.....</b>	<b>383</b>
Adam Adamski (Poland)	
<b>CONSCIOUSNESS AS A SET OF INFORMATION AND QUANTUM PROCESSES IN THE BRAIN.....</b>	<b>391</b>

## INTRODUCTION

“Information technology (IT) tools in education have been primarily intended to serve two distinct goals, first expanding access to educational opportunities for learners who would not otherwise have them and second, improving the quality and effectiveness of teaching and learning for all. The Digital Planet 2006 report from the World Information Technology and services Alliance (<http://www.witsa.org>) states as follows: Indeed, despite the expected peaks and valleys, countries around the globe are finding ICT the indispensable technology for increasing productivity, raising the standard of living, delivering greater educational opportunities, improving healthcare and human services and eliminating barriers to greater participation in world market” (Evaluation of the design and Development of IT Tools in Education, Thomas C. Reeves, Chapter International Handbook of Information Technology in Primary and Secondary Education Volume 20 of the series Springer International Handbook of Information Technology in Primary and Secondary Education pp 1037-1051)

As a response to these challenges a monograph has been prepared and the IRNet project has been launched ([www.irnet.us.edu.pl](http://www.irnet.us.edu.pl)) with participating thirty researchers from ten countries. In the framework of Work Package 4 there was conducted research in the scope of selecting and testing new IT tools: social media, selected Web 2.0 and Web 3.0 Massive Open Online Courses, etc.; evaluating synchronous and asynchronous tools, methodologies and good practices; comparing and evaluating LMS (learning management systems), CMS (Contents Management Systems), VSCR (Virtual Synchronous Classrooms), SSA (Screen Share Applications), CSA (Contents Sharing Application), Cloud Computing Environment; identifying and defining profiles of virtual campus, virtual learning environment and virtual synchronous classroom; reviewing and comparing virtual classrooms (VCR) based on hardware equipment against the ones based on PCs; identifying VCRs which better serve the teacher's or student's activities; comparing from the technological point of view the best known VCR (PC based) available in the market; analyzing the technological profile that virtual classrooms should have to ensure a good pedagogic result; characterizing methodological and technological aspects of multimodal didactic communication; identifying the general methodological aspects of VCR with a special focus on online tutoring, continuous online evaluation and good practices; testing IT tools in concern with effective developing ICT and e-learning competences as well as in design of intercultural competences.

The monograph “IT Tools - Good Practice of Effective Use in Education” includes the best papers, prepared and presented by authors from seven European countries and from more than twenty universities during the scientific conference entitled “*Theoretical and Practical Aspects of Distance Learning*”, subtitled: “*IT Tools - Good Practice of Effective Use in Education*”, which was held between 12-13 October 2015 at the Faculty of Ethnology and Sciences of Education in Cieszyn, University of Silesia in Katowice, Poland.

The speakers were from the University of Ostrava (Czech Republic), Extremadura University (Spain), UCL Institute of Education in London (United Kingdom), Graal Institute (Portugal), Constantine the Philosopher University in Nitra (Slovakia), The Lisbon University (LU) (Portugal), Borys Grinchenko Kyiv University (BGKU), (Ukraine), Gdańsk Technical University (Poland), Abant İzzet Baysal University, Bolu, (Turkey), Herzen State Pedagogical University of Russia, St. Petersburg, (Russian Federation), Dniprodzerzhinsk State Technical University (DSTU), (Ukraine), Jagiellonian University (Poland), Warsaw University (Poland), Silesian University in Opava (Czech Republic), University of Silesia in Katowice (Poland), University of Defence in Brno (Czech Republic), Maria Curie-Skłodowska University in Lublin (Poland), Lublin University of Technology (Poland), Kazimierz Wielki University in Bydgoszcz (Poland), Cracow Pedagogical University (Poland), Lisbon Open University (Portugal), Centre for Innovation, Fryderyk Chopin University of Music in Warsaw (Poland), University of the Basque Country (Spain), Higher School of Economics in Katowice (Poland), Cardinal Stefan Wyszyński University (Poland), Leaneus University (Sweden), University of Social Sciences and Humanities in Warsaw (Poland), Poznań University of Medical Sciences (Poland), Adam Mickiewicz University in Poznań, (Poland), University of Social Sciences and Humanities in Warsaw (Poland), University College of Social Sciences, Częstochowa, (Poland), Jesuit University of Philosophy and Education "Ignatianum" in Cracow (Poland) and other educational institutions.

The authors include well-known scholars, young researchers, highly trained academic lecturers with long experience in the field of e-learning, PhD students, distance course developers, authors of multimedia teaching materials, designers of web-sites and educational sites.

I am convinced that the monograph will be an interesting and valuable publication, describing the theoretical, methodological and practical issues in the field of the use of e-learning for societal needs, offering proposals of solutions to certain important problems and showing the road to further work in this field, allowing for exchange of experiences of scholars from various universities from many European countries and other countries of the world.

This book includes a sequence of responses to numerous questions that have not been answered yet. The papers of the authors included in the monograph are an attempt at providing such answers. The aspects and problems discussed in the materials include the following:

- analyzing and comparing IT-tools for education,
- contrastive analyses and evaluation of ICT and e-learning competences in different countries,
- e-learning methodology which is not yet fully developed and specified, both within the EU and in third countries,
- information and educational environment of blended learning: aspects of teaching and quality

- intercultural aspects of higher education in the globalised world
- e-learning as an innovation of methods and techniques in the different education system
- the legal, ethical, human, technical and social factors of ICT and e-learning development and the state of intercultural competences in different countries
- effectiveness and quality of e-learning in various areas of science and education
- ICT competence in modern school and university
- Formal, non-formal and informal distance education and LLL
- A new role and possibilities of using e-learning for lifelong learning (LLL);
- Teachers' and learners' competences in distance learning and computer science;
- A relation between building an information educational environment of the university (school) and forming lecturers' (teachers') ICT competences
- efficient use of e-learning in improving the level of students' key competences;
- pedagogical and methodological aspects of cloud computing;
- mobile technologies – effectiveness of online technologies used in real education
- distance learning of humanities as well as science and mathematics – a differentiated approach;
- how to successfully use e-learning in the training of professionals in the knowledge society
- psychological, cultural and social aspects of distance learning;
- e-learning and social media for the disabled; the use of Internet technology and social media for people with limited abilities and special needs – theoretical and practical aspects of their use;
- appropriate, efficient methods, forms and techniques in distance learning;
- educational strategies to enhance learners' motivation in e-learning, etc.

Publishing this monograph is a good example of expanding and strengthening international cooperation. I am very grateful for valuable remarks and suggestions which contributed to the quality of the publication. Here I especially want to thank Andrzej Szczurek for his assistance in editing this publication. Also, I would like to say 'thank you' to the authors for the preparation and permission to publish their articles. I wish all readers a pleasant read. Thank you.

Eugenia Smyrnova-Trybulska





# I. IT TOOLS – GOOD PRACTICE OF EFFECTIVE USE IN EDUCATION

## INNOVATION AND CREATIVITY IN E-LEARNING

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**Abstract:** *Problems of innovation and creativity raise particular interest in education. In the distance education you can discuss the extent to which e-learning tools trigger the need for innovation and creativity. Therefore, in light of the literature and environmental studies, attempts were made to address the challenge of innovation and creativity in utilization of e-learning techniques. Analysis of available sources and research materials enable to outline the concept of the continuous improvement of e-learning in order to implement the innovative and creative development of the student and progress in teaching.*

**Keywords:** innovation, creativity, utilization of e-learning.

## INTRODUCTION

E-learning in the educational process is an effective form and method of digital intellectual development in order to achieve the desired results in the acquisition of general and professional qualifications, as well as participation in the research of cognitive and utilitarian nature. The aim of the actions for obtaining reliable sources and data analysis is to deepen knowledge about the possibilities to utilize e-learning in developing innovative and creative attitudes covering the diagnosis of cognitive source materials, motivational and emotional attitudes and practical actions. The rationale for the development of this subject is, on the one hand, intellectual curiosity associated with the treatment of e-learning as the form-method streamlines and even supposedly facilitates the process of learning and self-study, and self-learning. In fact, learning, self-study and self-learning seek to master the desired innovative and creative skills, which are associated with far-reaching abstraction, intellectual effort and emotional experiences that do not always yield the expected results. Therefore, there is a need to discuss e-learning as a standard, relatively great educational tool for the exchange of information, distance communication, diagnose

of needs and intellectual abilities of the participants' as well as control of the pace and evaluation of completed tasks.

In the process of acquiring innovative and creative skills when utilizing e-learning, much depends on the predispositions of the participants, especially their aptitude, so that the self-learner and self-taught benefits from the help of a tutor or coach effectively. A lot depends also on the sophistication of the e-learning program, allowing and encouraging the multilateral innovative and creative attempts.

## **1. THEORETICAL PREMISES OF EDUCATIONAL INNOVATION AND CREATIVITY**

### **1.1 Effectiveness of education**

In general, theoretical premises are considered from the point of view of declarations acquired and developed in the research. In fact, they do not correspond directly with the subject of research, but show a relatively coherent system of statements and permit the formulation of some practical conclusions necessary in the procedure of making methodological assumptions. Therefore, the effectiveness of education systems operating in the West, including in Poland, should be considered first and foremost on the canvas of significant successes of the neo-liberal economics (to 2008).

Little success in terms of innovation in Polish science and economy is reflected in the available documents and research studies. Polish place in the rankings indicates, inter alia, that the domestic economy is one of the least innovative economies in Europe. This results from the fact that economic growth is based on low labour costs, large internal sales market and funds from the European Union, which may result in a few years in the exhaustion of reserves and slowing down of development. The current position of the country is the result of long-time and strengthened negligence in the financial sector deficit, public debt and ubiquitous Euro problems, suggesting further savings in spending on research and development (Smith 2012, p. 167). Therefore, the implementation of the competitive system of knowledge creation, particularly in the form of taking care of equal opportunities for research institutions and potential innovators, so that competitive and open support system created a positive feedback to increase the efficiency of the whole NSI in Polish science and R&D sector (Bukowski, Szpor, Śniegocki 2012, p. 29).

The publications of a team of School Effectiveness working on testing the quality and effectiveness of education and institutionalization of research facilities describe major problems in this regard. 1. Is the school important in the light of the analyzed different aspects of efficiency in the first stage of education? 2. To what extent determinants of the effectiveness of education at the second stage of education are revealed (research report)? 3. Is the school self-evaluation the result or the cause of educational achievement? 4. Is there an inter-school diversity of learning outcomes after the first stage of education? 5. The extent to which *the Criteria for Achieving*

*Success in the Opinion of Partners* are applied? 6. Where is the *Educational Optimism of Parents* revealed? 7. What are the values of parents and their conditions? 8. What are the possibilities of using the computer application? (SUEK 2015). Unfortunately, educational studies initiated and supervised by the Institute for Educational Research, in the convention for Human Capital (National Cohesion Strategy) and the European Social Fund (EU), there were no research materials published on the impact of e-learning on innovation and creativity in terms of educational efficiency. Similar case applies when referring to the effectiveness of Polish higher education, as criteria for evaluating the effectiveness of the university is defined and set from the comprehensive perspective, e.g. recognition of its assumed functions in relation to the realized ones (Piasecka 2012). On the other hand, in the area of the effectiveness of achieving the teaching and upbringing objectives of university, it is worth paying attention to academic favorability in relation to the cost of operation and economic efficiency, e.g. in reference to partly historical, multifaceted evaluation of the effectiveness (R. Kaplan and D. Norton 2001).

## 1.2 Innovation and creativity in education

There were numerous scientific studies published on innovation and creativity in educational terms, e.g. a series of articles (Grzesiak 2014, Wenta 2015, p. 91) and in popular science publications. Innovation is variously interpreted, for example as ... *introducing something new*, which means repeating semantic phrase (i.e. almost the same “*eodem*” - Lat.) or ... *newly introduced thing; news; reform* (Kopaliński, 1988, p. 231). In the dictionary of philosophical terms... *Innovation* (Lat. *Innovatio - renewal*) - is ... *the process of introducing new techniques, methods, agents, habits, a change in the method of exercising something. Innovation is effective if it allows to do something that could not be done previously, or at least could not be done so well. Often innovation is opposed to the idea which was approved and used for the renewal of a course of action* (Damski 1996, p. 91). For the purpose of education, these concepts are missing actors as sources of innovative projects and objectives, educational values, principles, efficiency etc. (Denek 2012, pp. 142-143). An example of the implementation of innovation to the research on education may be the publication of the Joint Research Centre of the European Commission, which has the form of legislative expertise. The category of innovation is closely linked with creativity: innovative solutions in education trigger a paradigm shift that allows free use of creative competence of students. Therefore, innovation in education is: 1) teaching creativity and 2) using new teaching methods. The analysis of education in EU member states also shows that schools always remain reluctant to innovation understood as “creative disruption”, regardless of the system. The aspect that limits the school to adapt the requirements of “innovation” is the negative catalogue, based on the absence of such qualities as flexibility, positive approach to new ideas, independence, acceptance of risk, celebration of success, fostering synergy and promoting the “fun” (Konepczyński 2014). In search of the roads taken towards high-quality education system, the Ministry of Education supports activities and

participation in mainstream politics for the development of innovative projects that test finished products (Law of 2006).

On the other hand, creativity is the broadest and most indefinite concept, because it concerns the whole of human culture and the various spheres of human activity recognized as a universal and necessary phenomenon. Modern criteria for the creativity have been extended and liberalized, so it may be not only art, but also technology, organization, fashion etc., as in every area you can explore and construct new symbolic and material forms. It is true that creative activities (and its results) occur in at least two basic meanings: psychological and sociological. In the sociological meaning attention is drawn to the types of fields of human activity, the results of which deviate with its originality from those achieved so far and gain public approval (Rudniański 1981, p. 16). Both of these terminological approaches are generally differently applied to general didactics and subject education, especially in a situation of far-reaching commercialization of science and education (Wenta 2015, pp. 91-92).

Opinions and views about the digital generation are generally negative, e.g. based on the research. Therefore, we can argue with the opinion of Professor Bauerlein that a teen of the twenty-first century, connected to the network and performing multiple tasks at the same time, autonomous, and at the same time, striving for partnerships, failed to make a huge step forward in the field of human intelligence, global thinking and citizenship network. ... Not being [ready] to bear his responsibilities towards the past, he has made a breakthrough in the foundations of our society, as seen in their stopping before the threshold of adulthood and citizenship (Tapscott 2010, p. 44-45). Values important in the consideration of his innovation and creativity include: 1) a sense of freedom of speech and the possibility to choose, e.g. people can wade through the chaos of marketing signals that correspond to their needs due to technical novelties; 2) passion for personalization and media adjustment to own needs, especially in the times of no longer standardized job descriptions and one variety of the product; 3) being a generation of careful observers, who are conscious of their market power, knowing what can be required from manufacturers and employers; 4) the desire of entertainment and fun at school, at work and social life, as this is a generation raised on interactive experiences; 5) attitude towards joint action and networking, for example cooperation on Facebook, computer games, constant sending of text messages, etc. .; 6) the need for speed, not only in computer games, in chat rooms, in marketing, but also in dealing with employers; 7) innovation, which manifests itself in the efforts to work in innovative companies that use new equipment, for example Black-Berry, iPhone and others, but also search for new forms in the joint efforts, spending free time, acquiring knowledge and organizing work (Ibid pp. 85-88).

Utilization of educational media in order to develop innovative and creative attitudes, taking into account pedagogical talent of a parent, guardian, teacher shall develop a student for innovation and creativity.

### 1.3 E-learning for innovative and creative education

Distance learning, as a new form-method of education to acquire theoretical knowledge and to some extent also practical knowledge that leads to action in the postmodern world, has been marked by at least two English-language terms. The first e-learning, is sometimes interpreted as a teaching method, which uses a different electronic media, controlled by computer technology, the most active in local and global networks. The second of these terms e-education is a form of extramural education mainly at secondary and higher education and is based, like e-learning, on the appropriate use of new technologies, including the Internet for interactive and multimedia education of students, who strive for all kinds of knowledge (*Strategia* , 2003).

In considerations on the barriers and difficulties in the implementation of distance education, especially in Poland, there is a need to take into account a long list of objective factors, often material-technical and financial ones, but also subjective factors, which lie in the potential participants. It is important to create an economy based on knowledge and long-life learning society, which depends on the state of Polish education and a vision of development for education until 2020 and beyond. On the other hand, it is important to notice that the educational success of students does not always translate into the conditions of employment in the labor market and wage, and human capital cannot be considered only in terms of access to knowledge. Pupils and students are very talented and capable, compared to the average, less able and intellectually disabled, including very diligent and hard-working as well as more focused on fun and lazy, who are the great unknown for the functioning and improving system of distance education.

The specificity of communication between the teacher and students in the online environment is expressed in the form of diverse consequences in terms of organization and personality of participants, including in the field of decision-making, skills to apply social codes, selection of a communication channel—of and technical skills, reception of a communication channel, which depends on the interpersonal skills of both parties in the interaction, the way and direction of interpretation in favor of maintaining interpersonal contact, the impact of the message on the recipient in terms of encoding content, especially emotional one (Lubin 2012, pp. 151-152).

Qualities and even dysfunctional nature of e-learning are related to the fact that it becomes a popular tool as a distant educational portal, because it is a teaching system designed for self-education and under the supervision of a teacher via the Internet. It includes six interrelated elements: technology, communication, content, people, behavior and contextual factors (Plebański 2011, p. 10). The two most commonly used forms applied for individual and group education in e-learning include: 1) CBT (Computer Based Training) is a carrier of educational materials in the form of documents, presentations, multimedia, audio and video recordings as well as external data carrier; 2) WBT (Web Based Training) is an online interactive

form or the form operating in a closed computer network (intranet, extranet) for transmitting educational content (Przewodnik 2015). Both forms are characterized as self-learning techniques due to their mode of participation and access and transmission of information, but from the point of view of the so-called education for innovation and creativity, they are most predisposed in the field of blended learning.

From the point of view of education for innovation and creativity, e-learning refers to the characteristics of Moodle (Modular Object - Oriented Dynamic Learning Environment) based on LSM system (Learning Management System), which enables to gain intellectual experience related to online education. Moodle is designed to apply the theory of constructionism to effectively interact with teaching materials for others and communicating with other users while learning (Rice 2008, p. 19). The use of online interactive and static materials by the e-learning user, e.g. taking online tests and sending a file to the teacher online, as well as the utilization of standard questionnaires (multivariate response) drawn up by specialists, opens up innovative and creative possibilities. On the other hand, in addition to interactive materials the Moodle platform enables also to utilize social networking materials, for example chats, forums, conceptual dictionaries, Wiki websites (Ibid p. 241), which can enrich innovative and creative teaching.

## **2. METHODOLOGICAL BASIS**

### **2.1 Research objectives and problems**

Terminological base on the impact of e-learning on innovative and creative teaching are presented in the theoretical premises. Interdisciplinary research is aimed at obtaining data for analysis and interpretation aiming to understand the functioning of e-learning in innovative and creative teaching. This is related to the utilization of cognitive achievements of other humanities and social sciences, and natural sciences about the nature of man, his institutionally and intentionally stimulated development and his self-development - self-education, self-learning, self-creation (Palka 2010, p. 342-353). Therefore, it is so important to notice different pedagogical paradigms, which should take into account the idiom of pedagogy as a key science of education (Kubinowski 2010, p. 43-44).

The applied research methodology on the utilization of e-learning in innovative and creative education, the following questions should be answered. 1. Does the Internet, especially e-learning platforms, for example Moodle, allow for creativity and innovation in the work of the teacher? 2. Why are formal standards of e-learning ~~are~~ limited or is there ~~is~~ “no” possibility of introducing significant modifications showing signs of creativity and innovation? 3. To what extent do we learn from mistakes? 4. What can be done to expand the corset of formal restrictions related to the introduction of creative and innovative elements in improving e-learning platform? 5. What determines trust in the school when it is promoted with the use of

e-learning? The analysis of the impact of e-learning on the perception of messages and task-implementing activities related to education for innovation and creativity should take into account a variety of complications, especially in the so-called appearances in building own knowledge.

## 2.2 Description of the research environment and results

The research environment includes 32 teachers of various specializations as students of the Postgraduate Studies - IT and Computer Classes for Teachers at the Higher School of Humanities in Szczecin. The research was conducted in May 2015 on the basis of a questionnaire including 2 open questions and 3 questions with answers to be chosen by the respondent.

**Table 1.**

**Personal declarations of respondents with respect to e-learning and online school promotion**

Declarations of respondents	Number	Percent
I'm a fan of e-learning	12	37,5
I use the Internet in school promotion	28	87,5
I'm neutral to e-learning	4	12,5
<b>Total</b>	32	100

*Source : Own work*

Most of the surveyed teachers declared (Table 1) to use the Internet to promote school (more than three-quarters of respondents), which was shown e.g. in diploma theses, and one-third of the respondents considered themselves to be fans of e-learning.

The obtained data from respondents is important in the response of the importance of the Internet, especially e-learning platform, for example Moodle, in teacher's work in favor of education for innovation and creativity. Almost all respondents (96.9%) declare that the Internet and e-learning allow them to be innovative and creative (only one of the respondents found it difficult to answer), which corresponds to their participation in postgraduate IT studies for teachers. However, the question arises as to what extent these declarations coincide with their statements on possible restrictions and proposals for use of the Internet, especially e-learning, in education for innovation and creativity?

In response to the question - Why do some formal standards in e-learning limit the possibility of introducing significant modifications showing signs of innovation and



creativity - 62.4% of respondents gave a positive answer, and 37.6% did not respond. Some of the answers are even only contextual, e.g.: ... *the life experience teaches us on mistakes and we accept them with humility; limitations arise from lack of contact with the teacher; ... the time of waiting for the questions asked by the student is extended; ... Limitations are associated with the transmission of information, the selection of the program and the use of IT tools; ... Not everything can be done digitally, there are also legal restrictions; ... There is a long time of waiting for the assessment and feedback; ... There are difficulties in sending large files; ... E-learning platform does not allow to demonstrate all the teaching aids.* Interpretation of the responses on formal standards in e-learning, which partially limit the use of creative innovations, shows that, in general, knowledge of these terms is superficial. Educational innovation and creativity carry a wealth of semantic designates that are applied to the teaching practice with a great deal of difficulty.

In these considerations an important question is to formulate - What can be done to expand the corset of formal restrictions related to the introduction of creative and innovative elements in improving e-learning platform? Here a reference is made to praxiology understood as the science of good work (Kotarbinski 1996, pp. 182-183) in terms of individual and team activities, with minimal intervention in order to avoid own contribution to global resources, including in the sphere of self-knowledge, self-study and self-learning, interprofessional teaching functions and the dynamics of change in applied education (Wenta 2002, p. 119). Answers to the question about what can be done to improve e-learning platform when introducing innovative and creative elements are rather poor both in terms of quantity and quality. Brief responses were given by only 37.5% of respondents, and 65.5% of the surveyed teachers – students did not give any answer. The following answers are characteristic: ... *there are being constantly created new tools that enable the presentation of information and they must be applied; ... Seek to overcome the limitations associated with the size of files to be sent; ... Because not everything can be done digitally, direct contacts should be considered; ... You must constantly improve in terms of didactics and IT; ... Raising funds for the purchase of new e-learning platforms.* The answers given by the respondents show that the issues of educational innovation and creativity are rather general for them, because educational planning among students is still rather poor. On the other hand, the surveyed teachers most frequently use Moodle because it is free, although it also includes considerable formal restrictions for the user.

In the analysis of the selected diploma theses written by surveyed teachers doing postgraduate IT studies it is worth to refer to their statements about trust of Internet users in the school (Table 2), because in their work they use Moodle to present schools where they are employed.

**Table 2.****Differentiated trust in school of surveyed teachers**

<b>Specification</b>	<b>Total</b>	<b>%</b>	<b>Inter.</b>	<b>%</b>	<b>Fan</b>	<b>%</b>	<b>Neutr.</b>	<b>%</b>
Teacher	28	87,5	20	71,4	4	33,3	4	100
School management	10	31,2	4	14,3	2	16,7	4	100
Parents	8	25,0	2	7,1	2	16,7	4	100
Students	6	18,8	2	7,1	-	-	4	100
Local opinion	24	75,0	18	64,3	2	16,7	4	100
Online presentation	12	37,5	7	25,0	2	16,7	4	100
Total	32	100	28	100	12	100	4	100

Legend: Inter. – Declaration of the respondent that he/she opts for the use of the Internet in school promotion;

Fan - Declaration of the respondent that he/she is a fan of e-learning;

Neutr. – Declaration of the respondent that he/she is neutral to e-learning

*Source : Own work*

From the analysis of the respondents' opinion (Table 2) it can be concluded that the most common and effective impact on trust in the school have: the teacher (87.5%); local opinion (75.0%); school management (31.2%) online presentation (37.5%) parents (25.0) and students (18.8%). Therefore, even declarations of respondents about opting for the use of the Internet in school promotion, being fans of e-learning, do not have a significant impact on the choice of authorities, institutions and opinion-forming factors in creating trust in the school. This is due to the fact that respondents treat e-learning mainly instrumentally, and they do not have a wider knowledge about what is education for innovation and creativity.

Analysis of six diploma theses (Błaszczów, Podwójna, Mikołajczyk, Nicka, Sikora, Szechyńska 2015), studies also among other teachers through a survey (Tables 1-2), who are students of postgraduate IT studies, allow to conclude that e-learning is primarily treated as a form-method for supporting the educational process and the online presentation of their educational facility. It is significant that these theses do not include merit signs, which would show that their authors notice the issues of innovative and creative education. However, the analysis of the topics and content of diploma theses shows that they include e.g. issues concerning the description of an online medical school as a showcase and source of information

(Błaszczów 2015), the school website as a pedagogical micromarketing (Podwójna 2015), website of the care center as a showcase and source of network information (Nicka 2015), website presentation of the complex of special schools (Sikora 2015), e-learning Moodle platform as a system supporting the education process (Szechyńska 2015) and support for the organization of teacher's work with the use of Google Classroom (Mikołajczyk 2015).

A characteristic feature of the diploma theses of the surveyed teachers – IT students is that they are dominated by descriptions focused on the importance of information technology in education, but the process is presented briefly and they do not include issues related to the information education for innovation and creativity. They include the list presentation of tools and their use by the teacher and the student, and the valuable description of the so-called cloud computing, Microsoft Office 365 version EDU and Google Apps for schools and universities (Mikołajczyk 2015). An example of approach to innovative and creative teaching is the use of e-learning Moodle platform in supporting the educational process, where e-learning is described as a form of teaching aid, and Moodle platform is characterized from e.g. social perspective, although the reader is bound to critical deduction (Szechyńska 2015).

To sum up, substantive issues relating to the use of e-learning procedures regarding innovation and creativity in the work of the teacher and student rather do not occur in the responses of the surveyed teachers - graduate students of applied informatics, as well as in the selected theses. It results from the fact that the issue of innovation and creativity of teaching revealed itself rather in signal dimension of using the Moodle platform to present the school and the school, image.

## CONCLUSION

The issues concerning innovation and creativity of teaching supported by e-learning are entangled in strands of internal and external contradictions, due to their semantic and substantive inconsistency. It is connected with the apparent belonging to teaching, although they belong to two different fields of science. Theory and practice of innovation and creativity in principle situates itself within the humanities and social sciences, while e-learning in its digital-communication layer rather opts for mathematics and technical sciences, and also strongly corresponds to the area of communication and information. When considering their substantive-objective and practical integrity, it is worth noting that issues related to innovative and creative teaching are more abstract and difficult to undergo qualitative and quantitative analysis than e-learning, because it is based on measurable mathematic and technical values, realized “here and now” in the context of the far-reaching results in the form of educational success of individuals in terms of science, art and social practice.

In the question about the cloud or a silo of human culture resources, which is influenced by dynamic transformations of civilization, it is worth paying attention to

at least two aspects of e-learning. The first of these concerns the need for effective lifelong learning based on constantly evolving and improved learning tools. On the other hand, you cannot fail to notice that educational outcomes, also achieved with the use of e-learning, are measured over long periods of time, and sometimes in the information self-education the categories of error and failure are the source of success for the common good, but also can provide threat to humanity.

The practical conclusions from the analyzed literature and surveys concerning theses are addressed to the scientific and research community to promote interdisciplinarity in the search of the truth. This paper also aims to make interdisciplinary science serve social practice, e.g. in the area of education, taking into account the attributes of freedom, skepticism and reductionism in solving scientific and educational problems.

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# IT TOOLS IN A UNIVERSITY – E-LEARNING ENVIRONMENT: STUDENTS' OPINION SURVEY

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**Abstract:** *This article presents a diagnostic instrument and data analysis results within the European IRNet Project, Work Package 3. One of the aims of the survey was to analyze the benefits of a modern university e-learning environment, students' opinion about an e-learning environment and its IT tools. The data cannot only be the basis of determining the degree of students' activity in a university e-learning environment, but can also help to identify ways to improve a university electronic environment. The paper includes results of the research carried out at several partner universities - Herzen State Pedagogical University of Russia, St. Petersburg (HSPU), The University of Silesia in Katowice (US), Poland, Borys Grinchenko Kyiv University (BGKU) and Constantine the Philosopher University in Nitra (UKF), Slovakia.*

**Keywords:** e-learning environment, students, university, IT tools, survey

## INTRODUCTION

One of the common features of modern education in different areas of training is the presence of positions that define the ability to apply e-learning and distance learning



technologies in the educational process (Gutierrez-Esteban, Alonso-Diaz, Smyrnova-Trybulska, Čápay, Ogrodzka-Mazur, Pinto, Noskova, Gajdzica, Pavlova, Yakovleva, 2015). This is true not only when the problems are solved, related to the provision of educational services in the remote form and training of students with disabilities. An important aspect of a university graduate is the ability to work in a professional environment with a variety of available information resources and networking opportunities. Information and communication technologies are considered today as natural tools for education and professional activities; they quickly progress and are widely used by young generations in different areas of their activities (Morze, Spivak, Smyrnova-Trybulska, 2014).

Contemporary educational standards specify the goals and results of training, including a wide range of graduate and professional competence and objectives that a student should be ready to achieve (Kommers, Smyrnova-Trybulska, Morze, Noskova, Pavlova, Yakovleva, 2014). Regardless of the professional activities students are expected to implement, information and communication technologies have a high potential to achieve educational outcomes, improve the efficiency of network forms of educational process organization (Noskova, Pavlova, 2012). To realize this potential, it is necessary to form a system of targeted information and communication educational opportunities, taking into account the benefits of modern information environment.

It is important to analyze and systematize the main benefits of e-learning environment that can be used by students during training. Such benefits can be evaluated from different perspectives: improvement of educational services quality, formation and development of competencies for the knowledge society, formation of graduates' competitiveness. It is important that the achievement of educational outcomes should be possible on condition of the strategic use of IT tools by students in a university electronic environment.

## **1. UNIVERSITY E-LEARNING ENVIRONMENT - THE MODERN REQUIREMENTS**

An electronic environment of a modern university should create opportunities for the development of the 21st century competencies, for the implementation of a lifelong learning strategy. In this paper we analyze the data obtained at several universities – the participants of the IRNet project: Herzen State Pedagogical University of Russia, St. Petersburg (HSPU), The University of Silesia in Katowice (US), Borys Grinchenko Kyiv University (BGKU) and Constantine the Philosopher University in Nitra (UKF), Slovakia.

Each university provided at least 100 respondents – students of all stages education (bachelor degree students and master degree students).

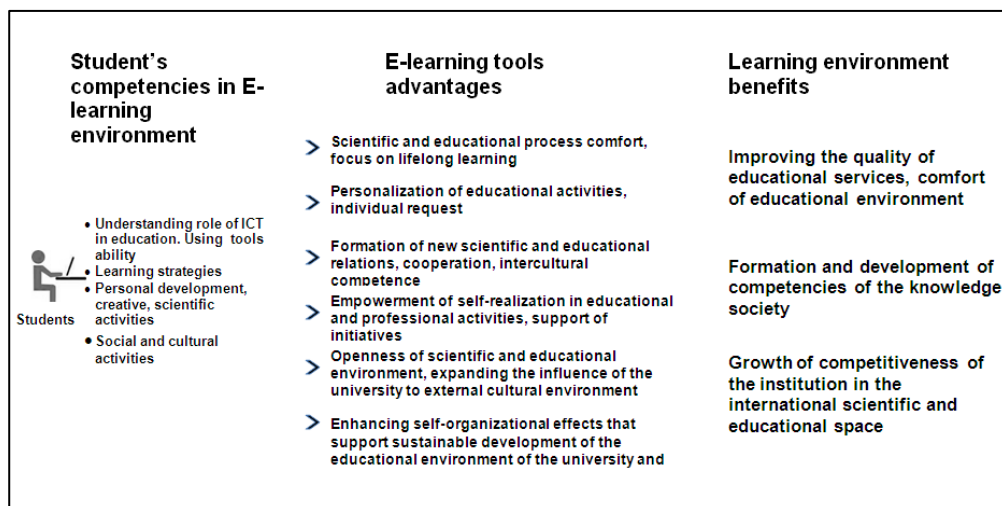
In order to identify the ways students use IT tools in their universities' e-learning environments and to outline possible ways for improving educational interactions in a network learning community, the data, obtained in the framework of Work Package 3 of the IRNet project (<http://www.irnet.us.edu.pl>) was analyzed. One of the aims of the survey was to determine if students understand the opportunities and educational benefits of e-learning environment: expansion of space-time coordinates, personalization of educational activities, individual request, increase of the degree of educational openness. The data cannot be only the basis of determining the readiness of students for self-guided work and activity in e-learning environment, but can also help to identify ways to improve a university electronic environment.

It is important to mention that the WP3 of the IRNet project was dedicated to the analyses and evaluation of the ICT level, e-learning and intercultural developments in every participating country and to the elaboration of the conceptual framework for a joint research project based on lasting collaboration with the project participants. It was assumed that participants of e-learning environment (academic teachers, students, administration) are involved in activities with the following benefits:

- increase of scientific and educational process comfort, focus on lifelong learning goals;
- personalization of educational activities, individual request of e-learning;
- formation of new scientific and educational relations, cooperation, intercultural competence;
- empowerment and self-realization in educational and professional activities, support of initiatives;
- increase of the openness degree of scientific and educational environment, expanding the influence of the university to external cultural environment; positioning of the actors in the research and education community;
- enhancing self-organizational effects that support sustainable development of the educational environment of the university and its participants.

The whole vision of e-learning environment is presented in Figure 1.

In the rest of the paper, we will pay particular attention to the following benefits: increase of scientific and educational process comfort, focus on lifelong learning goals; personalization of educational activities, individual request of e-learning; increase of the openness degree of scientific and educational environment; expanding the influence of the university to external cultural environment.



**Figure 1. E-learning environment: IT tools, students' competences and learning benefits.**

*Source: Own work*

## **2. E-LEARNING ENVIRONMENT OF A UNIVERSITY AND TRAINING FOR THE 21ST CENTURY FROM THE STUDENTS' PERSPECTIVE**

### **2.1. Benefit 1: increase of scientific and educational process comfort, focus on lifelong learning goals**

Traditionally, one of the main benefits of IT tools and e-learning implementation in an educational institution is the expansion of space-time coordinates, increase of scientific and educational process comfort, and focus on lifelong learning goals. Nevertheless, in the aspect of the problem under discussion, it is important to emphasize that a variety of IT tools allow not only for learning in a comfortable mode and showing a greater extent of educational activity and independence. A new task of education is to focus on lifelong learning goals, which involve a possibility of fulfilling own potential for people of all ages, regardless of place and time, using all possible ways and means of interaction. To achieve this goal in a learning period, a student as a future specialist needs an understanding and willingness to take advantage of IT tools for educational solutions and further professional tasks with a focus on an individual information and communication request.

Table 1 shows how students understand the role of IT tools and use their opportunities when studying to expand space-time coordinates of learning.

**Table 1.****Expansion of space-time coordinates of learning**

For what purpose do you use the electronic environment of your University (electronic library, distance learning platform Moodle, e-courses, university website, scientific databases of university subscriptions, etc.)? (single choice)				
	HSPU	US	BGKU	UKF
I use it only if it is required by a teacher	49.2%	48%	59%	28.2%
I use it as it makes it easier to perform the tasks	43.5%	47%	36%	67.1%
I don't use it, as I don't understand the rules and its usefulness	0.8%	3%	7%	2.9%
I don't use it at all, as I find other alternative Internet resources (for example, Mass Open Online Courses, etc.)	6.5%	2%	9,4%	1.8%
Choose two main reasons for your using, more actively, the electronic environment of your University (electronic library, distance-learning platform Moodle, e-courses, the university website, scientific databases of university subscriptions, etc.) (multiple choice)				
	HSPU	US	BGKU	UKF
getting acquainted with the possibilities and usage rules	33.1%	19%	32.5%	21.5%
having an opportunity to perform tasks at own pace, anytime and anywhere	79%	23%	73.5%	83.5%
finding more diverse electronic resources	47.6%	51%	43.6%	72.6%
Choose the most important, from your point of view, indicators of comfort of the electronic environment of the University. (multiple choice)				
	HSPU	US (single choice question)	BGKU	UKF
Availability of Wi-Fi access points	79%	47%	88%	20.9%

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Opportunity to use one's own gadgets	47.6%	10%	64.1%	17.9%
Availability of electronic educational resources in different formats (video, audio, hypertext, etc.),	31.5%	11%	30.8%	15.9%
University website with the relevant information for students and comfortable navigation,	42.7%	16%	47%	20.6%
Availability of distance support for disciplines (tasks in electronic form, electronic journal, discipline's website or Moodle)	44.4%	8%	52.1%	11.5%
Availability of a fast feedback from a teacher	49.2%	8%	51.3%	13.2%

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*Source: Own work*

As far as the expansion of space-time coordinates of learning is concerned; firstly, it is important to understand the purpose of e-learning environment use and its IT tools. In particular, the use of environmental resources such as an e-library, a distance learning platform (e.g., Moodle), e-courses, university website, scientific database in university subscription. Students' degree of e-learning environment use is an indicator of their understanding of the possibilities and the role of such environment in their educational routes, as well as application possibilities in the teaching environment. There may be different levels of using IT tools of e-learning environment: use only on teachers' instructions (this may be typical for students of initial training courses), independent use due to the understanding that it facilitates the performance of tasks, as well as providing greater opportunities for self-education and the development of professional competencies. An important feature of e-learning environment is the access to its resources, the opportunity to perform tasks at own pace, anytime, anywhere. This fully corresponds to the modern information behavior of young people. We also have to mention that the level of using e-learning environment depends on the number of used environments at the university. It is common that at many universities multiple environments, tools and systems are used, so some users can easily get lost and thus they use only tools required by a teacher. There are also other problems that we have to mention. Many students use the e-learning environment just for downloading study materials (Costa, Alvelos, & Teixeira, 2012; Mozhaeva, Feshchenko, & Kulikov,

2014) and the education staff has low IT competencies (Barberan, Gutierrez, & León, 2013).

However, students might not use e-learning environment and its IT tools of their educational institution, as they do not understand the rules and the feasibility of its use. In this case, it is important to note the need to familiarize students with the possibilities, rules and resources. Therefore, teachers need to offer assignments that will motivate students to use these opportunities and to be acquainted with them. There is another option: students do not use e-learning environment of their educational institutions, as there are other alternative Internet resources (educational portals, websites, massive open online courses - MOOCs, etc.) (Smyrnova-Trybulska, Morze, Varchenko-Tritzenko, 2015). In this case, it can be assumed that the particular environment does not fully comply with students' information and educational needs (Yakovleva, 2013). Consequently, changes are required in the university e-learning environment.

What are the most important indicators of e-learning environment comfort and attractiveness for students? The most important indicators are the following: Wi-Fi access points; the possibility to use own gadgets; the availability of electronic educational resources in various formats (video, audio, hypertext, etc.); university website with relevant information for students and convenient navigation; the availability of remote learning support (tasks in electronic form, electronic score list, e-course on the Moodle platform) (Smyrnova-Trybulska, 2014); the possibility of a rapid feedback from teachers (Noskova T., Yakovleva O., Pavlova T., Morze N., Drlik M. 2014). It is obvious that the presence of these indicators makes the environment comfortable not only to solve educational problems, but also to meet the challenges of self-development, self-realization, research and scientific activities.

## **2.2. Benefit 2: Personalization of educational activities, individual requests in e-learning**

The second benefit of an e-learning environment and IT tools is the implementation of individual request and learner preferences, based on the characteristics of interests, social interactions, learning context and individual requirements. The primary means of achieving this advantage is the ability to select the types of information and educational activities, electronic resources, and participants for interactions. Accordingly, these possibilities should be considered when designing an e-learning environment. Among them, the use of adaptive hypermedia and interactive, formation of new and different scientific and educational ties and relations that address the educational task in cooperation in a corporate environment, and not limited to the scope of the university, and the improvement of cross-cultural competence (Smyrnova-Trybulska E, Ogrodzka-Mazur E., Gajdzica A., Noskova T., Pavlova T., Yakovleva O., Morze N., Kommers P., Sekret I., 2014:). Networking, distributed command work, which has become common type of professional activities in many areas require special aspects of

training. While studying in a university students have the opportunity to try themselves in different roles, typical for a promising professional activity, to understand their strengths and challenges. Such training becomes possible by means of IT tools and e-learning technologies. The data in Table 2 shows how students recognize the importance these opportunities for learning, self-development, self-realization, research and scientific activities.

**Table 2.**  
**Personalization of educational activities, individual request in e-learning.**

Should teachers consider students' educational requests, their interests and needs while creating electronic resources in educational environment (presentations, websites, tests, video lectures, etc.)? (single choice)				
	HSPU	US	BGKU	UKF
No, they should not - I can use the resources in accordance with my needs	42.7%	17%	29.9%	11.8%
Yes, they should provide resources, adapted to my individual needs	57.3%	83%	70.1%	88.2%
What additional electronic educational services would you like to receive at your university? (multiple choice)				
	HSPU	US (single choice question).	BGKU	UKF
Studying foreign languages,	62.1%	44,00%	65%	57.9%
Acquiring an additional profession,	51.6%	36,00%	58.1%	49.7%
Learning about start-ups and own business	25.8%	20,00%	45.3%	30.6%
Other	3.2%	-	0.9%	4.7%

*Source: Own work*

Among "other" additional electronic educational services students named additional knowledge and skills for future profession, additional knowledge and skills according to personal interests.

There is a question that is difficult to answer unequivocally: to what extent should teachers take into account the information and educational needs of students, their interests, needs to create electronic educational resources (presentations, websites, tests, videos, lectures, etc.). On the one hand, students can use the proposed resources in accordance with their needs. On the other hand, teachers have to take into account the information and educational needs of students, their interests, and provide resources adapted to individual request, especially when it comes to inclusive education. It is important to note that the modern e-learning environment allows variation of electronic resources. Furthermore, additional electronic educational services can be provided in such environment. For example, the study of foreign languages, additional profession, business start-ups, etc. Obtaining additional educational services ensures the readiness of the graduates for professional careers in the dynamically changing conditions.

**2.3. Benefit 3: Increase of the openness degree of scientific and educational environment. Expanding the influence of the university to external cultural environment.**

E-learning environment IT tools allow for enriching the educational process with visual representation of educational results, scientific, university artistic and sports activities and achievements of particular students. Thus, students have the opportunity to presentthemselves and their achievements to others: potential employers, teachers, students, prospective students, social partners of the educational institution. Because the presentation of achievements improves students’ status, the circles of acquaintances and interactions are expanding. Possession of means and methods of the presentation of professional activity results today is an important competence for a representative of any professional field. By offering students, at the initial stages, assignments aimed at presentation of educational activity results in an e-learning environment, the preconditions for the formation of such competence are created.

Table 3 shows the opportunities for increasing the openness degree of scientific and educational environment and expanding the influence of the university to external cultural environment.

Table 3.

**Increasing the openness degree of scientific and educational environment and expanding the influence of the university to external cultural environment**

Choose what elements of the university electronic environment can influence your choice to study in it. (multiple choice)				
	HSPU	US (single choice question)	BGKU	UKF



Massive online courses, provided by the university	16.1%	22,00%	24.8%	43.2%
An attractive university website with a user-friendly interface and up-to-date information	38.7%	13,00%	56.4%	54.1%
Own university social network	23.4%	6,00%	21.4%	26.8%
A clear presentation of the university teachers' achievements on the web-site (awards, publications, etc.)	33.1%	9,00%	29.9%	30.6%
A clear presentation of students' achievements on the web-site (awards, publications, etc.)	18.5%	12,00%	17.9%	31.8%
Information about successful university graduates and their achievements	40.3%	16,00%	17.1%	37.9%
Collaboration of the university with schools, kindergartens, educational centers, etc.	28.2%	9,00%	27.4%	47.1%
Participation of the university in social activities and cultural life (volunteering, charity concerts, exhibitions, etc.)	54.8%	13,00%	47%	32.4%
Choose which informational resources you use most often when doing assignments, doing research, preparing reports, etc. (multiple choice)				
	HSPU	US	BGKU	UKF
Search engines (Google, Yandex, etc.) - Search by keywords	95.2%	45%	93.2%	90.0%
Printed publications (books, journals, guidelines, etc.)	51.6%	16%	50.4%	51.5%

Electronic scientific databases from your university library subscription (databases of electronic journals, full-text electronic resources, etc.)	23.4%	14%	32.5%	31.2%
Digital libraries in the Internet	48.4%	10%	69.2%	44.1%
Open storages of electronic educational resources (institutional repository, WIKI)	21.8%	5%	45.3%	35.3%
Video channels (YouTube)	24.2%	6%	35%	40.0%
File sharing, torrents	14.5%	4%	33.3%	15.6%
Webinars, podcasts	5.6%		10.3%	4.7%

*Source: Own work*

The findings show that students perceive as meaningful the following attributes of e-learning environment: massive online courses provided by university; attractive university website; university social network; presentation of teachers' and students' achievements (awards, grants, publications, etc.); information on successful university graduates and social partners (cooperation of a university of with schools and educational centers); university participation in social events and cultural life (volunteering, charity concerts, exhibitions, etc.). Students see these attributes as a potential opportunity for themselves to show their activity, attitudes and abilities. The data shows that students actively use external information resources and less actively are turning to university resources. This allows us to specifically recommend that students should be familiarized with these opportunities offered by each university participating in the IRNet project.

## CONCLUSION

Students can effectively use the benefits of IT tools and e-learning environment, thereby achieving the purpose of improving the quality of education, formation and development of professional competencies, formation of competitiveness in the labor market. These benefits are fully compliant with the emerging knowledge society, the ideas of lifelong learning. For a more complex and comprehensive results, research in the WP3 "Analyses and evaluation of the level of ICT, e-learning and intercultural Developments in every Participating countries" also took place among academics and the results will be presented in subsequent publications.

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# IMPLEMENTATION OF CORPORATE STANDARDS OF ICT COMPETENCE – GUARANTEE QUALITATIVE OPEN ELECTRONIC ENVIRONMENT OF THE UNIVERSITY

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**Abstract:** *The article is devoted to the design of high-quality electronic environment of the University in the context of European quality standards in the educational space of universities. A key requirement for the creation and development of quality e-environment is the availability of corporate standards developed by the University, including corporate standard of ICT - competence. These corporate standards of ICT competence of lecturers and students are designed and approved by the Borys Grinchenko Kyiv University. Described models and analysis tools for monitoring the levels of ICT competence of participants of educational process, the ways of their improvement. The displayed interdependence is the quality of the educational environment of the modern university and the level of ICT competence of teachers and students.*

**Keywords:** open e-environment of the university, corporate standard of ICT competence, model of ICT competence, instrument of formation ICT competence, monitoring, the quality of university education

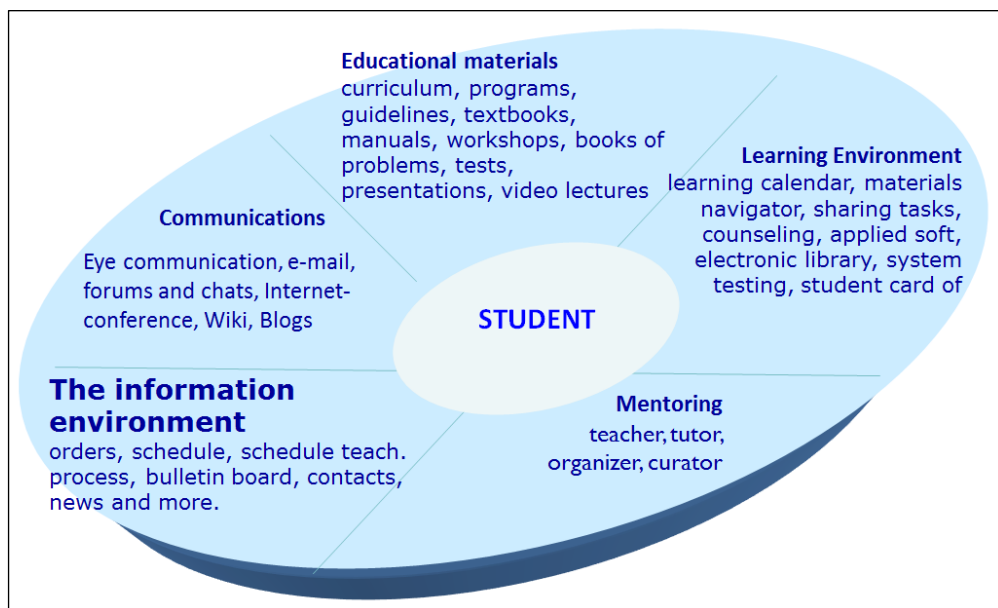
## INTRODUCTION

The rapid technological change, new quality modern education society based on high-tech learning tools is characterized by considerable mobility, versatility and solidity. Global science needs scientists who can solve global scientific problems, develop general scientific theory. International labor market requires skilled professionals with a flexible system of knowledge and operational capabilities of their applications in related areas that can quickly adapt to technological change, ready to improve and update their own educational level.

Development of new technologies and methods for innovative educational activities using ICT is the foundation of the international project «IRNet», of which Ukrainian partner is the Borys Grinchenko Kyiv University. In accordance with the work plan BGKU developed and implemented standards for ICT expertise and the tools to analyze and assess the formation of the ICT competence of participants of educational process. This will monitor the level of formation of ICT competence and develop quality university open electronic environment, which is based on competence and student-centered learning approaches to ensure that requests the modern information society on the preparation of competitive specialists.

## 1. DESIGNING INFORMATION AND EDUCATIONAL ENVIRONMENT OF THE UNIVERSITY

Studying the experience we have built the world's universities is an open environment Borys Grinchenko Kyiv University education priority of which is based on competence and personality-oriented approach. The model of the student oriented educational process is displayed in Figure 1.



**Figure 1.** Model of the educational process

*Source: Own work*

The model of the educational process indicates that the environment is mandatory components to be e-content and e-technology interaction and e-collaboration.

Technologies of e-communication and e-collaboration differ among students, faculty, students and teachers, leaders and students, managers and teachers.

By e-content attribute of e-resources of the University, this can be both open and restricted access.

E-resources include public access:

<b>Name</b>	<b>URL</b>
University webpage	<a href="http://kubg.edu.ua/">http://kubg.edu.ua/</a>
University in Facebook	<a href="https://www.facebook.com/grinchenkouniversity">https://www.facebook.com/grinchenkouniversity</a>
University in VK	<a href="http://vk.com/public24774525">http://vk.com/public24774525</a>
University in Twitter	<a href="https://twitter.com/nash_kubg">https://twitter.com/nash_kubg</a>
University in Instagram	<a href="http://instagram.com/grinchenkouniversity">http://instagram.com/grinchenkouniversity</a>
Library	<a href="http://library.kubg.edu.ua/">http://library.kubg.edu.ua/</a>
E-catalog Web IRBIS	<a href="http://ek.kubg.edu.ua/">http://ek.kubg.edu.ua/</a>
The e-learning platform with e-learning courses	<a href="http://e-learning.kubg.edu.ua/">http://e-learning.kubg.edu.ua/</a>
Institutional Repository	<a href="http://elibrary.kubg.edu.ua/">http://elibrary.kubg.edu.ua/</a>
WIKI	<a href="http://wiki.kubg.edu.ua/">http://wiki.kubg.edu.ua/</a>
E-publishing	<a href="http://kubg.edu.ua/2012-08-15-10-06-19/180-resursy/2402-elektronni-vydannia.html">http://kubg.edu.ua/2012-08-15-10-06-19/180-resursy/2402-elektronni-vydannia.html</a>
Scientific masterworks	<a href="http://masters.kubg.edu.ua/">http://masters.kubg.edu.ua/</a>
Improving ICT competence of BGKU teachers	<a href="http://cikt.kubg.edu.ua/">http://cikt.kubg.edu.ua/</a>
E-portfolio	<a href="http://e-portfolio.kubg.edu.ua/">http://e-portfolio.kubg.edu.ua/</a>
Single sign on to all e-resources	<a href="https://login.kubg.edu.ua">https://login.kubg.edu.ua</a>

E-resources with limited access:

With limited access (available on the University intranet)	
E-library	<a href="http://elib.kubg.edu.ua/">http://elib.kubg.edu.ua/</a>
E-testing	<a href="http://testing.kubg.edu.ua/">http://testing.kubg.edu.ua/</a>
Base qualifying works with an automated check on plagiarism	<a href="http://resbase.kubg.edu.ua/">http://resbase.kubg.edu.ua/</a>



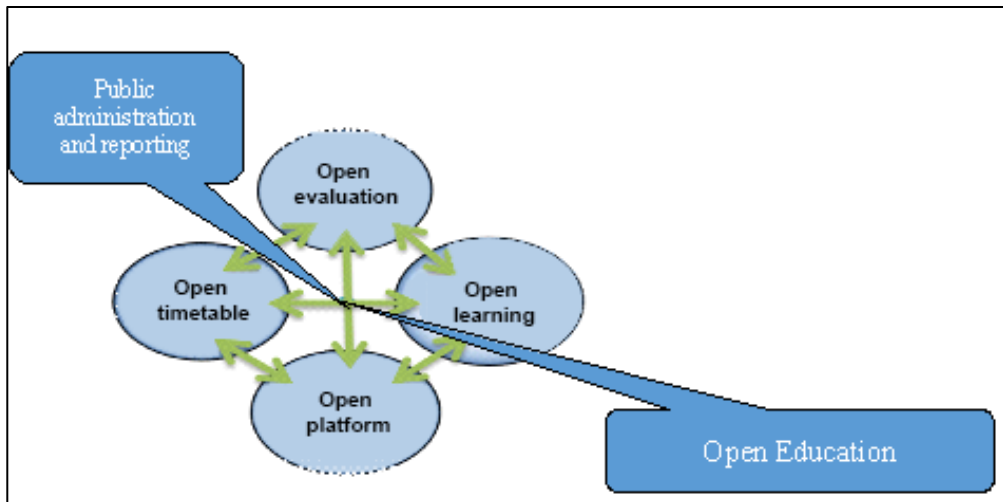
Details of the e-content of e-environment in the Borys Grinchenko Kyiv University can be found on the official portal <http://kubg.edu.ua/>, selecting main page menu «E-environment» (Figure 2).



**Figure 2.** E-resources of BGKU

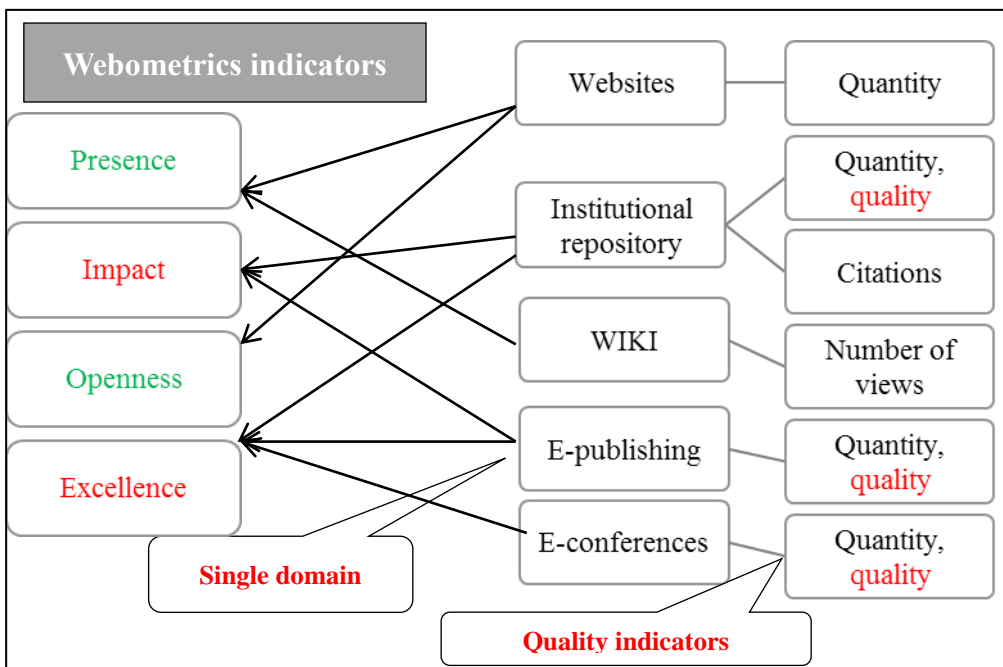
*Source: Own work*

For the development of environment quality it is not only university e-resources. Each component of e-resources must be focused on building individual learning paths each student's personal trajectory of each faculty and staff, constantly updated quality content that meets European standards. A key requirement for e-resources is their openness to the global community (Figure 3).



**Figure 3.** Open e-environment of the University

*Source: Own work*



**Figure 4.** The impact of public resources on the quality of educational activities (Webometrics indicators)

*Source: Own work*

With open e-resources administration, employers and applicants can analyze the quality of university education and compare it with other universities of the country and the world through the world ranking. For Ukrainian universities, today, the most effective tool for comparative evaluation of quality of educational activities in accordance with generally accepted international criteria is the Webometrics ranking. The impact of public resources is the quality of university education by indicators displayed on the Webometrics ranking in Figure 4.

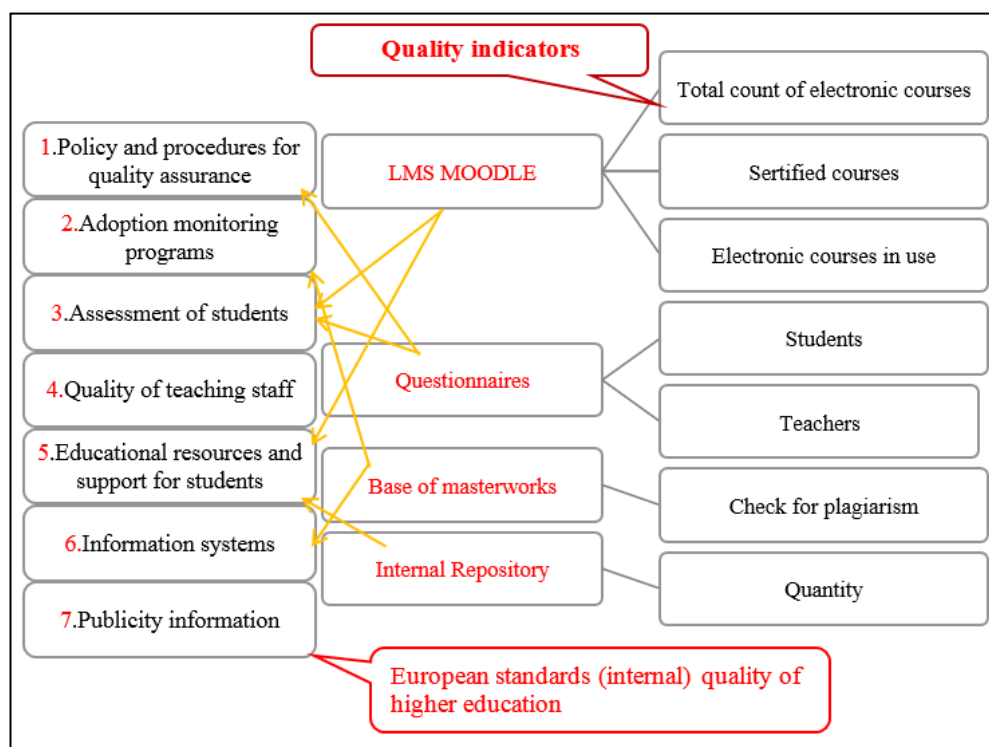
Assessment of quality e-resources with limited access is based on indicators of internal quality assurance of educational activities of the university. The impact of e-resources, limited access to quality educational activity indicators of BGKU is displayed in Figure 5.

To ensure the development of quality e-environment, we followed the recommendations of the UNESCO European standards of quality higher education framework of ICT competences 2.0, the Law on Higher Education of Ukraine, studied the effects of macro trends. As a result, we have created information-educational environment in the Borys Grinchenko Kyiv University (Figure 6).

The necessary conditions of quality e-environment University has developed and approved corporate standards, as well as development indicators and indicators of internal standards to ensure quality educational activity.

Among the corporate university standards we highlight:

- Standards for Quality Management System
- Standards for IT and information environment
- Standards of training documentation in an electronic form – Electronic Document Management
- Standards to provide additional education on the basis of DL
- Standards on scientific and methodological materials and tests
- Standards for the training
- Standards for organization of scientific activity
- ICT competence standards of teacher and student
- Standards for e-content and e-learning environment
- Standards for educational technology



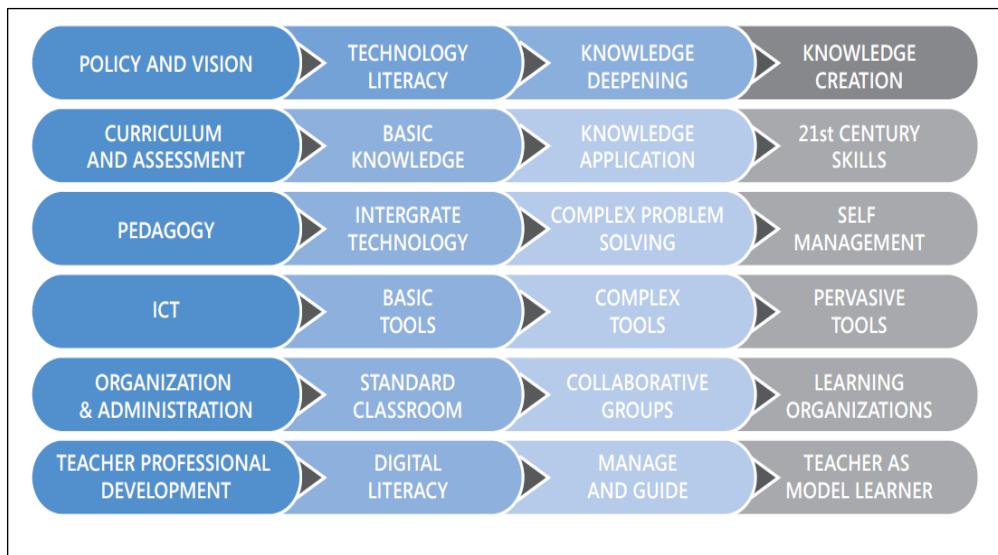
**Figure 5.** The impact of limited e-resources access to quality educational activities (internal European standards).

*Source: Own work*

In the Borys Grinchenko Kyiv University developed and approved corporate standards for ICT competencies of all participants in the educational process. The main objectives in this are: the establishment of appropriate models of ICT competencies (students and teachers) determine the levels of development and their respective monitoring instruments forming.

In the scientific literature, ICT competence allocated a separate component. Its interpretation is quite varied (Formation and development of ICT competence of teachers, 2012). We are inclined to the definition given in the State Standard of full secondary education, information and communication competence - the ability of the student (student teacher) to use information and communication technologies and appropriate means to fulfill personal and socially important problems. ICT competence may be divided into key and share competences.





**Figure 7.** UNESCO: ICT competence Standard

*Source: 2013,*

*<http://iite.unesco.org/pics/publications/en/files/3214726.pdf>*

UNESCO recommendations emphasize that for the modern professional is not enough to be technologically literate and be able to shape technological skills. Modern teachers should be able to help students use ICT to successfully cooperate to solve arising problems, develop 21st century skills.

When building a model of ICT competencies of scientific and pedagogical staff member identified three main approaches to teacher activities.

The first approach - «Technological literacy» - the ability to require the teacher to help students use ICT to improve teaching and research.

The second - «Enhancing Knowledge» - requires the ability of teachers to help students learn the content in deep subjects, applying the acquired knowledge to solve complex problems that occur in the world.

Third - «Creating Knowledge» - requires the ability of teachers to help students produce new knowledge and skills that employers need today.

Let us consider the standard model of corporate ICT teacher competency Borys Grinchenko Kyiv University in terms of its main aspects: understanding the role of ICT and their applications in education, research activities, training. Each of specified levels of ICT expertise of the teacher inherent specific knowledge and skills (ICT Competency Framework for Teachers, 2011).

**Table 1.**

Model of corporate standard of ICT competence of teaching staff

<b>Activity</b>	<b>Technological literacy</b>	<b>Enhancing knowledge</b>	<b>Creating knowledge</b>
Understanding the role of ICT in education and their use	Familiarity with education policy	Understanding educational policy	Innovation in education
ICT	Basic tools	Advanced tools	New technologies
Educational work	Basic knowledge: fragmented ICT use in education	Application of knowledge: systematic use of ICT in education	Skills knowledge of society
Scientific activities	Basic knowledge of scientific communication	The use of scientific knowledge (incl. virtual) electronic communications and scientific cooperation	Skills implementing research projects
Advanced training	ICT literacy: formal training in ICT	Management and direction: informal ICT learning	The teacher as an exemplary student: study on public courses (eg, MOOC)

*Source: Own work*

For the measurement of formation of knowledge and skills of each of the levels required specialized tools. Such monitoring tools forming ICT teacher's competence is presented in Table 2.

**Table 2.**

Monitoring Tools of formation ICT teacher's competency

<b>Activity</b>	<b>Technological literacy</b>	<b>Enhancing knowledge</b>	<b>Creating knowledge</b>
Measurement tools: <i>Understanding the role of ICT in</i>	1. Online survey to determine the level of awareness of teachers about the availability of documents on	1. Survey of students for use in the profession of innovative educational policy. 2. The survey of teachers in understanding ways to	1. E-portfolio: availability of information on participation in the group to create new educational development, a

<i>education and their use</i>	<p>education policy at the University or the State and their role in the activities of the university.</p> <p>2. Participation in seminars (full-time or remote) on educational policy of the University.</p>	<p>use innovation in the profession of education policy.</p> <p>3. Survey of students to determine the role of ICT in education and identify requests students to enrich the e-university environment.</p> <p>4. Teacher's e-portfolio: availability of data on participation in some group of educational initiatives.</p>	<p>strategy for ICT and their use.</p>
<p>Measurement tools:</p> <p><i>ICT</i></p>	<p>1. Tests for independent verification of levels of basic tools (created by the University, IT-Academy).</p> <p>2. Some components of e-learning courses (electronic educational course)</p>	<p>1. Certified electronic educational course, which is a necessary condition for the use of complex ICT tools.</p> <p>2. Teaching materials are based on the use of e-tools</p>	<p>1. Usage of Wiki portal.</p> <p>2. Own blog of the teacher.</p> <p>3. Usage of social networks for education.</p> <p>4. Teacher's e-portfolio.</p>
<p>Measurement tools:</p> <p><i>Education al Activities</i></p>	<p>1. Survey of students about the quality of fragmented use of ICT.</p> <p>2. E-testing students' educational achievements.</p> <p>3. Availability of electronic course in LMS Moodle.</p> <p>4. Questioning</p>	<p>1. Statistics of usage by students of electronic course, placed on LMS Moodle.</p> <p>2. Links in electronic course on Institutional repository resources.</p> <p>3. Links on open e-resources.</p> <p>4. Links on open learning courses (MOOC).</p> <p>5. E-science publications.</p> <p>6. Survey of students on</p>	<p>1. Creation an open electronic courses (MOOC) and statistics of their members.</p> <p>2. Organization of email communication and collaboration (including educational projects) in soc. networks and on the basis of virtual</p>

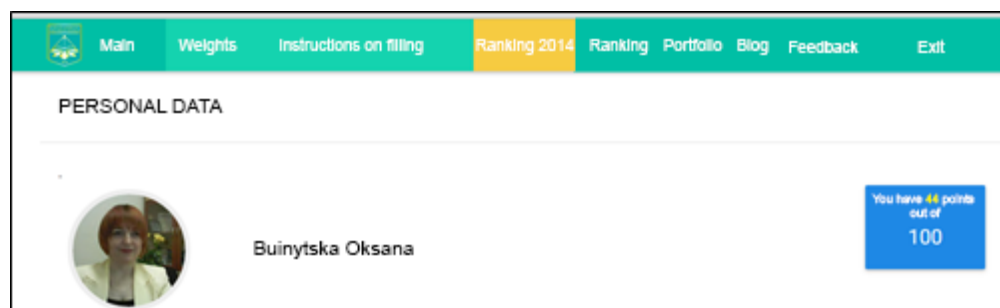


	teachers in understanding the effectiveness the use of ICT in practice.	<p>teacher satisfaction with the proposed e-resources.</p> <p>7. Evaluation of training programs: a list of recommended resources.</p> <p>8. Availability of certified electronic courses on each disciplines that teacher teaches.</p> <p>9. Assessment of systematic use of electronic course resources: reports on e-dean and electronic gradebook of specific electronic course.</p> <p>10. Availability on the Wiki portal annotations to certified electronic course.</p> <p>11. Assessment of systematic use of resources in the university environment</p>	<p>communication (skype, video conferences, webinars, etc.).</p> <p>3. Joint projects on the Wiki portal.</p> <p>4. Teacher's e-portfolio.</p> <p>5. The use of ICT for administration of the educational process</p>
<p>Measurement tools:</p> <p><i>Scientific activities</i></p>	<p>1. Survey for teachers awareness on the use of scientific communication: repositories, scientometric databases, e-libraries, e-journals, as well as opportunities and participate in online conferences.</p> <p>2. Number of publication in</p>	<p>1. Number of international publications.</p> <p>2. Number of appearances at international conferences</p>	<p>1. Participation in Intercollegiate and international research projects.</p> <p>2. Teacher's e-portfolio.</p> <p>3. Number of joint international publications with scientists from other universities.</p> <p>4. Citations index in international scientometric databases.</p>

	Institutional repository.		5. Organization and conduct online conferences, seminars.
	3. Citations index in Google Scholar.		
Measurement tools: <i>Advanced teachers training</i>	The certificate of training for ICT	1. E-portfolio. 2. Participation in distance training courses in Ukraine. 3. List of graduated non-formal learning.	1. E-portfolio. 2. The list of graduated open professional online learning courses (MOOC). 3. Training for colleagues on the use of ICT. 4. Online consultations, conducting webinars out of the experience.

*Source: Own work*

A key tool for monitoring formation of ICT in teacher competence serves BGKU have developed a system "e-portfolio", which displays all indicators of teacher (<http://e-portfolio.kubg.edu.ua/>). The system allows you to create rating tables and receive a variety of statistical reports as a separate teacher and department (Figure 8).



**Figure 8:** Profile page of teacher's Portfolio

*Source: Own work*

The profile of the teacher displayed besides personal data, information on major activities: research and development, professional development, teaching activities, scientific school.

E-portfolio provides automatic formation of an open portfolio lecturer at the University wiki portal (Figure 9).

**1 PERSONAL DATA**

- 1.1 Position, academic status, academic degree
- 1.2 Education
- 1.3 Job
- 1.4 Thesis
- 1.5 Contacts

**2 RESEARCH ACTIVITIES**

- 2.1 Articles in professional and international publications
- 2.2 Theses and Dissertations
- 2.3 Monographs
- 2.4 Training and educational methodical manuals
- 2.5 Educational programs
- 2.6 Other materials
- 2.7 Profiles in scientometric databases

**3 PROFESSIONAL DEVELOPMENT**

- 3.1 Participation in international and national projects
- 3.2 Presentations at international conferences and forums
- 3.3 Professional certification
- 3.4 Participation in competitions
- 3.5 Certificate of registration of copyright in works


**4 TEACHING**

- 4.1 Disciplines
  - 4.1.1 Electronic courses

## PERSONAL DATA

---

**Position, academic status, academic degree**


Head of IT in Education Laboratory, Associate Professor, PhD 


**Education**

Zatonskyi Kamenets State Pedagogical Institute, 0104 Specialty physics, physics teacher qualifications, Computer Science

**Job**

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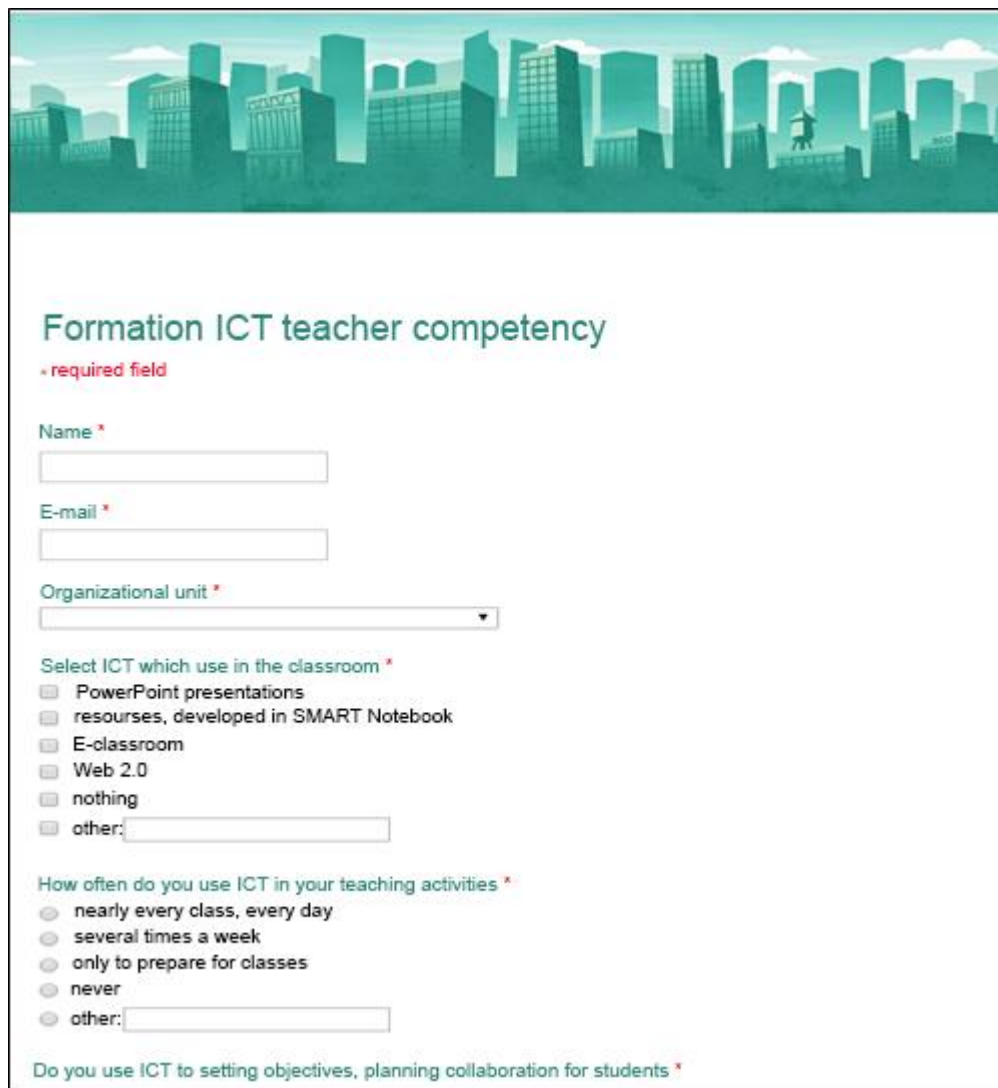
- **Borys Grinchenko Kyiv University** 
- Head of IT in Education Laboratory (since october, 2012)



**Figure 9.** Automatically generated profile of employee at the University wiki portal

*Source: Own work*

To determine the level of formation ICT teacher competency was developed Google form «Formation ICT teacher competency» (Figure 10).



The form is titled "Formation ICT teacher competency" and features a header image of a city skyline. It includes several required fields marked with an asterisk (\*):

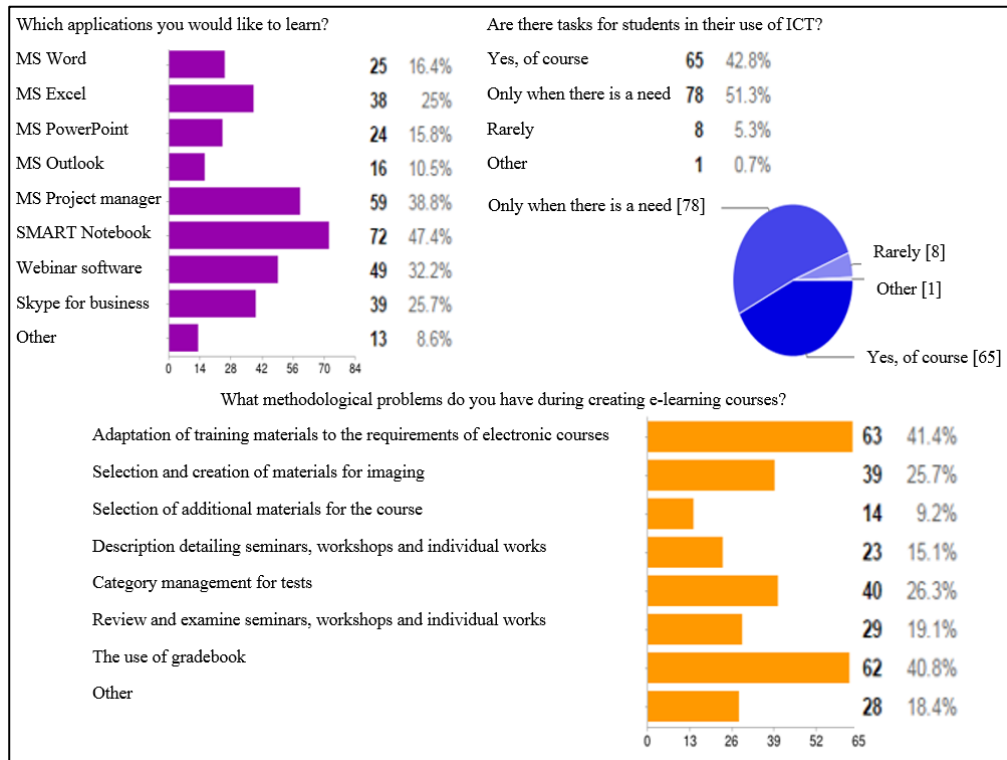
- Name \***: A text input field.
- E-mail \***: A text input field.
- Organizational unit \***: A dropdown menu.
- Select ICT which use in the classroom \***: A list of checkboxes with corresponding options:
  - ☐ PowerPoint presentations
  - ☐ resources, developed in SMART Notebook
  - ☐ E-classroom
  - ☐ Web 2.0
  - ☐ nothing
  - ☐ other:
- How often do you use ICT in your teaching activities \***: A list of radio buttons with corresponding options:
  - ☐ nearly every class, every day
  - ☐ several times a week
  - ☐ only to prepare for classes
  - ☐ never
  - ☐ other:
- Do you use ICT to setting objectives, planning collaboration for students \***: A text input field.

**Figure 10.** Questionnaire for teacher formation of ICT competence

*Source: Own work*

The results of the survey among university teachers (152 respondents), 64% reported using ICT in almost every class. Conducted survey made it possible to learn more about the problems that arise in teachers while working with established e-resources, their feasibility and use, allowing us to meet the needs of teachers to organize and

conduct relevant trainings, seminars, bar Camp under the "Advanced training scientific and pedagogical staff on ICT" (Figure 11).



**Figure 11.** Results of the survey of teacher formation ICT competence

*Source: Own work*

For the preparation of modern specialist that would meet the requirements of the labor market, and allow university graduate to find employment and be successful in the modern information society for students Borys Grinchenko Kyiv University developed and approved a corporate standard ICT competence degree, which laid the basis for standards UNESCO (Structure of ICT competency of teachers. Recommendations of UNESCO 2011).

With the formation of student ICT competencies conditionally distinguish three main levels:

- base (1st level, corresponding 1st bachelor year);
- advanced (2nd level, corresponding 4th bachelor year, or early education in magistracy);
- professional (3rd level, 2nd master year).

Formation of basic and advanced levels assigned to the department of computer science and information technology department and mathematical disciplines. With the formation of the professional level of ICT competence the responsibility of graduating university departments.

Each of certain specified levels of inherent knowledge, understanding, skills, judgment. In describing the knowledge and skills to baseline in detail, we will not stop, because it is clear that it should be basic knowledge and skills. On this basis, the knowledge and skills that are unique to students at the advanced level. Based on the advanced level, respectively, generated knowledge and skills inherent to students for professional level (Morze, Buinytska 2014).

Thus, for the professional level of the basic requirements are: ownership principles of operation of the computer and computer equipment; ability to organize access to the information resources of a global network; ability to independently study proprietary software educational and professional guidance; knowledge and understanding and the use of cloud technologies; ability to establish, build and test applications on PCs; possession of professional software packages; knowledge of the organization and conduct of TV and video conferencing, webinars.

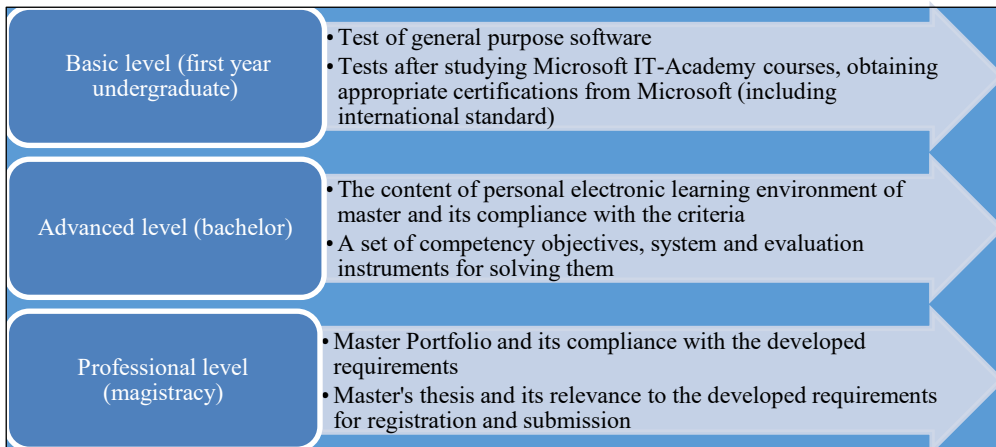
Training activities characterized involving professional level in international distance learning courses; the ability to use the Internet to find professional courses in education to implement informal training; Advice on the use of ICT in professional activities; possession methodology creating websites, blogs professional direction.

To implement the scientific activities of the same level we distinguish the ability to use methods and technologies of training and research; the ability of the materials chosen research topic and save the results obtained in the network; the ability to create a scientific publication and place it in an electronic journal; ability to present research results in the Masters is a university environment; ability to present own portfolio.

Social and humanitarian activities for the professional level of inherent ability to conduct seminars on integrating ICT in professional activities; developing and conducting training courses on basic computer skills and ICT.

Each level of ICT competence formation of the student has its own monitoring tools. It may be, TEST software, sets competency tasks, master work, complying with the requirements, developed a personal portfolio and the student's educational environment, etc.

Division of monitoring tools of formation of the ICT competencies presented on Figure 12.



**Figure 12.** Monitoring Tools of formation of the student's ICT competence

*Source: Own work based on Author, MORZE Nataliia, BUINYTSKA Oksana, 2014*

In order to test the developed tools were tested the basic level of ICT competencies of students in the Borys Grinchenko Kyiv University.

The computer questionnaire was responded by 885 1 year students (out of 1360 students enrolled at the University), representing 65% and 253 5th year students (out of 475 people), which accounts for 53%.

When checking the baseline formation of ICT competencies tested: knowledge and ability to use personal computers and computer networks; knowledge, understanding and ability to use computer programs (different OS (operating system), work with files, start the program, use the help system OS and other programs to work with files, word processor, image editor, means for preparing presentations, tools for preparation of publications, spreadsheet, antivirus programs, archiving and other programs); knowledge and ability to use basic services for the Internet (e-mail, information retrieval systems, teleconferencing); knowledge and ability to use technology Web services and Web 2.0 - 3.0 for solving educational problems; the ability to use electronic information and educational environment of the University; use of teaching tools created through ICT.

The test, which consisted of 100 questions, was divided into four main sections:

- The study of ICT;
- ICT in training activities;
- ICT in research activities;
- ICT in social and humanitarian activities.

Students had to answer 50 questions that were selected randomly, automated (20 questions - studying ICT, 10 questions - ICT in the educational activity, 10 questions - ICT research activities, 10 questions - ICT in social and humanitarian activities).

The maximum number of points that the students could gain was 50, minimum - 0. Depending on the number of points, there was defined the formation level 1 (basic) of ICT competence, namely:

- high – 45-50 points;
- sufficient – 35-44 points;
- satisfactory – 25-34 points;
- low – 15-24 points;
- null – 0-14 points.

The same task as the students were asked to perform 1 year (bachelor) and 5<sup>th</sup> year students (masters, specialists) in order to create the initial formation of ideas about the basic level of ICT competencies of University students.

Average score for the monitored University Bachelor's Degree students of 1 year of training is 31,4. Average score test result for the 5<sup>th</sup> year students of the University is 33,6.

According to the monitoring results 54.4% 1 year students who participated in the testing, with a satisfactory level of development of ICT competence, 32.4% of students - sufficient, 10.6% - low, 1.8% of students - not formed ICT-competence, only 0.8% of students have a high level.

According to the monitoring results we see that 55.7% of 5<sup>th</sup> year students, who just received a bachelor's degree have sufficient ICT competencies formation and 33.2% of students - satisfactory. Only 8.3% of students have a low level and 1.8% of students not formed ICT competence. The high level have only 1% of 5<sup>th</sup> year students of the University.

In order to enhance formation of ICT competence Masters offered to students in January-February 2015 to receive training in the IT Academy at no cost (two courses with arbitrary applications and one office - the use of technology); seize all opportunities corporate e-mail and related services free of charge; open master course "Presenting research masters using ICT", which is available on the wiki portal University; master the use of e-learning university.

In order to provide students with quality educational services necessary to amend the job training programs prepare students of educational level "bachelor" discipline "Information technology education", in particular to update training material, provide study of courses of IT Academy (Microsoft) got the corresponding certificates; require the teaching faculty of informatics and of information technology and mathematical subjects undergo distance learning in the IT Academy



(Microsoft) got the corresponding certificates; teachers of the course "Introduction to" the study section V "I am in the information environment University" pay special attention to all students perform tasks for independent work, placed in an open course at the University wiki portal [www.wiki.kubg.edu.ua](http://www.wiki.kubg.edu.ua); teachers of the course "Modern information and communication technologies in education (social pedagogy, history, psychology, etc., depending on specialty)" to make changes to the course and provide compulsory study module "Presenting research masters using ICT" materials to which is available on the wiki portal University [www.wiki.kubg.edu.ua](http://www.wiki.kubg.edu.ua).

These recommendations are nothing like the necessary conditions for the formation of the ICT competencies for students who participated in the monitoring. In general, the necessary conditions for the formation of ICT competencies include: the use of certified teacher's courses and social networks and Web 2.0 services; electronic course monitor the quality and effectiveness of their use; creation of personal electronic learning environment of the student; creation of e-Portfolios of student and its analysis; requirements for professional competence of masters, which includes ICT competence. This in turn is qualitatively created a public information and educational environment of the university.

## CONCLUSION

One way to create an electronic information and educational environment of the University is to develop corporate standards, create a personal learning environment for students and teachers. An important condition for the effective functioning of electronic information and educational environment is to transform it into a public system by the interaction with the labor market, providing students with more control over the educational process by participating in its planning and evaluation of quality, implementation of self-control and self-esteem. Privacy is a public environment in this case will be a means of strengthening the subjective position of students in teaching, increase the level of formation ICT competence as a teacher and student. The presence of public information and educational environment of the university is a necessary condition of formation the ICT competencies of students, which improves the efficiency and quality of the learning process.

## Acknowledgments

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# COMMUNICATION TOOLS ON E-LEARNING PORTALS

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***Abstract:** The value of classes held through distance learning portals is not only determined by the quality of the learning resources that are produced, but also by the efficiency of the specific forms of communication, user interactions, and the diversity of students' and teachers' activities. Without carefully planned and properly used forms of communication, difficulties may emerge in the distance learning process. Participants of e-learning courses, particularly teachers, should become acquainted with the tools available in the given learning portal so as to be able to implement them successfully in the exchange of information, integration and motivation of the learners' community.*

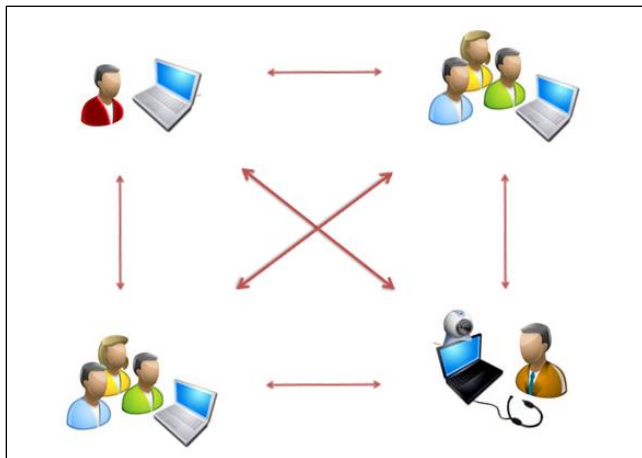
*The purpose of this article is to characterize certain selected, most commonly used synchronous and asynchronous communication tools available on e-learning portals and to identify the methods of employing them in a distance learning course. The authors, who have practical experience in distance learning in an academic context, aimed at directing the readers' attention to the frequently underestimated aspect of selecting the communication tools and methods for e-learning courses.*

**Keywords:** communication tools, e-learning portal, videoconference, chat, forum, Wiki, e-mail, calendar, academic education, distance education

## 1. COMMUNICATION IN COURSES

Communication in e-learning courses has slightly different characteristics than communication during conventional classes. It is usually more personalized. The teacher has fewer opportunities to communicate with the whole group but at the

same time they can spend more time talking to individual class participants. In this mode of teaching, the teacher can allow the learning process to extend to social interactions among the students themselves (see Figure 1). This purpose can be served by discussions within a course, where communication tools available in the portal can be employed.



**Figure 1. Communication in online course**

*Source: own elaboration*

Discussion topics should be planned before the class starts. The number of topics per module (class subject) should not exceed a reasonable amount, as it should be borne in mind that discussions should be mandatory for online courses, unless they are held as consultations.

Discussion is among the essential methods to promote the pro-active attitude, and it is the primary method for distance learning. Its importance mainly relies on the fact that it offers an opportunity to build and develop skills in the following areas:

- critical thinking and analysis of information received,
- practical implementation of the theoretical background,
- stating problems and hypotheses,
- structuring knowledge, generalizing and synthesizing,
- justifying and assessing claims,
- arguing, active reading, verifying the views of others.

The purpose of a discussion should always be to reconcile conflicting opinions or to resolve a well-defined problem. Therefore, every discussion should be prepared in advance and then moderated by the teacher. The extent of moderation depends on:

- the anticipated goals of the discussion,

- the topical area of the discussion,
- the function of discussion within the course,
- the anticipated discussion dynamics and activity levels,
- the manners of the participants,
- the teacher's work style.

Duties of the teacher-moderator include:

1. initiating discussion — namely, presenting the problem to be resolved, encouraging students to take part in the discussion;
2. organization and participation in the discussion — according to the expected goal of the discussion and the teacher's work style:
  - responding to anything a student says,
  - responding to some interesting things that were said, i.e. taking an active part in the debate and identifying problems for the discussion during the process,
  - targeting the discussion through verifying that it is proceeding properly, or restricting those discussion threads which are outside the current area of interest (including criticism towards speakers who are entirely off-topic, and eliminating aggression among participants),
  - responding only to questions asked directly to the teacher,
  - summing up the discussion;
3. encouraging the sharing of opinions;
4. analysis and summing up the discussions at the end of the module - a short commentary, reporting on the progress of the discussion, justifying the right solution to the problem, identifying follow-up issues, etc., thanking the students for their participation.

However, discussion management in an e-learning course not only involves organization and control of the actual progress of the discussion, but also administration of the communication tool implemented on the portal. The latter activity is usually determined by the technology in place, and should not be a challenge for the teacher.

Therefore, the teacher should be required to be familiar with the communication tools available on the portal because this could affect the quality and advancement of his course. The following communication tools are available:

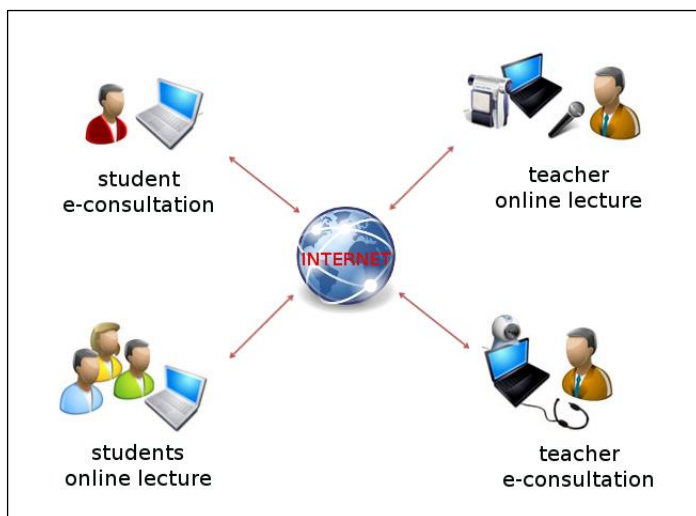
- asynchronous,
- synchronous.

In asynchronous communication forms, the recipient's responses are offset in time, while synchronous formats enable the discussion participants to communicate in real time. The most commonly used asynchronous communication tools include:

- e-mail,
- forum,
- Wiki,
- calendar.

The following should be mentioned as synchronous communication tools (see Figure 2) in this respect:

- chat,
- video conferencing.



**Figure 2. Synchronous communication in online course**

*Source: own elaboration*

The purpose of extensive forms of communication is to establish a group of learners and to enable group members to build their identity through the interaction with others. Therefore, communication is a motivating factor that gives the participants the feeling of actual participation and the need to maintain contact within the group, which ensures higher work efficiency.

## **2. SYNCHRONOUS COMMUNICATION TOOLS**

### **2.1 Chat**

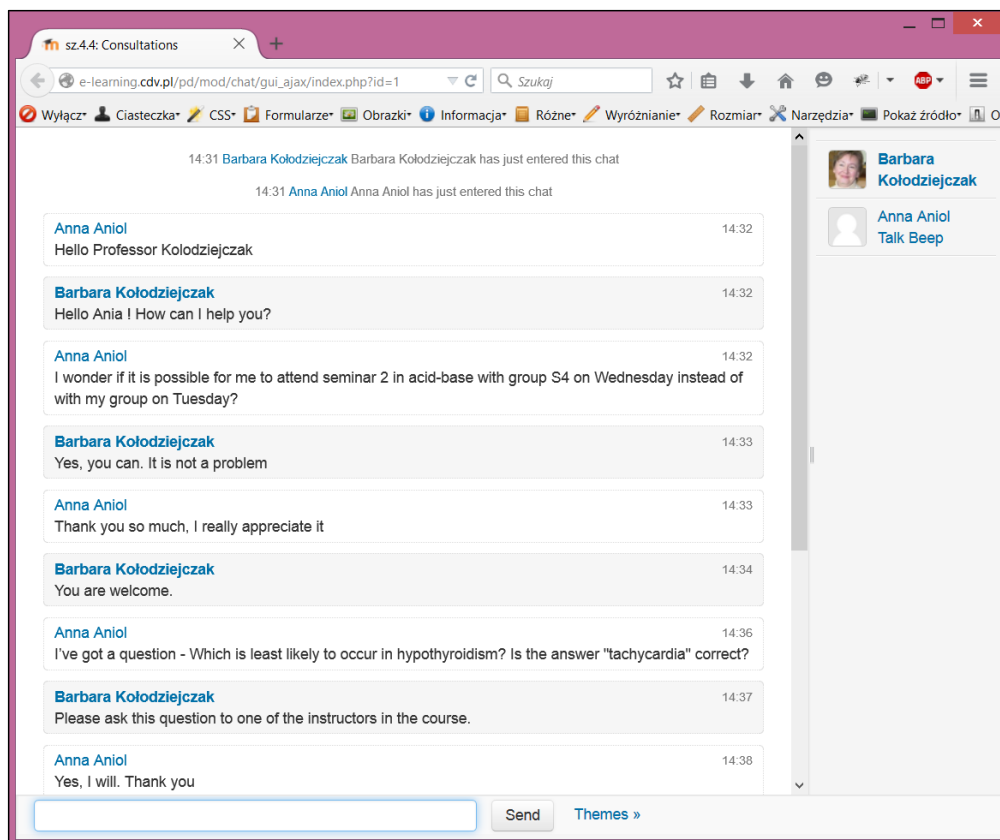
Online chat applications should be mentioned as synchronous communication tools. Chat function offers communication only with simultaneous presence of the teacher and the student on the learning portal. Typically, the date and time of such discussion is pre-arranged and communicated to a certain extent in advance. The function of the chat applications is the exchange of short text messages between the teacher and the student, typed in the message window, visible for other discussion participants immediately after sending. Generally, these are not designed for group communication.

The teacher, acting as the chat discussion moderator, should respond relatively quickly to specific messages and the direction of the conversation, which could be very difficult for larger groups of participants (e.g. 20) due to time limitations. With a continuous influx of questions, waiting time for a reply is extended, and after a certain time the teacher will lose control over the discussion. Therefore, online chat applications are not the right tools for efficient and to-the-point discussions within the framework of group communication. They will only work for communication with a single student, or for brainstorming sessions. Chat function remains useful for groups consisting of a few members only (3 is the preferred number).

Moodle offers chat communication options to users (see Figure 3). In addition, chat can be combined with a virtual board, which is a group work tool. In that case, it works as a kind of online conference, featuring an exchange of text messages and cooperation in creating graphic information. As an option, conversations can be recorded and stored.

On the OLAT (Online Learning And Training) portal, chat is available when Instant Messaging is installed. It allows users to engage in individual communication as well as group discussions in chatrooms. A chatroom can be assigned to the course or a user group. Another very convenient function of the messaging tool is its automatic synchronization with a project group, which is the group appointed to achieve certain course tasks.





**Figure 3. E-consultations in the pathophysiology course**

*Source: own elaboration*

## 2.2 Video conferencing

Video conferencing systems (video or audio conferencing) are further synchronous communication tools. With this type of tool, a video conference can be held at a specified time for a specific group of users. Students participating in a distance learning group can then listen to their teacher live.

High bitrates are required for video conferencing sessions because moving images contain enormous volumes of information. One second of video image contains the capacity of information equivalent to 5 thousand pages of text. This is a huge volume of information for transmission, even via a digital line, and therefore audio and video data must be compressed before transmission and decompressed after reception.

Video conferencing can be very efficient in the communication and learning process accordingly as (Czekan 2005):

- it is an interactive communication medium;

- it offers real time visual contact between the teacher and students;
- it offers visual communication and interaction to strengthen the communication and help course participants to communicate with each other;
- it offers eye contact and helps to build relationships among course participants, which may be more effective than via e-mail, phone or messaging applications;
- it enables text and video communication transmission to multiple destinations at the same time;
- it facilitates communication with experts located in various areas of the world;
- it enables participants to see various interesting places worldwide in real time.

Video conferences may work in the following communication modes:

- point-to-point – in this communication mode, a course participant will connect to another participant, e.g. a teacher engaging in video conference with one student, then switching to another student. They can all see each other on the screen.
- point-to-multipoint – there are certain video conferencing systems enabling simultaneous bilateral communication of one to many, e.g. one teacher can connect to multiple students at the same time. These video conferences are more efficient, although planning them for a large number of students can be very difficult in organizational, technical or logistic terms. In this video conferencing system, the teacher takes up the managing role, using an MCU (Multipoint Control Unit) to control multipoint communication. These services require at least one MCU, IT personnel to set up the conference links and controls, and high-speed Internet connectivity.

Learning portals are seldom fitted with video conferencing tools. Distance learning participants tend to use third party tools generally available to the public. Skype is one of the most common choices.

Up until recently, not more than ten persons could attend Skype video conferences. Before, the free version of Skype offered video calls on two separate devices only, and any user of Skype who was interested in setting up group video conferences had to buy a subscription for Skype Premium.

Other tools that offer video conferencing organization include:

- Google Hangouts,
- WiZiQ,

- Flashmeeting,
- OpenMeetings,
- BigBlueButton.

There are video conferencing systems that link up to 48 locations together (LifeSize system) over IP (typically over the Internet or Intranet) or via ISDN 128 Kbps. These can be used for audio and video transmission to SD, HD or Full HD standard (1920x1280 resolution). Examples of video conferencing systems include: LifeSize, Cisco, and Microsoft Lync. More information about video conferencing services, video and audio coding standards, multipoint conferencing modes, is available for example at <http://zstux.ita.pwr.wroc.pl/projekty/ezenia/itut.html>.

### **3. ASYNCHRONOUS COMMUNICATION TOOLS**

#### **3.1 E-mail**

Within a learning portal, group members will communicate mainly through asynchronous options. This type of communication proceeds more slowly than the synchronous one, however if it is properly organized, it is the most convenient tool of communication among group participants.

Conventional e-mail plays an important role in asynchronous communication. The integrated e-mail option on an e-learning portal is used for quickly sharing information and communication between users. An e-mail message can only be sent within a specific course. Thus, you cannot send a message to any user(s) of the given learning portal, but only to a user participating in the same course (Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2013: 340). Functions of the integrated e-mail on the portal are similar to e-mail functions on any other website.

An alternative for the integrated e-mail is to set up a mailing list in an external e-mail application such as Outlook, or to use a networking site that offers a single inbox that shows messages to all group members, such as Facebook, Twitter, or Academio.

The following types of transmissions can be distinguished:

- notifications, i.e. e-mail messages with complete information about the given course, including so-called welcome messages;
- messages encouraging discussion, e.g. a request for an opinion about an issue presented on the forum concerning the given part of module material;
- reminders of upcoming deadlines - these should appear when a deadline is approaching for submission of assignments/tests and only a few papers have been submitted, or when the volume of discussion on the forum is not satisfactory despite the passage of time;

- organizational messages - communications of course changes, e.g. notice of the next set of material being available, or reminder to complete an evaluation survey.

Well planned message structure plays a very important part in group communication via e-mail. Preparation of the right format for outgoing messages strongly facilitates the work of:

- the sender who repeatedly sends similar messages;
- and the recipient who is able to quickly identify and assign a given message to the given assignment or course out of a large volume of incoming messages.

For this goal to be achieved, the message subject must be stated properly, specifying course or assignment numbers concerned. It is recommended to prepare template messages.

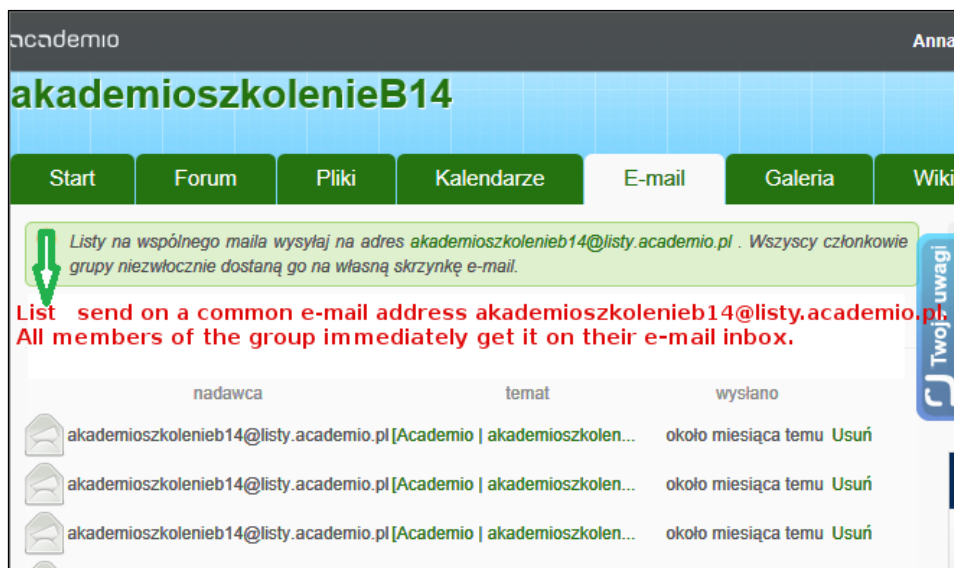
Summing up, we should emphasize the advantages of e-mail messages as the:

- ability to communicate at a convenient time;
- ability to correct your messages before sending;
- ability to archive and review prior correspondence.

The disadvantages of asynchronous communication should be brought to attention as well; a specific issue in this case can be the prolonged time to respond to an ongoing problem or uncertainty. Therefore, it is recommended to add a relevant notice to course regulations, such as: *Teachers will reply to students' e-mails every Monday and Thursday*, to let the users know when they can expect a reply.

The OLAT portal has a course component called *E-mail*. This is an e-mail function with an internal address book, which is very convenient for handling course communication. Unlike OLAT, Moodle does not have an integrated e-mail system or address book. External e-mail data of all registered course users is available in each user's profile.

If the learning portal does not offer e-mail access, specialized websites such as [Academio.pl](http://Academio.pl) (see Figure 4) or [MailGrupowy.pl](http://MailGrupowy.pl) can be used as an alternative.



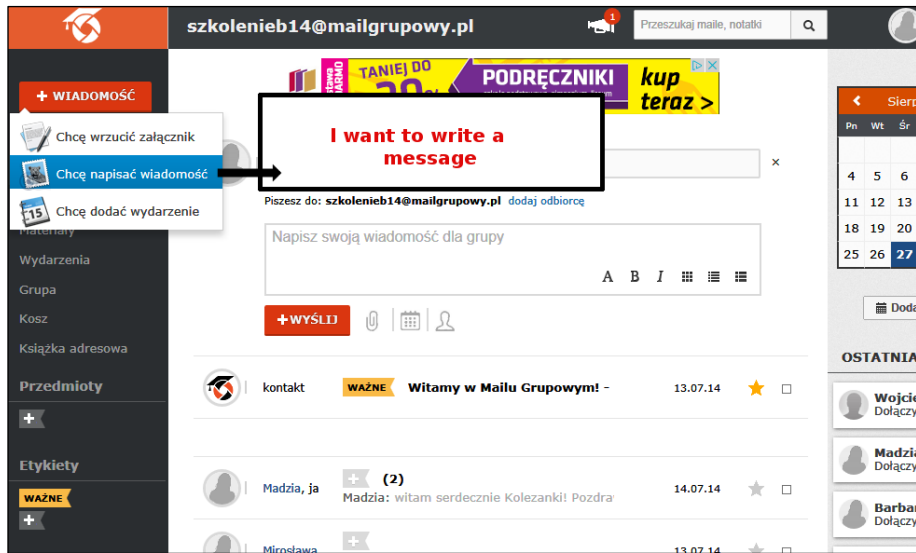
**Figure 4. Akademio.pl – a Polish website with e-mail services**

*Source: own elaboration*

Akademio.pl is a nationwide website enabling student groups (up to 260 persons) to communicate freely and efficiently. The following communication tools are offered:

- calendar,
- group mail,
- discussion board,
- forum.

MailGrupowy.pl is a free platform to support communication and coordination of various types of learning groups. The site facilitates gathering and sharing of materials together and solving problems. Every user has a separate account, however the e-mail address is shared by the whole group. The inbox comprises of a forum, e-mail and discussion group combined. Signed messages are accessible directly from the portal and do not "disappear" if deleted accidentally by any group member (see Figure 5). Teachers can send e-mail messages to the group's shared address and all members will be able to read the messages on the portal.



**Figure 5. MailGrupowy.pl – a free Polish platform for communication and coordination that supports all kinds of learning groups**

*Source: own elaboration*

### 3.2 Forum

Every e-learning course should have at least one discussion forum. Apart from e-mail, this tool is one of the most important asynchronous course communication tools. What aspects should be taken into account when choosing to use a discussion forum in a distance learning course?

- Discussion on a forum is asynchronous and therefore its duration is unlimited. It does not require the participants to be online at the same time. This is because forum posts are archived immediately and they are available to all course users as long as the course lasts, or as specified by the course administrator.
- A forum is a public discussion tool only. It is not possible to hide threads or posts from other course participants. Therefore, a forum should not be used for private conversations. The latter can be supported for example by e-mail.
- As users are given plenty of time to think about what they have to say and to carefully reply to the views expressed by other discussion participants, a forum is a perfect tool for engaging in academic discussions.

#### Functions of a forum

A discussion forum within a course can serve various purposes. We will review several selected applications (Centre for Distance Education of the

Jagiellonian University, <http://www.czn.uj.edu.pl/moodle/mod/book/view.php?id=26030&chapterid=21882&lang=en>):

- *Consultation forum* – when the course only supports the traditional course, a forum may work as virtual consultation;
- *Organizational forum* – each course on a distance learning portal where only organizational matters are discussed, outside the subject matter of the course;
- *Topical forum* – this is a platform for sharing opinions and views on a specific subject. Such a forum can, but does not have to, be moderated by the teacher. Discussions can be evaluated, in which case students must be informed in advance. It is also reasonable to set a time limit for posting a reply.

A topical forum can be managed in one of the two ways: first, you can invite students to spontaneously share their observations, inquiries, suggestions and comments on the issues discussed within the module, or you can schedule one or two discussion sessions to cover the key issues for the topic. In the latter case, discussion on the forum should be moderated by the teacher, i.e. initiated, moved onto the right track, structured and summarized.

- *Group forum* – this is a forum for group discussion about the issues stated by the teacher. Discussion on a forum may proceed according to different scenarios, such as:
  - all groups discussing the same issue without seeing each other, discussion is summarized on the general forum;
  - separate groups discuss different problems evaluated on an ongoing basis by the teacher;
  - groups discuss different topics but can view the discussions in other teams.

Group forum can also be used as a space for executing group assignments, e.g. projects.

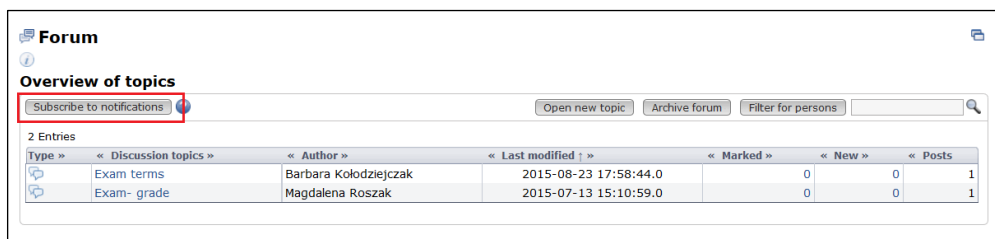
A forum is a standard communication tool offered by every e-learning portal. For example, Moodle offers as many as 5 different types of forums (Moodle 2.9 documentation, [https://docs.moodle.org/29/en/Using\\_Forum](https://docs.moodle.org/29/en/Using_Forum)):

- *Q&A forum* is the simplest available type of forum. It will work perfectly as a help forum, organizational forum or expert forum. Discussion participants ask questions and the person in charge answers these questions.
- *Standard forum for general use* is a forum without any special users - any user can open any number of discussion topics at any time and reply to any number of threads. This type of forum is the preferred solution for an academic discussion, consultation and online seminars.

- *Each person posts one discussion* type of forum applies a restriction of the number of threads created by each participant to one. However, each user can take part in any number of discussions initiated by others. This is a convenient solution if you want your students to independently start a discussion and continue moderating it according to their own concept.
- *A single simple discussion* is a forum with a single thread created by the course teacher. All course participants are invited to only discuss this topic. This type of forum can be a topical forum, expert forum, or presentation forum.
- *Standard forum displayed in a blog-like format* is an open forum where each course participant can open a new topic. All topics are displayed on a single page, with a link *Start a discussion*.

On OLAT, each group has one or more private forums. There are three types of groups:

- learning groups (related to the course),
- project groups (independent of the learning process),
- permission groups.



**Figure 6. Forum subscription in OLAT**

*Source: own elaboration*

Forum posts can be graded by the teacher, or by other course participants with specific permissions assigned, on the two above mentioned portals. You can subscribe to a forum (see Figure 6). If you subscribe for notifications of forum discussions, you will receive a copy of every new message from the given forum to the e-mail address you specify.

### **File window**

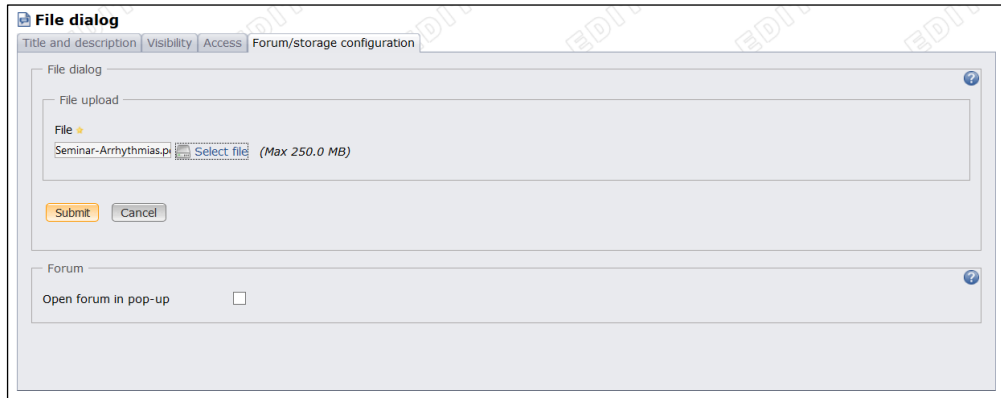
A discussion initiated by a file is a type of forum narrowed down to an issue/problem associated with a file uploaded by the teacher (see Figure 7). This tool strongly facilitates asynchronous discussion because:

- discussion focuses around threads in a single topic related to the contents of the file,



- it is easier to maintain discussion discipline than in case of a traditional forum,
- new topics can be opened by discussion participants after they upload their own files and thus, discussion can be expanded with more logically associated threads.

This type of forum is offered by the OLAT portal.



**Figure 7. File dialog – configuration window in OLAT**

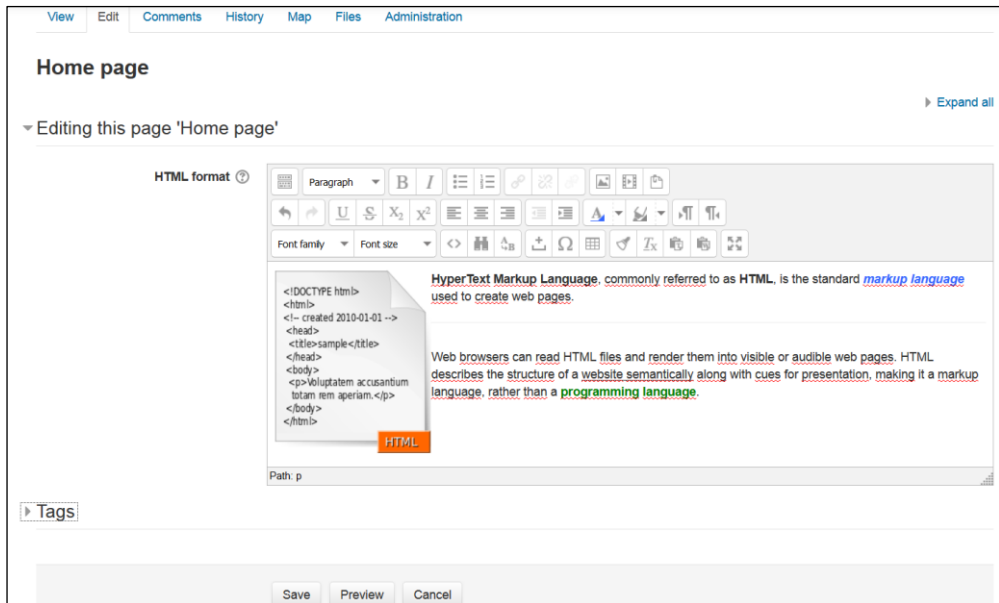
*Source: own elaboration*

### 3.3 Wiki

Wiki is a type of website that can be created on a browser level. The tool was created by Ward Cunningham in 1994 (Wikipedia, <http://en.wikipedia.org/wiki/Wiki>).

Wiki applications use simpler data formatting than HTML (MediaWiki, <https://www.mediawiki.org/wiki/Help:Formatting>), which renders them extremely popular in the work of various professional specialization groups. Text messages must be formatted with a unique set of tags. There are only a few tags, and simple help is usually available. This tool is a favourite among those unfamiliar with the basics of HTML tag language, although working with an HTML editor can be not intuitive enough without this competence. Participants of an e-learning course who understand the concept of hypertext organization of text messages will learn the editing process in a relatively short time. Wiki can be used for knowledge creation and sharing, as well as for communication among online course participants (Wrycza-Bekier 2012: 45-47).

Wiki pages are created in real time by online group members. Every group member is able to read articles published on Wiki, modify them or add new pages of his own (see Figure 8). Only a registered owner or author of Wiki can delete Wiki pages.



**Figure 8. Edition of Wiki webpage in Moodle**

*Source: own elaboration*

Wiki pages can be a typical asynchronous discussion platform within a group of users (Mokwa-Tarnowska 2014: 36). New threads in a discussion are added in the same way as on a forum. You can add an attachment to discussion contents, i.e. a presentation file, extra course materials, etc.

Threads are sorted by default according to the last modification time, and the most recent threads are at the end of the list. Portals also offer thread archiving options. Such archives can be used as documentation of group work on a common assignment or project.

Due to their structure, Wiki pages can be a perfect location for gathering complete contents and discussing any outstanding issues. Wiki as a type of forum can be used for usual asynchronous discussion among project group members as well as for consultation with the teacher or project supervisor. In addition, Wiki can be subscribed through an RSS feed. With such subscription, group members will receive Wiki updates, i.e. new articles and discussion threads (Palka 2012: 40).

Most e-learning portals offer the option of creating Wiki pages to their users. Moodle and OLAT support this service as well.

### 3.4 Calendar

Group calendar is among the basic tools of any e-learning portal. It combines asynchronous with synchronous communication methods. Using the calendar option,

group members can set deadlines online or check the availability of specified individuals.

A calendar may provide information not only about scheduled "group events" but also management of group work and to communicate progress. Information about every assignment or group activity may appear in the students' individual calendars. Such calendars show outstanding tasks in the relevant time according to the timetable, as well as give reminders about their completion.

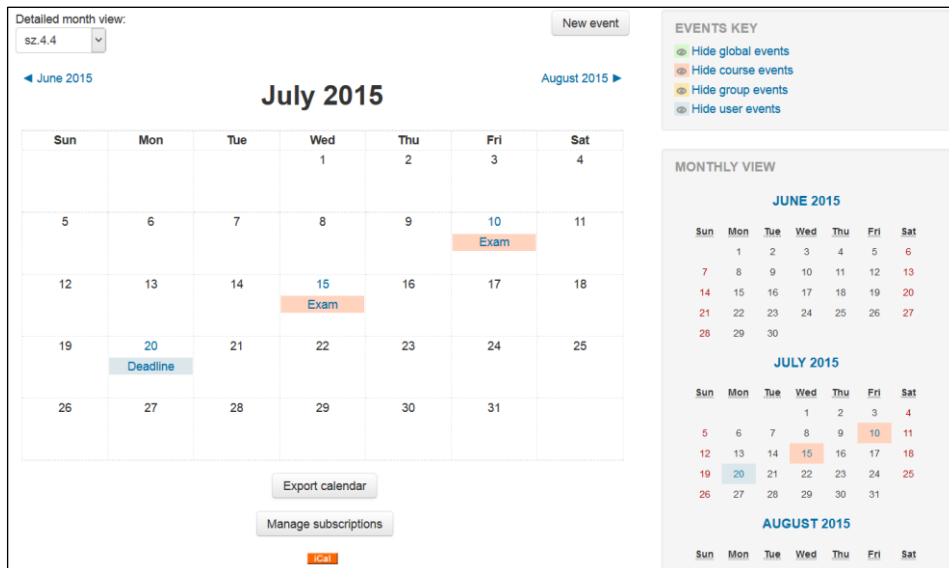
Calendar plays an important role in communication between the teacher and group members along the course schedule implementation (Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Bręborowicz 2014: 429). A properly structured schedule should account for off-class periods and the right proportions between the material covered and the time devoted to cover such material. In addition, a calendar offers ongoing control of specific course activities, such as:

- start and end of work on specific modules (assignments),
- commencement and closing of discussions on specific forums,
- handing in the assignments for grading,
- self tests,
- exams,
- other activities.

Calendars can be included on e-learning portals as an element of the course, integrated with the user's private calendar. In this way, the student will not get lost on a schedule even if they participate in more than one course at a time. A very useful functionality of the calendar is the linking of a deadline with the relevant course element concerned. For example, when the time limit expires for handing in assignment 1, the calendar will show the date together with the hyperlink to that element in the course structure. Not all learning portals offer such options.

E-learning portals usually offer a calendar function but it may be implemented in a different way. For example, OLAT offers three types of calendars: course calendar, group calendar, and individual student calendar. Any authorized user can make an entry in the calendar or tag it as private (displayed to him only) or public (displayed to all registered users). If a user has more than one calendar (as a member of multiple groups, participant of more than one course), he can propagate a single entry to all his calendars. Entries from different calendars are distinguished according to user-defined colour coding schemes. The OLAT calendar has the function of linking an event with a corresponding course component. In addition, you can use iCal (date management standard) to integrate different OLAT calendars with others, e.g. with Google calendar, and vice versa. (OLAT 7.8 User Manual, [http://www.olat.org/images/olat/downloads/manuals/help\\_en.pdf](http://www.olat.org/images/olat/downloads/manuals/help_en.pdf)).

Moodle offers four types of color-coded deadlines in a shared calendar: a global deadline, group deadline, course deadline, and user deadline (see Figure 9). It is very easy to edit a calendar entry, and there is the added advantage of the calendar being displayed on the course page (usually on the right panel). Furthermore, later releases of Moodle support the export of selected parts of the calendar.



**Figure 9. User calendar – month view**

*Source: own elaboration*

## CONCLUSIONS

Knowledge of teacher-to-student and student-to-student communication tools available on an e-learning portal is important for planning and creating an online course. The right choice of these tools can have a major impact on the learning quality and the course itself, particularly if the course is taught only on an online basis. This is because of such negative aspects of e-learning courses as isolation and a feeling of lack of support in overcoming difficulties. Thus, building an atmosphere that fosters integration and building motivation within the group of learners is an important part of course organization. Even very well prepared and professional materials would be insufficient without the support from competent persons or the ability to share your experience with other course participants. This, in turn, cannot be achieved without communication tools. Therefore, it is reasonable to demand that an online course teacher is familiar with these tools in the administrative aspect and in terms of their applicability in the learning process.

The communication tools available on e-learning portals can be used not only for university education, but also on other levels of education.

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# HOW TO ENGAGE STUDENTS IN ONLINE LEARNING – WEB-ENHANCED AND BLENDED ESP CLASSES

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***Abstract:** Greater engagement in educational activities in an e-learning environment developed for an ESP course could be achieved by providing students with web-based authentic materials and by using various techniques arousing participants' interest. The chosen pedagogical approach, profession-related content, simple structure and navigation should act as engaging stimuli. A well-developed online programme can prepare students for self-directed lifelong learning and for e-learning courses such as MOOCs.*

**Keywords:** engagement, ESP, Moodle, online courses, e-learning

## INTRODUCTION

A regular and monotonous routine may gradually make students lose interest in participating in any course, no matter whether online or traditional. The identical layout of units, similar exercises and activities and the same arrangement of materials, which one can see in many coursebooks, usually result in university students getting bored with learning English during traditional face-to-face classes, which they express when asked to evaluate them.

The paper aims to show how to enhance ESP classes with web-based e-learning, how to create simple e-learning courses that can effectively engage students in developing their knowledge and skills and how to prepare undergraduates to learn online to increase their professional competence. The presented hypotheses are supported by survey results and the observation of students' behaviour in class and during online courses (Wilczyńska and Michońska-Stadnik 2010).

## **1. PEDAGOGICAL APPROACH AND THE TOPIC OF ON ONLINE PROGRAMME**

Students attending regular language courses have to be stimulated in many different ways. The teacher usually uses different teaching techniques as well as exposes their learners to a variety of exercises and classroom activities in order to engage them effectively in the learning process, which is sometimes difficult even if lessons are well prepared and structured (Donelan, Kear and Ramage 2010). The topic is obviously the main stimulus. In the case of university students attending engineering and science courses, the challenge lies in targeting both their language and professional needs. No matter which pedagogical approach has been chosen, instructivist, constructivist or connectivist (Siemens 2005; Can 2010; Bayne and Ross 2013; Ho et al 2014, Mokwa-Tarnowska in press), Web-based and e-learning materials can prove to be a valuable addition to a face-to-face class. What is more, such a blended environment can prepare young people for using Internet courses, e.g. MOOCs available in English on Coursera, edX, Udacity, FutureLearn and other platforms, which in turn can lead to them becoming lifelong learners. Recent surveys have shown that an increasing popularity of instructivist Coursera and edX MOOCs, as well as constructivist FutureLearn courses have attracted people from various age groups virtually from all over the world, who found them engaging, professionally stimulating and rewarding. However, the data do not include much information on Polish participants, as their number is usually insignificant (Wintrup, Wakefield and Davis 2015). Some of the reasons of such low attendance might be low language competence in ESP and the scarcity of online or blended university courses in Poland, at least according to the Ministry of Education statistics. This can result in Polish undergraduates and graduates not being accustomed to learning online professional subjects in English.

## **2. VARIOUS TRICKS MOTIVATING STUDENTS TO LEARN ONLINE**

Increasing Internet students' motivation and engagement requires a great number of techniques encouraging them to learn, to maintain the pace of work and even to access the course (Palloff and Pratt 2013). Therefore any online component whose purpose is to supplement or replace traditional classes should be carefully thought over and laid out. There are many ways to make using an online environment a rewarding experience, from which some are mentioned below, particularly the ones that can be applied even by less experienced tutors or not very technically-minded teachers of English.

To begin with, making the content of the course webpages more attractive is very significant. Students are more likely to access learning materials, knowing that some new issues can appear on course webpages or that some elements of the course structure can change. When they log on to see if there is any new activity for them to

do they can do some exercises which were made available some time ago (Mokwa-Tarnowska 2015: 124). An irregular upload of additional exercises and quizzes keeps students interested in the learning process. They may also get engaged in the process of genuine writing by adding posts to the forum (Wenzel 2001: 96-108).

Emoticons are frequently used in e-learning programmes to increase students' motivation and attract their attention. They are added to headings, bulleted lists, tasks, exercises, longer assignments, posts, comments, explanations, reflective points, that is, to anything that is included in course materials. Students attending regular face-to-face sessions can always be aided by the teacher, at any time during a lesson. By arranging class activities and establishing their hierarchy, the teacher emphasises and highlights more important issues. When students encounter problems, the teacher can immediately help them by adding some exercises or providing more detailed explanations. Moreover, the teacher can verbally encourage learners to participate in class discussions and activities, and can draw their attention to certain issues by pointing to them. Participants of Internet-based courses lack their tutor's direct supervision. The developer or the tutor has to predict as many problems learners can face during the course as possible. They have to work out beforehand what difficulties learners will experience, and which parts of resources can be less attractive for them. As no immediate verbal communication between the tutor and participants is possible in a virtual learning environment, a substitute such as emoticons is used to transmit a message to learners. Whenever the developer or the tutor wants to make a comment on either some content or student work on a course page, they can place an emoticon, which attracts attention, alerts, encourages or points to something important. Emoticons grin, smile, laugh, wink, frown, show concern, embarrassment and various other emotions. On the one hand they can reflect the developer's or tutor's mood, and on the other hand their role is to evoke learners' emotions and increase their engagement. They are like messengers that enable one way communication or guardians whose task is to reduce the feeling of isolation online students are likely to have to cope with.

Online students have to be encouraged and stimulated in various ways. Not only are the contents of course resources and exercises significant but also the way they are displayed on course webpages is of crucial importance. If a page is overloaded with pictures, images, animations, various colours and fonts, students can easily get distracted by too many visual stimuli, which in turn can lead to them having lapses in concentration, and being unable to effectively extract information. On the other hand, materials which include only text and no graphics seem to be boring, as students are accustomed to the razzmatazz of the Internet. Only a balanced blend of information and visual effects can motivate online students to work in an e-learning environment. The teaching materials in any course must be easy to read. They should include no distractive graphics. The primary focus has to be on the simplicity of layout and easiness of gaining knowledge.

Another very important factor stimulating online students to work with resources uploaded to a VLE is easy navigation around webpages. The non-linear arrangement



of resources giving the user new possibilities of finding a required text, and allowing for easy access to indirectly related information poses a threat to learning. Instead of spending time acquiring knowledge necessary to complete assigned tasks, online students can waste it by clicking on different links to access yet another webpage which suddenly arouses their interest. This can happen if the materials are too many layered. A complicated hierarchy of links is a very discouraging element in studying e-learning materials. Knowledge has to be easily accessible, so the number of layers must be carefully thought over by course developers. For instance, Moodle-based materials usually have simple and common sense navigation, thus they are easy to use even by inexperienced tutors. The system does not allow for creating hierarchically structured resources with links to other webpages of the same course. Achieving a multi-layered structure of one document is only possible with the tool *lesson*, which is not very convenient in the case of language materials used to enhance traditional classes. However, Moodle resources and quizzes can provide links to external websites, which enables the user to have instant access to unlimited information packages in text or video format. All in all, links to any outside resources have to be justified by tasks or assignments given to course participants, who must be made to focus on learning rather than on searching for information.

Resources which online students use during a course developed in a virtual learning environment must be written in appropriate language. Since learners work with online resources without their tutor directly supervising their progress, all course materials must be easy to comprehend. Tasks and assignments should be self-explanatory so that participants will not have to seek assistance in understanding what they are supposed to do or what a certain piece of advice means. All grammatical terms which appear on course webpages must be either explained or translated. More difficult ones or rarely used should be avoided if possible. Students can get discouraged not by having problems with their assignments or by the level of the course being too high, but by having to cope with metalanguage expressions, which they may neither understand nor feel like learning. Thus, the language of explanations and instructions must be simple, clear and very precise, especially if lower-level students use e-learning materials (Simes 2007: 323-332).

Supplementing traditional classes with new activities leads to creating more comprehensive learning programmes, which improve student language skills. Blended courses or courses supplemented with web-based materials can offer learners more variety, and being innovative can provide them with a positive stimulus. Highly motivated and self-disciplined students who are open to new methods of acquiring knowledge can gain the most from online learning. Students who are less enthusiastic about learning languages in a new environment, as it requires a great deal of effort from them, when supported and encouraged by the tutor can become autonomous life-long learners, and they may gradually develop a liking for self-directed studying in an e-learning environment.

### 3. WEB-BASED ENHANCED LANGUAGE CLASSES FOR STUDENTS OF MECHANICS

Five short online components have been prepared to enhance the learning opportunities for students of mechanics attending regular courses in English offered by the Language Centre at Gdansk University of Technology. They aimed to introduce variety into teaching and learning English for specific purposes, to test to what extent students could benefit from e-learning incorporated into classwork, to prepare them for blended programmes and self-directed learning, and to teach them mechanics vocabulary in authentic context. The tasks either supplemented the topics covered in the coursebook or replaced parts of the units which focused on non-mechanical aspects of engineering. The modules with quizzes aimed to provide the students not only with new knowledge but also with some experience in using a virtual classroom, therefore the automatic assessment done by the course management system, Moodle, was of secondary importance and was not used. The quizzes were based on authentic lectures from, e.g., TED, which the students watched in class. They consisted of various closed and opened questions, which serve as a springboard for discussion.

Questionnaires filled in by all the 78 students who attended traditional classes during the spring semester of 2015 were taken into account to provide the following analysis. They consisted of various multiple-choice and open-ended questions concerning knowledge gained, value of e-learning materials when compared to the coursebook used in class, and attitude to web-enhanced classes. The analysis of the survey results is based on frequency distributions.

All the participants considered the classes to be very interesting and stimulating as they focused on many ideas already covered during their faculty lectures and laboratories. They found the tasks based on authentic materials to be an excellent means of information sharing and language competence development (100% respondents). Most of the students would like to learn ESP only from Internet-based resources including authentic professional talks (Table 1).

**Table 1.**

#### Coursebook-based tasks vs Internet-based tasks

Which do you prefer:	Number of students	Percentage
tasks based on ESP coursebook materials?	2	2.56%
tasks based on films, articles and other online materials?	65	83.33%
I would like to learn from both.	11	14.1%

*Source: Own work*

The majority of the respondents stated that web-based materials should be sometimes used in class. Only two persons would prefer them to be e-learning after-class tasks accessible from home. The answers are grouped in Table 2, the students themselves specified their preferences.

**Table 2.****Frequency of web-based tasks**

<b>How often would you like to do web-based tasks in class?</b>	<b>Number of students</b>	<b>Percentage</b>
Every class (15 classes a semester)	4	5.13%
5–8 times a semester	13	16.66%
3–4 times a semester	45	57.69%
1–2 times a semester	14	17.95%
Never	2	2.56%

*Source: Own work*

More than 50% of the students would more willingly attend face-to-face classes supplemented with online tasks uploaded to Moodle. Nobody would like to enrol on an entirely e-learning ESP course (Table 3)

**Table 3.****Preferred course type**

<b>Which ESP course would you prefer to attend:</b>	<b>Number of students</b>	<b>Percentage</b>
An entirely face-to-face course?	23	29.49%
A face-to-face course supplemented with e-learning tasks on Moodle?	55	70.51%
An entirely e-learning course?	0	0%

*Source: Own work*

## 4. CONCLUSIONS

The answers and comments given by the students in the questionnaire show a lot of similarities. The vast majority indicate that web-based authentic materials and tasks related to them increase interest in learning English. The students appreciated very much having been given the opportunity to develop their knowledge of mechanics vocabulary in context. A small percentage wanted to do additional exercises based

on the classwork so they were given access to the Moodle course and successfully completed other tasks uploaded to it. The course was designed according to the principles described above. All of the enrolled students, 10 persons, positively reviewed their e-learning experience in a post-course survey.

Surprisingly, although almost all the students who were exposed to web-based enhanced classes expressed their positive attitude to the inclusion of e-learning in the curriculum, not all of them would like to attend a blended course. This inconsistency could result from them not fully understanding what e-learning is about and being unprepared to work online or even being scared of self-directing their learning process. Whichever the reason is, to be able to successfully engage in web-based learning and then e-learning, undergraduate students should be encouraged to use these new learning environments, which could be achieved through well-structured, interesting and supportive programmes.

Web-based learning offers an opportunity for creating a more comprehensive ESP programme, during which students can increase their knowledge of the subject of their professional interest (Półjanowicz, Roszak, Kołodziejczak and Bręborowicz 2014) as well as develop many language skills. Moreover, by incorporating an e-learning component into a language course which is based on authentic materials and which targets the improvement of specialised listening, speaking, writing and reading, developers provide learners with ample opportunities for developing various literacies. This will very likely result in them becoming self-directed pursuers of knowledge and autonomous workers in the business environment.

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# ELECTRONIC REGISTERS IN THE SCHOOL AND DETERMINANTS OF THEIR EFFECTIVE IMPLEMENTATION

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***Abstract:** One of the assumptions of this article is the proposition that there is no turning back from tools such as electronic registers in schools, given current social and technological determinants, organisational, technical and humanistic aspects as well as the necessity to improve the quality of school management and educational processes. The article discusses selected results of a study into the functioning of the e-register as an electronic system designed to support management processes and to improve record-keeping of the educational process at educational establishments. The study was conducted among head teachers, teachers, students from selected schools in the Silesian province as well as their parents. The article comprises a discussion of theoretical issues, literature research, a review of software available in the market, and a statement of the objectives, the subject and results of empirical research.*

**Keywords:** e-services in education, electronic registers in school, management software, survey

## INTRODUCTION

This article reports results of a study into the functioning of the e-register as an electronic system designed to support management processes and to improve record-keeping of the educational process at educational establishments. The subject discussed seems to be very relevant today, as electronic registers are becoming a very popular tool used in the educational sector. More and more teachers can be heard to say that traditional registers will soon be a thing of the past.

The main research problems are expressed in the form of the following questions:

- How is the e-register perceived in school communities?
- What opportunities and threats in respect of e-register implementation at school prevail in the dominant view of school stakeholders?
- To what extent are schools prepared for the implementation of such solutions?

One of the assumptions of this article is the claim that there is no turning back from such solutions as e-registers. One might even risk saying that in the nearest future all schools will switch to this method of keeping records of their activities. They will be made to do that by means of, e.g. a requirement to develop special reports analyses, which cannot be accomplished in a traditional manner or will be a time-consuming task. Relevant governing authorities have already introduced a requirement to submit records in a specific format, generated using specific software. This way they intend to standardise the activities of the establishments they supervise, which in turn will facilitate and streamline data processing. Such management software now used at schools as e-educational plan applications or e-administrative office applications will force the implementation of e-registers, as very often the former are interrelated to the latter.

This article also aims at assessing divergent opinions on the e-register tool, voiced by teachers during online meetings, training sessions and discussions. The number of those in favour and the number of those against the e-register are the same. A commonly held opinion among e-register enthusiasts is that e-registers allow teachers to perform their duties at a faster rate, facilitate their work, improve parent/school communication and enhance education quality. Opponents of this technology most often point to the issue of data security and insufficient infrastructure as well as lack of familiarity with the application.

The study was conducted among head teachers, teachers and students from selected schools in the Silesian province as well as their parents. For the most part the people involved in the study represented local authority schools run by the commune authorities. The article comprises a discussion of theoretical issues derived from primary sources and results of empirical research.

## **INFORMATION AND ITS TRANSMISSION**

IT technologies are steadily increasing the range of human communication. Such expansion brings about numerous changes in organisations, including the necessity to use means of electronic communication. It has become an indispensable part of the functioning of each educational establishment, both in its teaching and administrative area. The Internet provides huge opportunities for obtaining and exchanging information as well as for learning. The world wide net has become a tool that is present in all areas of the economy, business, science and social interaction.

Communication-related issues appear to be very topical ones, because information exchange processes are an important component of activity in each organisation, including educational establishments. We witness modes of information transmission and communication tools change on a daily basis. In most organisations exchange of content is very intensive, with transmission being increasingly offered as digital products and services. There is every indication that in the nearest future the services of transmitting, processing and storing information will continue to expand. A fully operational communications system is not only an inherent part of an organisation but also a prerequisite for proper assignment of decision-making; such a system is directly related to major management functions: planning, organizing, motivating and controlling.

Due to the special nature of school activities, schools are required to generate, gather and store data. Increasingly such functions are performed using digital technology. Informational resources are being created (personal data, grades, student reports) about students, teachers and parents. What is more, there are clear signs that the process of informatization will continue at a steady rate. In this context, properly generating, processing, interpreting and disseminating data takes on added importance.

Modes of communication are evolving as technology advances. Communication within a school organisation and with its external environment is realised through multiple channels. There is no doubt that the latest means of information exchange have, to a large extent, modified traditional ways of communication. People less and less often engage in face-to-face conversations, as these are being superseded by various forms of electronic communication (email, communicators, forums, chats, discussion groups etc.) (Augustynek 2011: 69). An important development affecting the contemporary school is the gradual replacement of traditional forms of communication by digital transmission (e-registers, electronic parent/teacher meetings). Websites are popular means of imparting information; they have become an indispensable part of school infrastructure. Online communication and email are superseding traditional means of communication (the telephone, traditional mail, fax).

Nowadays such attributes as the speed of information transmission are acquiring enormous importance. The information and communication revolution, which is advancing at a fast pace, contributes to the development of technologies which are bringing about changes in virtually all spheres of human life. Above all, what has undergone changes is the social communication system, which has a significant effect on economic, political and social processes.

## SCHOOL IN THE INFORMATION SOCIETY

The characteristics of an information society include: *information, knowledge, technology, communication and development* (Dąbrowska, Janoś-Kresło 2009:



13). A technological revolution is now underway in educational establishments, having an effect both on the educational and organizational sphere. Information exchange through digital transmission is an increasingly growing trend in contemporary educational establishments. It is also tangible evidence of an information society coming into being. This type of society is said to have started developing in Europe in 1994, when the European Commission published its report *Europe and the Global Information Society* (Dąbrowska, Janoś-Kresło 2009: 13). Such a society can be described by the following material attributes:

- information is the main raw material that constitutes and forms an information society;
- it is technologies that impact information and not the other way round (as it used to be the case during the industrial revolution);
- ubiquitous nature of new technologies and their intensive effect on the society (forming processes of individual and collective existence);
- a networking logic is being created i.e. a set of relationships in which new information technologies are used;
- the structures are flexible, which allows for changes, modifications and reconstruction of network components;
- constant changes and organizational liquidity;
- combining technologies into one, highly integrated system (technologies combine with one another, which facilitates their development) (Castells 2008: 79-80).

K. Krzysztofek and M. Szczepański hold the view that a society is in the process of becoming an information society if the degree of the complexity of the social and economic development is such that it is necessary to use tools without which it is not possible any more to gather, process and use the enormous “infomass”, or to control information noise only by means of the brain and traditional information media and tools (Krzysztofek, Szczepański 2002: 178). On the other hand, M. Castells points to another feature of the information society, i.e. the networking logic of its basic structure, which is associated with another important concept - that of a “network society”. This concept refers to a theory stating that societies are increasingly organized around networks. Networks constitute the new social morphology of our societies, and the diffusion of networking logic substantially modifies the operation and outcomes in processes of production, experience, power, and culture (Castells 2008: 467).

One of the key features of an information society is focus on personalised devices, interactivity, networking and a constant quest for new technological solutions that often make no financial or rational sense (Castells 2008: 23). In order for schools to be able to satisfy the needs of an information society, they need to be provided with an appropriate infrastructure. All members of school communities should have

guaranteed access to modern IT tools. In addition, it needs to be stressed that teachers and administrative personnel should have appropriate competencies to operate hardware and software; such competencies can be acquired by attending post-graduate programmes and courses as well as through informal learning (e-learning courses, MOOCs, self-study, etc.).

## DEVELOPMENT OF E-SERVICES IN EDUCATION

A service is a non-material aspect of a good. One cannot acquire title to a service or see it prior to purchase. Emphasis is often placed on the unique role of human resources in the process of service provision; attention is also drawn to issues involved in the measurement of consumer requirements and difficulties in controlling the quality of service provision. Services can be classified according to various criteria. The European classification of economic activities distinguishes services for consumers, services for manufacturers and for businesses as well as general social service activities. Services for consumers are grouped into material and non-material services. Education is classified as a *non-material* service.

The expansion of the e-education phenomenon is a result of a rapidly changing reality. Changes happening in all spheres of life have enabled the majority of society to enjoy a relatively easy access to information resources. An information society that is thus coming into existence is contributing to the development of e-services. E-education is a new method for running training courses and for teaching, allowing learning to take place at any place, time and pace. Its advantage over other methods consists in shifting a focus in the teaching process: from the teacher to the learner (Dąbrowska, Janoś-Kresło, Wódkowski 2009: 80). In the e-education sector we have also seen the emergence of systems allowing instructors to track the broadly-understood student progress using IT tools.

## LEGAL AND ORGANIZATIONAL FRAMEWORK

Provision for maintaining records in electronic format is made in the Ordinance of the Minister of Education of 29 August 2014 on Methods of Maintaining, by Public Kindergartens, Schools and Establishments, of Documentation on Teaching, Educational and Care Activities, and Types of such Documentation (Journal of Laws of 2014, Item 1170). This item of legislation also lays down rules for maintaining e-registers in schools. The following are the most important provisions of the ordinance in the context of this article:

### “§ 22

1. The registers referred to in § 3, 10–14, 19 and 21, may also be maintained in electronic format; registers maintained in electronic format shall hereinafter be referred to as “electronic registers”.

2. If the governing authority of a kindergarten, school or establishment gives its consent, the registers referred to in § 3, 10–14, 19 and 21, may be maintained exclusively in electronic format.

3. Where an electronic register is maintained, the following requirements must be satisfied:

- 1) selective access shall be allowed to data constituting an electronic register;
- 2) protection shall be provided for data constituting an electronic register against unauthorised access;
- 3) protection shall be provided for data constituting an electronic register against destruction, damage or loss;
- 4) change description and the authors thereof shall be recorded in the revision history;
- 5) parents shall be provided with free-of-charge access to the e-register to inspect their children's data.

4. An IT system used to maintain electronic registers shall have a feature allowing for exporting data to XML and for preparing the registers mentioned in § 3, 10–14, 19 and 21 as hard copy.

5. In the event the registers referred to in § 3, 10, 11, 13 and 21 are maintained only in electronic format, the teacher's entering, in the e-register, of the lesson topic mentioned in § 3 section 2, § 10 sections 3 and 5, § 11 section 2, § 13 sections 3 and 5 as well as § 21 sections 2 and 3, shall be synonymous with the teacher's confirmation that the class was actually taught.

## § 23

Within 10 days of the end of a school year, and in the case of post-secondary schools for youth and colleges of further education – within 10 days of the end of a semester, data constituting an e-register shall be recorded on a computer medium with their status as at the end of the school year or the end of the semester, respectively in such a way as to ensure that:

- 1) the integrity can be verified of the data constituting the e-register through the use of the electronic signature referred to in Article 3 Item 1 of the Act of 18 September 2001 on Electronic Signature (Journal of Laws 2013, Item 262);
- 2) the electronic signature or identification data can be verified;
- 3) data constituting an e-register can be read to the extent as provided for the storage of the registers referred to in § 3, 10–14, 19 and 21.”

## WHAT IS AN ELECTRONIC REGISTER?

An electronic register is software used to gather all and any information about the activities of a school. E-registers record lesson topics, attendance data, grades, information on the teaching and learning process, personal data etc. In addition, e-registers have various features - they can print school reports, student IDs, grade sheets, letters, can synchronise data with other applications. E-registers are no longer tools to merely record lesson topics and student attendance. Software developer companies are increasingly offering powerful tools to assist in school management processes, and these tools often support other computer applications.

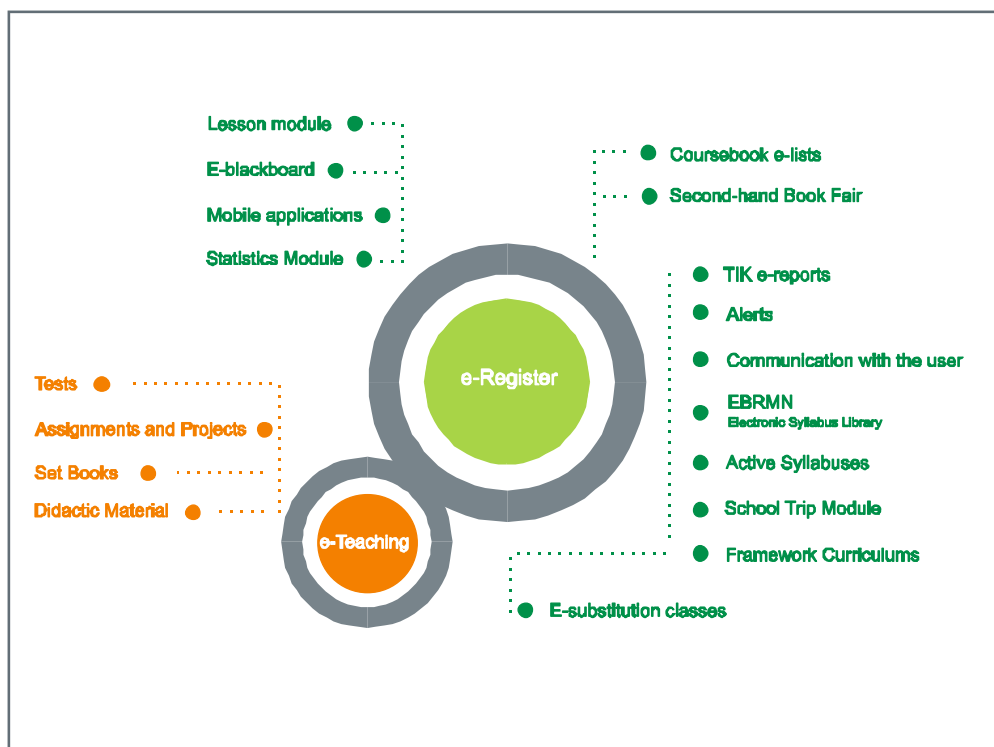
Such factors as the speed of information transmission, universal availability, transmission channel capacity and relatively low costs determine, to a large extent, the popularity of electronic registers. Key advantages of such applications also include the absence of spatial and temporal restrictions, communication is not affected by the place where the sender and receiver are present. Usually such communication is of asynchronous nature, which means that the sender and receiver need not be online at the same time. A sender sends information that is stored in a buffer at a certain location and then retrieved from there by the receiver. Exchanging information or data by means of an e-register allows also for sending messages to multiple recipients at the same time. Such mode of communication records teachers' activities, which may be important from the employer's and employee's point of view. On the other hand, communication over the Internet can have adverse effects, such as decline in parental contact with the school, to name just one.

The implementation of e-registers in schools is intended to:

- make management more efficient (assisting head teachers),
- improve the documentation of the teaching process,
- improve communication with parents,
- increase student attendance rates,
- facilitate the work of the teacher,
- make it more difficult for students to get around the rules.

The review of e-registers presented below is illustrated with two examples of the software that the majority of the school representatives surveyed identified. The software selected was that developed by the companies Vulcan and Librus.

In order to encourage schools to use the software, the developers are designing solutions that integrate multiple educational systems. The application developed by the company Librus can serve as a good example. Figure 1 below shows the structure of the solutions offered.



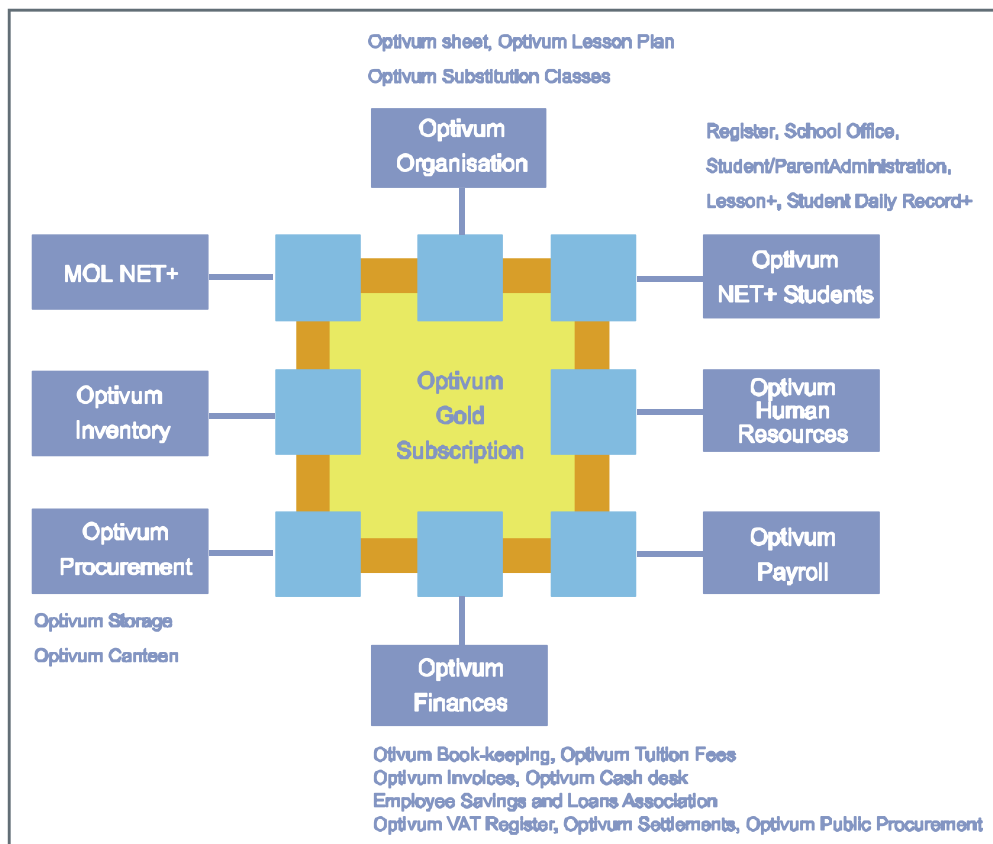
**Figure 1. Librus' integrated information and communication technology**

*Source: own research based on <https://dziennik.librus.pl/informacje/integracja> (accessed 24 July 2015)*

The Librus company advertises itself not only as a software supplier but also as a leader championing an innovative approach to enhancing education quality. The company promotes a comprehensive strategy of the individualization of learning at school, providing tools, training courses and sources of inspiration for work with students. The project is intended to combine findings of modern neuro-didactics with hands-on school practice, and innovative technological solutions with broad expertise.

The company's mission is to support educational development by delivering state-of-the-art solutions facilitating educational processes and education management.

The other company that enjoys a strong market position is Vulcan. It offers a package called *Organizacja Optivum* comprising such modules as: *education plan, timetable, substitution classes, students, e-register, human resources, payroll, finances, procurement, inventory, MOL (library)* (Figure 2).



**Figure 2. Vulcan's integrated information and communication technology**

*Source: own research based on [https://www.vulcan.edu.pl/program.php/49\\_zloty\\_abonament\\_optivum.html](https://www.vulcan.edu.pl/program.php/49_zloty_abonament_optivum.html) (accessed 24 July 2015)*

In order to give an example of the operation and features of e-registers, below a description is provided of the e-register developed by the company Vulcan. The application comprises 3 modules: *Register, School Office, Administration*. Each user has specific privileges. Privileges include those of an administrator, a head teacher, a teacher, a librarian, a school secretary. The *Register* comprises the following tabs: *lesson, form register, syllabuses, register of classroom observations, student grade sheets*. The *Printouts and statements* comprises: *printouts, grade sheets, school certificates, head teacher's statements, form teacher's statement, teacher's statements*. The *Help* tab comprises: *manual, knowledge base, revision history, updates*.

The *School Office* module is very extensive. After the user clicks the *Card indexes and books* tab, the following sections open: *students in forms, students register,*

*children register, candidates register, students not promoted.* Furthermore, the application offers: *dictionaries, register, printouts*, and each of these tabs has further functionalities.

The *Administration* module comprises the following components: *structure of the school, forms, employees, non-working days schedule, lesson plan*. Users can configure the features according to their needs.

The software company highlights the following advantages and features of its product:

- a feature allowing for automatic calculation of average grades and attendance figures, in order to improve communication with parents or just to see if the e-register will work in a given establishment,

- electronic development and management of comprehensive educational plans,

- a feature allowing users to print all standard documents that form the basis for approving draft comprehensive educational plans, amendments to such plans as well as complete draft financial plans,

- automatic and on-going monitoring for possible inconsistencies: verifying data in terms of completeness and integrity,

- professional support for the head of an educational establishment in fulfilling key obligations associated with organisation and preparation of the financial plan,

- electronic comprehensive educational plan, capable of being adapted to suit any educational establishment,

- comprehensively supported management processes at educational establishments,

- electronic development and management of comprehensive educational plans,

- a feature allowing users to print all standard documents that form the basis for approving draft comprehensive educational plans, amendments to such plans as well as complete draft financial plans,

- automatic and on-going monitoring for possible inconsistencies: verifying data in terms of completeness and integrity,

One of the major advantages of e-registers is contribution to improved student attendance rates. The software allows the user to immediately notify parents of their children's failing to attend school. Most software companies offer applications for smartphones, so, if a teacher regularly records attendance, parents can track, in real time, their children's attendance at school, their grades or teacher's entries in a student's daily record about the student's conduct. It should be stressed that recently such tools have become a fad. School using e-registers are said to be superior, to a certain degree, to other schools.

Why are traditional paper registers doomed? The features described above seem to point to unequivocal conclusions.

## ORGANIZATION AND RESULTS OF THE STUDY

According to the provisions of the afore-mentioned ordinance, neither head teachers nor teachers' boards have powers to decide independently to use e-registers at schools. Where an educational establishment wants to maintain registers in electronic format only, it must secure the approval of its governing authority. On the other hand there are no contraindications to using e-registers as a complement to traditional registers.

What is important in the context of the study conducted is the fact that the ordinance also lays down methods for eliminating hazards associated with maintaining records in this way. Many software companies are now offering tools for electronic record-keeping. Customers are voicing legitimate concerns about the degree of professionalism of such businesses, about the methods of ensuring data security etc. These concerns were expressed by means of questions asked by teachers during the survey. The most common concerns were as follows:

- What guarantees do we have that in a few years' time a given company will still be around?
- What about data storage, data submission in the event a company goes bankrupt?
  - What are the guaranties regarding data security?
  - To what extent are personal data safeguarded (protected)?
  - How is data archiving carried out?
- How will the school cope in the case of a system failure, if the Internet connection is lost?

The survey was completed via the [www.ebadania.pl](http://www.ebadania.pl) website during the period 5-15 June 2015 by a sample of 80 representatives of school communities from all types of state-run schools in the Silesian province. The survey was a pilot study – the results of the pivotal study will be presented and analysed in the doctoral dissertation. The study was carried out using the diagnostic poll method, and the data collection technique was that of a survey questionnaire. The study was supplemented by interviews with teachers from local authority schools in the Skoczów commune (Cieszyn county). These schools are now implementing the system supplied by the company Vulcan.

The questionnaire was completed by 18 students, 8 parents, 34 teachers, 17 head teachers, 3 school administrative staff. 54 of the questionnaires were filled out by women, 26 - by men.



**Table 1.****People who took part in the poll**

<b>Respondents</b>	<b>Number</b>	<b>%</b>
Students	18	22.5
Parents	8	10
Teachers	34	42.5
Head teachers	17	21.25
Support staff	3	3.75
<b>Total</b>	<b>80</b>	<b>100%</b>

*Source: Own research*

The request was sent out via the e-register to 140 parents, and the questionnaire was completed by only 8 of them, which might be taken to indicate that such communication is not very effective. Due to the insufficient size of this sample, no detailed analysis of this group is provided in this article.

Only 18.75% of the establishments polled have used the e-register for more than three years, while 62.5% have used it for less than 3 years. The teaching process is recorded exclusively in electronic format in 32.5% of the schools. 40% of the schools use paper-based registers and electronic registers at the same time. The other schools did not respond.

After the request to take part in the survey was emailed, many schools sent in replies with the following content: “...our school does not use an e-register”; “...we have only just begun implementing an e-register”; “...unfortunately, as of now we have no experience in using e-registers”; “...I am afraid we have not started using an e-register yet”; “...our school does not maintain records in electronic format”.

One of the replies read as follows: “...Hello, I teach in a secondary school of general education in which e-register based Vulcan software has been implemented. In a nutshell – this application is pathetically bad, instead of facilitating work – it makes things more difficult as all operations are carried out very slowly, it keeps freezing, and in class it is really a waste of time to wait for the next page to open (or fail to open)...”

Table 2 sets forth statistical data on school locations. The subsequent tables provide data on the ages of the persons polled (Table 3), the type of school (Table 4.), level

of professional advancement of teachers (Table 5), years of service in education (Table 6), types of e-registers in schools (Table 7).

**Table 2.**

<b>Location of the school</b>		
<b>Location of the school</b>	<b>Number</b>	<b>%</b>
Rural area	26	32.5
Towns up to 20 thousand residents	17	21.25
Towns with 20 - 50 thousand residents	18	22.5
Towns with more than 50 thousand residents	19	23.75
Total	80	100%

*Source: Own research*

**Table 3.**

<b>Age of people polled</b>		
<b>Age of people polled</b>	<b>Number</b>	<b>%</b>
11-20 years	18	22.5
21-30 years	8	10
31-40 years	24	30
41-50 years	30	37.5
Over 50	0	0
Total	80	100%

*Source: Own research*

**Table 4.**

<b>Type of the school</b>		
<b>Type of the school</b>	<b>Number</b>	<b>%</b>
Primary	18	22.5
Middle School	12	15
Secondary	33	41.25
Vocational	17	21.25
Total	80	100%

*Source: Own research*

**Table 5.**

<b>Level of teacher's professional advancement</b>		
<b>Teacher</b>	<b>Number</b>	<b>%</b>
Trainee teacher	1	1.9
Contractual teacher	6	11.7
Nominated teacher	4	7.8
Certified teacher	40	78.4
Total	51	100%

*Source: Own research*

The number of teachers (34) and head teachers (17) add up to a total of 51.

**Table 6.**

<b>Length of service in education</b>		
<b>Teachers' length of service</b>	<b>Number</b>	<b>%</b>
0-5 years	5	9.8
6-10 years	5	9.8
11-15 years	8	15.6
16-20 years	7	13.7
21-25 years	13	25.4
26-30 years	8	15.6
Over 30 years	5	9.8
Total	51	100%

*Source: Own research*

**Table 7.**

<b>Types of e-registers in schools</b>		
<b>Type of e-register</b>	<b>Number</b>	<b>%</b>
Vulcan	19	23.75
Librus	17	21.25
Mobidziennik	4	5
iDziennik	3	3.75
Eszkola24	2	2.5
Wywiadówka.com	2	2.5
No response	33	41.25
Total	80	100%

*Source: Own research*

Most of those surveyed could not name the application used in their school.

## **HOW IS THE E-REGISTER PERCEIVED IN SCHOOL COMMUNITIES?**

Over 86% of those surveyed believe that mass-scale implementation of e-registers in schools is a good solution, and of this group, all the head teachers (100%) were in favour of electronic record-keeping (agree and strongly agree). Most of the teachers are optimistic about the e-register – 94.11% of them are strongly and fairly in favour. Only two of the respondents think that the e-register is definitely not a good solution. 70% of the respondents praise the e-register, but 41.25% say that nowadays a school can function without this method of electronic record-keeping.

Asked if the e-register can replace personal contact between parents and the school, 95% of those surveyed clearly say that it cannot. It is interesting to note that all of the students hold the view that the e-register can guarantee that.

77.5% of the respondents believe that the e-register contributes to improved quality of the operation of schools. As far as the head teachers are concerned, they are unanimous in their opinion – 100% believe that such solutions enhance the status of schools.

The majority of those surveyed think that e-registers contribute to improved communication between teachers and parents – 71.25%. When asked if the e-register is useful in teaching, 78.75% of the respondents say that it is, while 72.5% say that it enhances comfort at work. As for the teachers, almost 95% reported that e-registers are useful. 76.25% indicate that e-registers can successfully replace traditional paper registers.

In the group of teachers with the longest service (over 25 years) 85% view the tool favourably. 100% hold the view that extensive implementation of e-registers in schools is a good solution, while 82.5% believe that the informational revolution will soon force all schools to use e-registers.

58.75% of those surveyed speak favourably of e-registers, claiming that the e-register neither causes them to stay longer at work nor disrupts their work. The same number of the respondents say that e-registers facilitate work and improve record-keeping of the teaching process.

## **OPPORTUNITIES AND THREATS IN RESPECT OF E-REGISTER IMPLEMENTATION AT SCHOOL**

According to the respondents, opportunities afforded by the e-register include: improved access to data – cited by 58 respondents (72.5%), making work easier – cited by 50 respondents (62.5%), increased control – indicated by 43 of those polled (53.75%), improved consistency – cited by 37 respondents (46.25%), less time taken up by work tasks – indicated by 29 respondents (36.25%), more effective management – cited by 36 respondents (45%).

The respondents also perceive a positive potential in the features allowing for better school attendance control. 61.25% of the respondents believe that the Internet-based attendance management system contributes to improved attendance rates.

The threats listed in the survey drew the following responses from the respondents: hardware and Internet issues – cited by 51 respondents (63.75%), data security – indicated by 30 respondents (37.5%), inability to operate the software – cited by 29 of those surveyed (36.25%), more time taken up by work tasks – indicated by 14 respondents (17.5%), increased oversight by head teachers – cited by 7 respondents (8.75%), lack of support, lack of training – 6 respondents (7.5%). Fifteen of the respondents saw no threats (18.75%).

The key problems that the teachers cited included Internet issues (disruption in Internet service, lack of access) – these were cited by 81.25% of respondents.

## **PREPARING SCHOOLS FOR THE IMPLEMENTATION OF E-REGISTERS**

It should not be a surprise that all the head teachers say they are familiar with the legislative act that governs the implementation of electronic record-keeping. As far as the teachers are concerned, familiarity with the legislation is cited by 76.4% of the respondents; in the other respondent groups - 75%.

48% of all respondents say that schools are ready to implement e-registers, while 45% hold the opposing view. The other respondents did not have any opinion. School employees view the situation slightly differently. Only two teachers are of the opinion that schools are very well prepared for the implementation of the e-register (strongly agree), 18 (35.2%) of them agree moderately, 14 (27.4%) expressed moderate disagreement and strong disagreement. The head teachers are decidedly less optimistic. Nearly all of them hold the view that schools are not ready for this new challenge (disagree and strongly disagree). Only one of them says that the opposite is true. As for the degree of preparation in rural schools, there are as many optimists as there are pessimists.

If asked about the technical requirements for operating the e-register, 60% said the requirements were met, 15% were sceptical, while 25% could not express an opinion.

## **CONCLUSIONS**

As the survey indicates, school employees are ready to embrace novel solutions. They believe that new technologies contribute to improved quality of work and enhance the status of schools. The respondents hold the view that e-registers are useful in the teacher's work and improve communication between teachers and

parents. They also indicate that there is not turning back from the digital school - the informational revolution will soon force schools to use e-registers.

The implementation of e-registers in schools should be accompanied by the provision of technical support. It is important that schools should have an adequate quantity of computers, a secure and reliable Internet connection (most of the respondents clearly identified lack of a stable connection and insufficient amount of computer equipment as threats). If a school has a Wi-Fi network, it has to be password-protected. The same is true of computers in classrooms. It is also necessary to ensure teachers have access to professional technical support and can consult IT specialists.

It would also seem important to ensure that appropriate software is selected that matches the requirements and capabilities of the school so that it can be fully utilised (to print certificates, sheets, ID cards etc.). It would be advisable to arrange a transition period so that teachers should have adequate conditions and ample time in which to learn to use the application. Training should be run for teachers and parents, in the traditional form and as a distance course, to make them aware of the advantages of e-registers, with permanent access to learning materials and documentation.

Functioning in contemporary schools requires the ability to seek, filter and analyse information. In order to meet the demands of today's world all members of a school organisation have to acquire the ability to effectively use modern technologies. These technologies constitute necessary support for all processes taking place in schools, as competent use of ICT tools increases the effectiveness of the performance of work tasks, enhances quality of education and makes communication more efficient.

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## II. E-LEARNING AND INTERCULTURAL COMPETENCES DEVELOPMENT IN DIFFERENT COUNTRIES

### ICT EDUCATION IN TURKEY: NATIONAL ICT CURRICULUM TO IMPROVE TEACHING AND LEARNING

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***Abstract:** ICT becomes more and more important concern for educational institutions and governments for increasing the quality of teaching and learning. Ministry of Education (MoNE) in Turkey aims to be part of this. Policy makers in MoNE initiated a new project called FATİH. This project defines the role of ICT and integrates it at levels and education so that teachers and students can take advantage of ICT. This paper presents the current situation in Turkey and present some research findings related to FATİH project.*

**Keywords:** informatics education, ICT curriculum, teacher training

### INTRODUCTION

The common thought about ICT is having an impact on our world (Bownell, 1997; Widmer & Amburgery, 1994; Barker 1993) as well as on education (Bates & Poole 2003). Governments already spend billions of US dollars each year on their education systems. All of them are looking for more effective, efficient and consistent education systems. They all accept the role of technology in this view. “To be a country that has become a focal point in the production of science and technology, that uses information and technology as an effective tool, that produces

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more value with information- based decision-making processes and that is successful in global competition, with a high level of welfare.” (Information Society Strategy, 2006)

There are many suggestions for implementing technology into teacher education programs, mandates and guidelines conceived by professional organizations, state boards of education and experienced educators (Widmer & Amburgery: 1994). Indeed, what is important is to provide student teachers with technology integrated teacher education programs so that they will be able to use technology once they become in-field teachers (Bownell 1997).

## **ABOUT TURKEY**

Turkey is a country with a physical and cultural bridge between Europe and Asia. It has a total area of about 780 km<sup>2</sup>. With a population of 75 million and nearly 17 million students and 800,000 teachers. Children between 0 and 14 age group constituted 29.8 % of this estimated population. Population between 14 and 64 age group constituted 65 % and above 64 age group constituted 6 % of population. The primary and secondary education is mandatory education which is divided to 4+4+4 years in 2014 for children aged between 6 and 18 age groups. According to MoNE (2014), primary education institutions consist of four-year and compulsory lower secondary schools, four-year and compulsory lower secondary schools which give opportunity to allow for different programs, and lower secondary schools for imams (person who lead prayers and Islamic obligatory practices) and preachers.

After the students have graduated from secondary schools, they have to take the university entrance examination to be get acceptance for a university. There is a great competition for entry into the 193 public and private universities. Due to the characteristics of educational system, Information Communication Technology is a rational option to increase an overall education level in Turkey.

## **ICT PROJECTS IN TURKEY**

Turkey has made many efforts for increasing the quality of education and reducing educational inequality across lines of gender and socioeconomic background (World Bank, 2013). One of them is Basic Education Project which aims to provide public schools with access to computing equipment and interactive teaching technologies. The last one that is FATİH project which is Movement to Increase Opportunities and Improve Technology was started in 2009.

### **Basic Education Project:**

In the first project which is World Bank supported Basic Education Project implemented between 1998 and 2004, the aim was to improve basic education quality by providing computer labs and educational materials to schools. Within the

scope of the project, computer equipment was provided to 2,802 classrooms and ICT trainers and coordinators were trained.

While the project was ongoing, a lot of effort was made to overcome the difficulties of integration in educational settings and educate the pre-service teachers in usage of technology (MoNE, 2007). After completing the project, many research results proved that insufficient computer software was provided to schools; actual courses taught by ICT trainers were limited to laboratories and focused on basic computer skills. According to the World Bank report (2004), subject teachers were not trained in how to integrate computers into their subject teaching in this project.

#### Fatih Project:

FATİH, which means Movement of Enhancing Opportunities and Improving Technology, is among the most outstanding educational investments of Turkey. The Ministry of National Education has designed projects to provide Interactive White Boards, tablet computers and Internet network infrastructure to all schools in basic education in an attempt to enhance equality of opportunity in education and to improve ICT use in teaching and learning processes in schools. The scope of this project is that “Smart Class” project is put into practice in all schools in Turkey. With this project, 42,000 schools and 570,000 classes will be equipped with the latest information technologies and will be transformed into computerized classes (Smart Class).

In the official website of FATİH, The project, which was initially launched in secondary schools and is continuing for all grade levels between 2011 and 2019, has expressed five main components.

1. Providing Equipment and Software Substructure: the first step is preparation of the infrastructure for hardware and software that comprises effective procurement, distribution and technical set-up of equipment in schools.
2. Providing Educational e-content and Management of e-content: in order to enable ICT-supported instruction, providing and administering of the e-content that entails creating new class materials consistent is going to be a crucial step.
3. Effective Usage of ICT in Teaching Programs: programs of effective ICT usage with curricula focus to figure out new channels of integrating ICT usage with course curricula.
4. In-service Training of the Teachers: according to previous experiences, training teachers is an important pace of the project. Conscious, reliable and measurable usage of ICT and the Internet that focuses on teaching users of ICT, how to use relevant ICT tools with complementary information on the web as well as evaluating how people use ICT are main concerns.
5. Conscious, Reliable, Manageable and Measurable ICT Usage: Using quality ICT instruction in classrooms enables teachers to use ICT tools effectively in a classroom environment properly.

## NATIONAL ICT CURRICULUM DEVELOPMENTS

There is a guideline for integrating ICT in education at large scale recognizes the value of inter-ministerial collaboration when implementing an ICT in Education plan (UNESCO, 2004). There are two main institutions in Turkey, the Ministry of National Education (MoNE) and the Higher Education Council (HEC) that are responsible for the organization and utilization of all levels of education: defining roles, concrete work plans attached to realistic budgets, and putting and following up a clear and measurable vision.

While in primary curriculum, the subject information and communication technologies (ICT) is an elective course, ICT is a mandatory course which is offered two hours per week in secondary education. These courses aim to teach basic computer skills and to introduce students to some commonly used computer applications, such as word processors, paint, and communication tools. The objectives of ICT have been defined by the MoNE. Concepts and descriptions include computer literacy terms “Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments” of computers to solve problems. The main objectives are as follows (MoNE, 2005):

- to develop an understanding of the practical methods of using computers,
- to learn the definitions, developments and ways of using computers,
- to identify the basic parts and their functions of computers,
- to use basic software,
- to get information from reliable resources

The last ICT curriculum has been developed and put into practice in 2005. However, some minor modification has been made according to evaluations of research findings implemented during the process. The current ICT curriculum, which is already used to facilitate information and communication technologies in schools, is limited as to the technologies and software provided to learners (Gülbahar, Ilkhan, Kilis & Arslan 2013). Defining abilities of ICT or digital literacy is not easy, but one definition that commonly uses three „abilities“ is as follows (Nutt 2010) :

- The ability to use digital technology, communication tools or networks to locate, evaluate, use and create information.
- The ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers.
- A person’s ability to perform tasks effectively in a digital environment.

Defining or creating IT standards is an effective and important way of both teacher competencies and learners achievement levels (Thomas, & Knezek, 2008; Steiner 2012). Therefore, the existing ICT curriculum aims to include important concepts such as digital literacy, technology use, ethical considerations, security, privacy, programming concepts and cybercrime types.

### Framework of National ICT

Hence, a framework of the National ICT curriculum approach was established based on the international standards of ICT (NAACE, 2007; ISTE, 2013), which was composed of four dimensions:

- (1) Digital literacy,
- (2) Communication, Knowledge Sharing and Self-Expression via ICT,
- (3) Research, Knowledge Construction and Collaboration and
- (4) Problem Solving, Programming and Development of Authentic Materials.

The general goal of the standards-based curriculum was formulated as: “learners are expected to use information and communication technologies effectively, efficiently and in parallel with the ethical values”. The official name of the course is specified as “Information and Communication Technologies and Software” (Table 1).

Besides, cognitive and technical competencies are another crucial topic to take into consideration in the curriculum development process. Digital literacy can be achieved through the use of digital technologies, i.e. communication tools and social networks in the process of accessing, managing, designing, evaluating and creating information by means of cognitive and technical knowledge, skills and values through doing tasks rather than just reading about it. Furthermore, learners have different background knowledge on the topic in the huge school system, each learner should be provided with an individual instructional design according to their background knowledge.

**Table 1.**

### **ICT levels for learners used as a guide while specifying learning outcomes**

<b>Levels</b>	<b>Explanation</b>
Basic I	Understanding ICT
Basic II	Accessing and Evaluating information
Intermediate I	Managing information
Intermediate II	Transforming information
Advanced I	Creating information
Advanced II	Sharing information

The mainly three levels can be summarized with two dimensions in each level, based on some taxonomies and levels defined by various researchers. In the ICT curriculum, there are ten measurable performance steps about information communication technologies skills.

Activity based and learning by doing approaches are adopted by teachers in order to emphasize their method of teaching through activity in which the students participate actively and bring about efficient learning experiences from the course. Real life related cases are the key for achieving the general objectives. These learning domains are placed in spirally at eight years curriculum.

While implementing the curriculum in their classroom, teachers are responsible for figuring out the level of each learner and then try to improve ICT knowledge for each learner individually or for the group. During the implementation of the curriculum in classroom and computer laboratory, teachers are free to decide what they teach and how. This means that they are able to design which teachers here is to choose up-to-date topics and activities in their course. In order to be a successful teacher in their teaching career, prospective teachers must be competent pedagogically and in the subject field. Pierson (2001) supported this by claiming that teachers need a subject-related content integrated with both technological and pedagogical expertise. The main aim of this curriculum is to build an international culture about ethical issues of technology using and to improve the abilities of each student.

**Table 2.**

**ICT course levels and students grade**

Basic Level	Intermediate Level	Advanced Level
1		
2		
2		
	4	
	5	
		6
		7
		8

During the teaching-learning process, assessment and evaluation should be learner centered for this curriculum. A central concern of learner-centered teaching is learning, and so evaluation in the student-centered classroom is not just to generate

grades but, more importantly, to promote learning (Weimer, 2002). As a result, alternative assessment techniques and tools that “are fulfilling the premise of learner-centeredness together with constructivist and cognitivist approaches, e-portfolio assessment” were picked for evaluating students’ works and process during the course term. This approach will not only enhance contributions to a national content development process by the use of national products like EBA, Kırk Ambar etc., but will also make learners learn by doing (Gülbahar, İlkhan, Kilis & Arslan, 2013).

## **MAIN BARRIERS OF ICT INTEGRATION IN TURKEY**

Many big projects about technology integration into education implemented around the world as well as Turkey have some efforts for this aim. The last big ICT projects of Turkey has launched in 2011 and MoNE decided to start by equipping schools with the appropriate technology apparatus for this aim. There are many research findings related to effectiveness of this kind of projects. These findings will be used for redesign or improve the existing structures for reaching the goal of effective integration.

Pouzevara, Dincer, Kipp, and Sariisik, Y. (2013) published a report that brings up the some issues related to integration of ICT curricula. In many studies, similar results showed that there is not enough in-service training about ICT, technical support, hardware as well as there is lack of appropriate course content and instructional programs, lack of time, and lack of appropriate administrative support (Goktas, Yildirim, & Yildirim, 2010; USDE 2000). Another important issue is the fact that school leaders’ preparation for supporting students day-to-day may be the key factor in the project’s successful implementation. As well as school leaders, teacher educators in the preservice should function as role models for prospective teachers in how to use ICT’s. FATİH project has a great advantage of flexibility in implementation and has provided some guidelines. However, many researchers claim that this kind of flexible model which is dependent upon individual motivation and capacity for innovation without having provided a gradual scaffolding for teachers to support them, including opportunities for peer-support, action research, sharing of best practices, and incentives for risk-taking and innovation is not enough to achieve goals.

However, it is not true to say that all teachers are left in the field without support. For this purpose, MoNE has either developed or purchased a variety of e-content software, tutorials, encyclopedias, animations, simulations, games etc. for students, for use both within and outside of the classroom. In addition, on-going face-to-face and online training are being conducted with the users of these new technological devices. Lastly, students’ orientation training issue is less emphasis in the schools. However, teachers are provided with short periods of training several times, but are still needing more for both students and teachers.



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# INFORMATION TECHNOLOGY AND EDUCATION: DOES EDUCATION NEED EXAMPLES OF PRACTICE WITH POSITIVE AND NEGATIVE EFFECTS?

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***Abstract:** The main focus of this paper is oriented on the best examples from practice and their structure. These examples are important for optimal implementation of information technology (IT) as well as education. Available spectrum examples, analyses, case studies and surveys try to show an optimal solution, but there are still many difficulties in adopted solutions and many IT projects end in failure. For examples from practice, the advice is to respect default rules for scientific paper structure and adding more information about weaknesses with links to partnerships, innovations, and future research.*

**Keywords:** benefit, education, examples of practice, information technology, knowledge, weakness.

## INTRODUCTION

Quick, hard, and dynamic changes involve realized activities in global information society. These uncompromising demands bring positives and negatives. (Global Internet Report, 2015) The positives are often centred on available information with the support of collective thinking. This reality gives an easy way to share information based on the best examples from practice. There are also alerts against the identified difficulties and advice for active solutions. (Akpem 2015) Detailed descriptions define aims, realized activities, adopted methodologies, and achieved results that may help with optimal design and IT implementation.

The spectrum of accessed examples, studies, analyses and surveys is wide, but there questions are about their usefulness. The reason is based on the fact that many IT projects contain errors and it is difficult to learn from them. (Volek 2012) Why? Their implementation teams perhaps do not know about actual development trends in the IT field, or maybe they communicate very little with end users. On the other hand, managers, designers, analysts, programmers, operators, and other people around information technology have a high interest in IT product development and

implementation for IT users. One practical reason is a high pressure of competitors and a global team supporting open-source products. There is also a place for education.

## **1. INFORMATION TECHNOLOGY AND EDUCATION**

Information technology is a field that is based on highly specialized work with various devices like servers, computers, tablets, and other mobile devices. The work is oriented on hardware and software equipment. The well-known phenomena are words like data, information and knowledge. The global information society has knowledge just like with goods having the price of gold. (Information society in figures, 2015) Whoever has knowledge can make appropriate decisions and succeed.

Knowledge is not many rows showed in a browser, or various graphs on a given topic. Available data and information must be processed in many relations according to actual needs and specified aims. Information technology is a means to obtain an overview in real context. The problem is in the quick development of information technology and existing changes that are realized without our confirmation. (Dineley 2015) Current knowledge is not easy to keep, and education is needed.

Education has many formats. (Quinn 2014) There is education for competitiveness, employees, adults, seniors; we must also consider primary, secondary, university education, vocational education and training or PhD education in many forms such as full-time, combined, or e-learning. The Internet also offers a source for continuous education according to personal preferences, or some people prefer individual training via Skype, and so on. The default education with teachers allows one to obtain optimal knowledge based on communication in a study team (classic or virtual class) and many solved examples with links to a necessary volume of theory. The realized tests reflect achieved knowledge.

Individual education according to personal preferences has a higher importance than before. The benefit is updating current knowledge, specifying new approaches or clarifying existing relationships between examined objects. The best benefit is presented by the multidimensional view on reality and regular updates based on the Internet. This activity is better perceived and understood through examples from practice.

## **2. THE BEST EXAMPLES FROM PRACTICE WITH OPTIMAL STRUCTURE**

Examples from practice, the best examples from practice, practical examples, handbooks and a collection of examples from practice are only fragments of various stories from practice with a positive or negative influence on the solution of a selected situation. (Examples from Practice - Guide, 2012) The Internet shows many examples in various formats with detailed descriptions. The focus is on:

- Aim of guide.
- Conception.
- Innovation aspects.
- Benefits.
- Methodology.
- Practices.
- Partnerships.
- Research directions.

The default interest is oriented on business, added value, information and communication technologies, understanding, action criteria, project documents, regional catalysts, small and medium enterprises, opportunities, education and training, influenced objects, or domestic products. In most examples, innovation plays a key role. The mentioned experience links needed layers like technical, social, economic, and cultural to share knowledge and skills. (Khan 2009) This sharing is required in general and also in detail with respect to local conditions. There are visible changes based on IT support for open-access and global cooperation.

A common motto is to show a collection of experiences learned from the events that have helped to remove existing problems and develop more appropriate solutions and successful practices. The offered examples have helped to determine the advantages of innovative technologies and have shown the best solution in existing companies and organizations. Sustainable development supporting new forms of cooperation and IT implementation with a positive impact on the competitiveness are also mentioned. Sustainable development needs openness, cooperation, partnership, and inspiration in the exact composition of available IT products based on suitable knowledge and skills for the optimal use of information technology. For optimal understanding, it is suitable to also show negatives and weaknessess of realized solutions. The reason is to prevent the same mistakes in other projects.

Unfortunately, some examples from practice only bring basic information about a given topic and the achieved results:

- Data warehouse above SharePoint. (Memos Software, 2013)
- Ferona is betting on new Business Intelligence. (Microsoft – Case Study, 2013)
- Infa Partner – Data Integration (Informatica at Raiffeisenbank, 2010)

Such information is less useful. In all of these cases, optimal structure is important based on inspiration from scientific paper structure. (Day & Gastel 2011) The optimal structure of these examples holds its suitable place in practice as well as in education. (as seen in Please see Table 1.

**Table 1.**

**Design structure of the best examples from practice based on  
the actual needs of the global information society.**

<b>Designed parts of the best examples from practice</b>
<i>Introduction</i>
<i>Background</i>
<i>Existing controversies</i>
<i>Conception</i>
<i>Innovation</i>
<i>Methodology and methods</i>
<i>Realized activities</i>
<i>Achieved results</i>
<i>Partnerships</i>
<i>Discussion</i>
<i>Future research</i>
<i>Conclusion</i>
<i>References</i>
<i>Source: Own work</i>

The introduction describes the perspective of an example from the common view. The background is oriented on specifying needed objects and positions in the selected topic. Existing controversies show difficulties that the current state brings. There is also a place for opinion collection based on current literature review. Methodology and methods are needed for an optimal solution based on adopted bases. Realized activities describe individual tasks solving the identified problems. Achieved results are centred on benefits and weaknesses. These results should be further analysed with links to existing studies and visions for further innovations in the discussion and future development sections. A standard conclusion presents the traditional summary, and references indicate used sources.

## CONCLUSION

IT product implementation is a standard activity in all fields. Many false projects show that correct selection and use of these products bring difficulties. For active solution, education is needed with many examples from practice. Problems cause ambiguity and low informative value with relation to the structure of these presentations. The solution can easily respect the default scientific paper structure.

This structure is oriented on the introduction, background, controversies, methods, discussion, and conclusion. With regard to practice, it is important to add information about the conception, innovations, partnerships, and also about weaknesses that bring difficulties.

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# EDUCATIONAL POLITICS AND INTERCULTURAL EDUCATION – THE POLISH PERSPECTIVE<sup>1</sup>

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***Abstract:** Intercultural education is undertaken and implemented in the conditions abundant with contradictions. On one hand – in democratic states the official politics and legal regulations enhance multi- and intercultural education. On the other – the practice reveals not only the diversified needs of different ethnic, religious and national groups but also the issue of the hidden activity programme. Conflicting interests of various groups of significance in particular countries, the fearful attitudes to the Other, stereotypes and prejudices deeply rooted in social opinions are just some of the threats which hinder the promotion of the model of intercultural education. However, due to social transformations, this is the area which should be taken into account in educational policies. Politics itself is defined as an art of controlling and negotiating the interests of various social groups but is also treated as a kind of strategic game, of which the foundation is winning and losing. What seems of special rank is the awareness that no political system, even perfectly democratic, can provide all people with everything. Political activities always favour some at the cost of others. This largely derives from the fact that one of the essential, constitutive elements of politics is its axiological dimension, associated with creating particular ideas, ideologies and political doctrines. They organize the view of the world from a certain perspective, indicating the way of acting – the applied principles, norms or methods – of the people who implement them. Therefore, educational politics is also based on appropriate knowledge of the art of implementing what is possible among the postulates expressing the interests of different social groups. This gains significance in the culturally diversified environment, where educational politics should be especially focused on.*

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*Unfortunately, educational politics in Poland is one of the most neglected/abandoned fields of education. Obviously, this results from excessive influence of politics on the educational sphere in the period of communist Poland.*

**Keywords:** politics, educational politics, multi- and intercultural education, culturally diversified environment

## 1. INTRODUCTION

Intercultural education is undertaken and implemented in the conditions abundant in contradictions. On one hand – in democratic countries the official politics and legal regulations foster multi- and intercultural education. However, on the other hand – practice indicates quite differentiated needs of various ethnic, religious or national groups (Lewowicki 2005: 21, Kelley 2010) and the appearing issue of the hidden programme. Conflicting interests of various significant groups in particular countries, attitudes of fear towards the Other, stereotypes rooted in social opinions, and prejudices are just some of the threats which hinder promoting the model of intercultural education. Yet, due to social changes, this is a field which should be taken into account in educational politics. Unfortunately, educational policy in Poland is one of the most neglected/abandoned areas of education. This must be an effect of excessive influence of politics on the educational sphere in the times of communist Poland<sup>1</sup>. Although the recent years have been full of suggestions for educational changes in a more narrow or broader scale, they cannot be treated as a transparent educational policy. These are rather urgent activities introduced without social consultations. Despite the fact that these activities have become a part of election programmes, their essential value is difficult to assess. They constitute a set of populist slogans rather than the actual description of suggested activities planned by a particular political party in the field of education. Still, educational politics is an area which requires special interest – particularly in the context of functioning of education in the more and more diversified world. It is not possible to implement efficient educational policy without a well-prepared system of diagnoses and prognoses which will allow for realistic/optimal planning of educational changes. It is expected that due to the necessity to consider the postulates of various social groups in the educational policy, its main constituents are strategy and tactics. The analysis of educational politics in multicultural environments may create an impression that other activities are dealt with – compromise and struggle (1989).

The presented text is an attempt at indicating the determinants of practising educational politics in culturally diversified environments. These issues have been explored in the publishing series *Edukacja Międzykulturowa / Intercultural Education*. As a separate thread, educational politics has been discussed by many authors. In 2005, a publication entirely dedicated to these issues was prepared (Lewowicki, Ogrodzka-Mazur 2005). However, educational politics most frequently appear as a secondary motif touched by authors merely on the margin of basic discussion (Gajdzica 2011, Ogrodzka-Mazur 2014, 2015).

## 2. DETERMINANTS OF PRACTISING EDUCATIONAL POLITICS

Functioning of education in culturally diversified environments results in specific situations in all areas which determine its development. Which minority group is taken into account is also a significant factor. There are three sources of the birth and development of national minorities: migrations, the annexation of foreign territories and change of state borders (Grzybowski 2008: 68-81). The presence of minority groups forces the state to formulate a policy towards them. Its nature depends on two major issues – whether the presence of the minority is accepted in a particular society and whether a due part of the society's resources is justly allotted to minority groups (Rabczuk 2006: 144).

In order to examine how the issues of educational politics have been described by the authors exploring them in the publishing series *Edukacja Międzykulturowa /Intercultural Education/*, some factors have been applied in this study which are associated with state politics (political system) as well as demographic, sociocultural and economic determinants.

### ***2.1 State politics (political system) and the activities undertaken in multicultural environments***

Political determinants agree with political and ideological interests of education. They influence directly the contents and form of the educational policy. The type of authority in a particular country, the earlier mentioned election programmes of political parties as well as their quality and character determine the introduced changes, core curricula, educational network, and the autonomy (or its lack) of head-teachers and teachers in their work at school. The focus on education results from the wish to shape social awareness, views and beliefs. Totalitarian, conservative and autocratic politics necessitates the hierarchical nature of the educational system – because it should reflect the implemented educational policy. Such a system of education involves control over the teacher's work, indicates compulsory curricula at each educational stage, and – in compliance with the applied direction – more precisely indicates the axiological and teleological assumptions. The educational network, its patency and teaching profiles are also supervised. This as well concerns the nature of the implemented educational policy towards minorities and immigrants.

The state's undertakings are reflected in the educational law – a part of the administration law system, which comprises legal acts regulating the state activity in the field of the educational system, teaching and moral education, and the legal relations appearing in this sphere. Educational law specifies the state's tasks in education and the system of education is responsible for their implementation. The way in which national or cultural minorities build their social capital is also associated with the implemented educational policy – particularly at the state level (Gajdzica 2010: 188-199, Gajdzica 2015: 95-105).

The policy aiming at support for the majority and building a strong mono-cultural

state makes the representatives of minorities choose one of the following:

Active opposition – the capital is a manifestation of rebellion taking place along with some repressions caused by political reactions. As a result, the conducted actions have the nature of fight or active resistance. Associations and organizations act in conspiracy and are based on a hidden programme. Social bonds are strong and emotionally tinted. What occurs in this case is minority education aiming at survival and maintaining the identity – yet, this is marked with rebellion, resistance and willingness to change through fight-oriented activities. The contents and values passed down the generations constitute the basis for shaping attitudes of the young – the attitudes involving aggression and prejudice towards the majority. The educational policy of the minority stands in opposition to the one officially implemented by the state.

A passive attitude – subordination to the majority. As a result, there are no undertakings heading for promotion of the own culture or tradition. In such a situation, the educational policy of the minority does not exist. Neither do the activities which aim at taking into account (in general curricula and educational policy undertakings) the key issues for minority groups. This might also result from dispersion of the minority, its inner conflicts or weak social bonds. Lack of educational policy results in gradual assimilation.

Opposition which poses passiveness – building the social capital in secrecy, as a bridgehead and from the fear of repressions. Activities are undertaken in a narrow range and are based on mutual trust and loyalty within a small group of people. The mechanisms of building the educational policy are similar to the first type – education is treated by the minority as a sphere which enables maintaining the identity and preservation of tradition. The social bonds are strong and emotional. The minority education heads for survival and maintaining the identity but there are no acts promoting aggression and rebellion against the majority. The priority is surviving.

Discussing currently implemented types of educational policies towards minorities may lead to noticing that they can be placed on an axis from official support (but with the hidden programme of the state) to optimal actions, which constitute the foundations of the educational system which promotes intercultural education. They can be briefly described as three types of activities:

- Official political support – aiming to obscure hidden actions (a cover for acts of repression in a different area). Activities promoting a particular minority are treated instrumentally in order to achieve particular political objectives. The minority, which in this situation has good conditions for building the social capital, is under control and feels to be in opposition to other social groups. This influences the educational policy of both the majority and the minority. Willingness to show a democratic face means that double activity of the majority takes place – the official and hidden programme. The contents convenient for the state are endorsed, promoted and financially supported. What is established are

showcase schools and associations which are of decorative nature. The activities conducted by the minority group are supervised and subjected to censorship. Officially, the minority is not repressed but, in the situation of lack of subordination, it loses its privileged rank and financial source.

- Passive political acceptance by the state without (e.g. financial) support. As an effect, activities are conducted in compliance with the own resources. This allows the minority to implement their own open educational policy. The state does not interfere in the undertaken activities, neither hinders nor limits them. Therefore, it is possible to run a system of teaching, training and conducting organizations which promote culture. What constitutes a difficulty is the lack of financial support – when the financial measures are limited and the minority does not feel that education is indispensable for maintaining the identity, educational activities can sometimes be abandoned. Implementation of the educational policy is independent from the state politics and its quality and range is a derivative of the social capital of the minority.
- Political support – as one of the pillars of the state's programme – financial and programme support, taking into account the needs of the minority in the broader programme of social activities. What can be noticed also in this area are many ways of conducting the educational policy by the state – from activities aiming at gradual assimilation to the optimal, widely promoted intercultural education. Educational policy implemented by the minority has the open character and its quality and range depends on the awareness of the significance of educational activities and the social capital of minority groups.

It is worth due attention that educational liberalism might also lead to negative effects – for instance, to perpetuation of the mechanism of social reproduction or of social stratification (Lewowicki 2000: 25). Thus, it is essential to specify the teleological assumptions in a precise way. The educational policy heading for interculturalism should aim at:

- learning and understanding the own self, the culture of the own region – in order to be aware of oneself as well as of the possessed values and cultural heritage;
- overcoming the tendency to limit oneself only to staying within the own values, the native world, in favour of opening to Others and understanding them – respect for differences and treating them as an enriching developmental factor;
- implementation of noticing and familiarizing with the Other, shaping sensitivity and ability to cooperate, counteracting the creation of simplified schemes of the Other based on stereotypes and limited knowledge (Nikitorowicz 2002: 50-51).

## ***2.2 Economic factors and implementation of educational policy***

Economic determinants of educational politics reflect both the economic condition of a particular state and the rank attributed by politicians to educational sectors. The

awareness of how significant the education system is for the development of the state makes some countries allot much larger budget to educational development than in other states with a comparable or higher gross domestic product. It is also important how the received financial resources are spent – whether they just fulfil the current needs associated with maintaining the existing system or whether some planned investments are undertaken – both in material and human resources (e.g. staff training system). Another major issue is the relation of education to the economic sector through activities which concern designing vocational and higher education.

The significance of economic factors was confirmed in the research results of the studies conducted in the county of Cieszyn (Gajdzica, 2005). In four out of twelve schools run by local authorities, educational policy was limited to specifying the conditions of educational activity. This means that the county authorities focus on the maintenance and development of the school material base. Only in two cases, the view on educational policy reached beyond the economic area<sup>1</sup>. The information obtained in particular county schools suggests that economic issues – often emphasized as the most important factor in organization of education – become the only element comprised in the assumptions of educational politics. It is interesting that the financial condition of the municipality does not matter. What becomes a characteristic feature is the care only for ensuring the functioning of school. Educational issues are often on the margin of municipal activity – treated as a financial burden. There is hardly any planning.

Economic factors become a determinant especially in the case of bad financial condition of administration units responsible for running the educational network. Such a situation took place when municipalities were obliged to fulfil obligatory kindergarten preparation for six year old children without any additional subvention. This resulted in closing down many kindergartens, especially in rural areas, and in decreased indices of popularization of kindergarten education (Grabowska 2005: 87). A slightly different dimension of economic dependency of school education is presented by Irena Bogacz (1996), who explores the issues of minority education in Zaolzie in the historical aspect. The author writes about economic pressure which became the heaviest blow for school education in Zaolzie at the beginning of the 20<sup>th</sup> century. In the interwar period, enrolling a Polish child to the Czech school was frequently the only way to protect from unemployment (p. 43).

### ***2.3. Sociocultural and demographic factors***

The way of conducting educational policy is directly associated with **social determinants**. The less autocratic way of implementing the policy in a particular country, the more possibilities of considering social needs (including those of local nature) in the process of educational transformations. What is possible in the democratic state are bottom-up changes, which take into account the specificity of the social environment, demographic changes, and the needs concerning particular jobs, hence also vocational education. The recent years brought about an

informational explosion, which resulted in the increased demand for new professions and jobs. This is also situated among socially significant factors which educational policy should consider. What can exemplify this are social campaigns and the diagnosed problems concerning the general health condition of citizens (Piechaczek-Ogierman 2009).

It is the issue of **historical-national determinants** – strictly related to the specificity of the state, local environment, its history and culture – which is also of due significance, especially in the context of implementing the policy towards minority groups. This is associated with the citizens' general awareness of their own identity as well as with their attitude to changes. It affects the opinions and functioning stereotypes – e.g. concerning minorities.

Radical politics is linked with promoting the idea of a strong state and nation. School is treated as a tool for shaping the attitudes and the hierarchy of values which agree with the promoted model of education and the aim of building a uniform view of the world (Paszko 2000: 307). Past experiences are of a lot of significance here. Presenting the situation of Poles in the period of partitions, Lewowicki (2000) describes the issues of implementation of the educational policy aiming at assimilation of the Polish population, and in the case of territories annexed by Prussia – at maintaining and promoting the German national spirit (pp. 24-25). Less determined actions aiming at assimilation of the Polish population were carried out in the territories under the Austro-Hungarian rule. The author defines them as an alleviated form of subordinating the societies or communities deprived of freedom/independence. This consisted in small gestures liberating the educational regulations and allowing for references to the elements of national cultures (Lewowicki 2002: 18). The tragic experiences of the partitions substantially influenced the attitude to national minorities and their cultures after World War I in the reborn Polish state, in which there were some opportunities of learning in national languages but, on the other hand, unwillingness was often manifested and numerous restrictions were introduced (Lewowicki 2013). The further experiences – associated with World War II and later with having the externally controlled government – caused that it possible to notice a more favourable attitude to national, ethnic and regional cultures only in the seventies. Although the notion of multiculturalism, used in West-European countries, did not function in the official language, the conducted activities were of multicultural nature. The tendencies to build multicultural education (fulfilling the needs and ambitions of national and ethnic minorities) became much more intensive after the political transformation in 1989 (Lewowicki 2014: 24-26).

Historical-national conditions frequently determine the character of the minority school and the way in which it is perceived in the local environment. Dariusz Wojakowski (2000) draws attention to the stereotype of an Ukrainian which is maintained in the South-East of Poland. The implemented educational policy aims at education into tolerance and familiarization of the youth from the dominant group



with the minority culture, which contributes to the change in the attitudes of the young (p. 126).

Lack of discussion on the common past might often perpetuate stereotypes and lead to abandoning discussion in other fields. This can be exemplified by the attitude of the Lithuanian majority to the Polish and Russian minority. The historical-national determinants become the foundation of the excluding educational policy which blocks the development of the minority (Kurzępa 2002: 181-194). A similarly difficult situation can be observed in the case of the Polish minority in Belarus, where historical factors – concerning both the distant times (I and II Republic of Poland) and the whole 20<sup>th</sup> century (Sobecki 2005: 253), affect educational politics and determine the quality and character of minority schools and their work.

Observing the demographic prognoses and changes in culturally and ethnically diversified environments allows for indicating certain tendencies which enable planning social or educational activities. The analysis of demographic conditions is mostly associated with predicting birthrate increases and declines which determine the development of the educational network. These factors are directly related to other fields, e.g. economic determinants. In the case of minority schools, demographic changes most frequently result in closing schools down, especially if in particular countries there are trends to open huge school “giants”. This takes place in the Czech Republic and occurred earlier in Czechoslovakia. The tendency described by Janina Urban (1994, 2000) to close down small schools in Zaolzie – as unprofitable and unnecessary due to the decreasing number of learners – has maintained till today (1994: 116, 2000: 55-59).

### 3. CONCLUSION

Politics is a notion which has functioned unceasingly in scientific discussion since ancient times. The Aristotelian expression “the man – a political animal” (2006) indicates that the man, who by nature is a social creature, is also oriented towards life in the community which is politically organized. Politics itself is described as the art of controlling and negotiating the interests of various social groups (Wnuk-Lipiński 2000: 135) and, at the same time, it is treated as a kind of strategic game based on winning and losing. What seems important is the awareness that no political system, even a perfectly democratic one, provides everybody with everything. Political activities always favour some at the cost of others (Buttolph Johanson, Reynolds, Mycoff 2010: 18). To a large extent, this results from the fact that the axiological dimension is a constitutive element of politics. It is associated with promoting certain ideas, ideologies and political doctrines which organize the view of the world from a particular perspective and indicate the way of acting – the applied principles, norms or the methods used by people who implement them in life. This often becomes a source of conflicts which might result either from the protection of self-esteem (both on the individual and group level) or from ideological differences – the latter is a consequence of building the individual or

group identity in the system of the own beliefs and convictions (Wosińska 2004: 502). Thus, educational politics as well is based on appropriate knowledge of implementation of what is possible among all the postulates presenting the interests of different social groups. This gains in significance in the culturally diversified environment – therefore, especially there educational politics should be paid special attention.

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# **BUSINESS PROCESS MANAGEMENT AS A SUPPORT FOR E-LEARNING DEVELOPMENT IN POLAND**

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***Abstract:** Polish model of higher education is to be an open system of education with latest technological solutions, which should enhance efficiency, quality and cost-effectiveness. Modern educational technologies include mainly e-learning platforms. This paper presents the new world-wide trends in contemporary e-learning in comparison to Polish e-education and its condition. The authors suggest also the Business Process Management as a solution to support development of Polish e-learning.*

**Keywords:** process management, educational organization, e-learning development trends

## **1. WHY E-LEARNING?**

**E-Learning** proves to be a perfect tool to achieve expected goals in a short time span. Continuous education with on-line learning is an advantage mainly because it aids succession planning, helping workers/students to acquire the knowledge and skills they need with low cost incurred.

There are 7 key e-learning trends for 2016.

### **Automation**

Automation will finally become a key feature of content creation and processing. An increasing number of automated solutions appear on the market to create new courses and learning materials, saving the time and money. These tools will scan the course content and recognize its most important aspects that should be tested involved in conventional processes. Courses, tests, quizzes and exercises will all be



tailored to the preferences and requirements of every single user. The skills and knowledge will be assessed by automated tools that will in turn offer algorithmic solutions used in creating course content.

**Augmented learning** adapts environment to a learner by means of QR codes or mobile technologies like Apple Watch or Google Glass. Learners can be placed in a replica of their work space, or a modeled 3D environment, with content pop-ups and features superimposed. This action-based functionalities in real life will be conducted by means of GPS tracking, as well as with courses developed by Oculus Rift.

### **Big Data**

The amount of data is growing year by year. E-learning centers will use application made especially for big data processing to make sense of the user-generated information. These tools will analyze a heap of data to produce meaningful and valuable conclusions about user performance or course content optimization. Big data analytics will aid better understanding of the learning process itself. Course providers will be able to track student and group learning patterns and perform a feedback analysis. These tools will be extremely useful to compile a comprehensive ROI report for learning.

**Cloud Based LMS** will dominate the market as they are secure, with low initial costs, easily accessible from anywhere and anytime. Moreover, they do not require storage space on users' devices and are fully customizable and scalable.

### **Gamification**

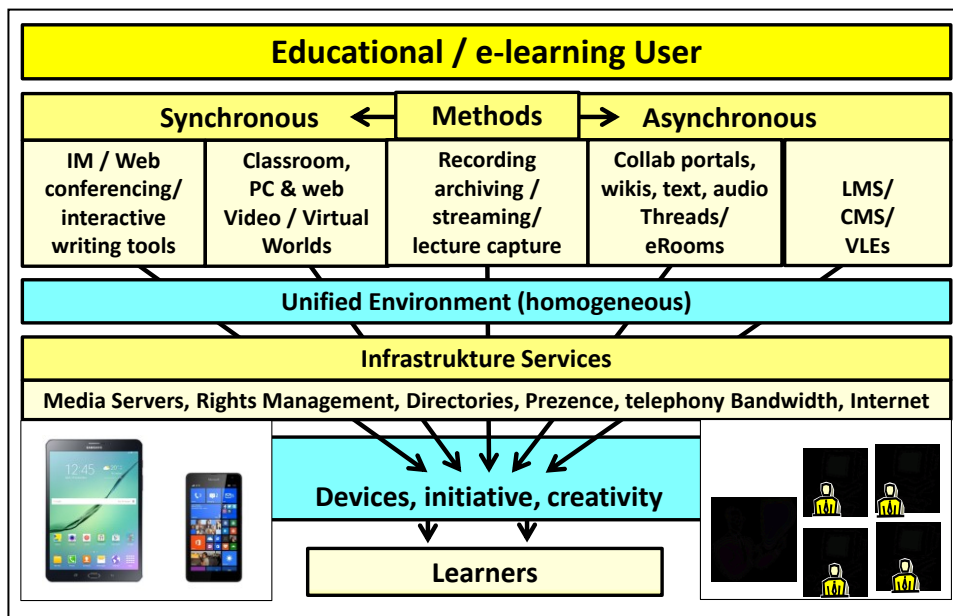
A mass of facts and information and various stimuli distract learners, make impossible to concentrate on one thing. It requires a lot of effort to keep students engaged in a state of "flow" – a phase of concentration. One of an effective motivator is a prize, even a small one (Piękoś 2015). It has been proved that applying game dynamics onto non-gaming contexts brings really great results as it motivates people to achieve their goals. This new problem-solving tool can be easily applied to learning. Gamification offers a potential strategy for improving user engagement with learning materials – some experts claim that the technique can boost learner's motivation to a smashing 90% recall rate. It's quite simple. Once learners assume an active role in knowledge reception, they will automatically improve their chances at remembering it.

Communication and Collaboration are two essential processes to foster relationships among students and between students and teachers. The 500 student lecture hall is just as ineffective as the 500 student online course. Only a small percentage of students can successfully complete a MOOC.

**M-learning** - is likely to become more and more attractive by **compliance** and both **regulatory and general topics**. It is mobile, informal, and performance support type learning. Using m-learning technologies learners will benefit from contextual

learning achieved through micro-location technologies (like QR codes, GPS and other) that will also allow for a much better use of augmented reality.

Figure 1 illustrates the types of technologies applied in e-learning, and what might be referred to as a unified collaboration environment for distance education and e-Learning. The “unification process” is only just underway, and will continue to evolve for years to come.



**Figure 1. Unified Collaboration Environment for Distance Education & e-Learning**

*Source: Elaborated on the basis of The Distance Education and e-Learning Landscape. Wainhouse Research Segment Report 2009, USA*

**Personalization** will be all about adjusting the pace of instruction, motivating students, letting them to follow their own learning path and adjusting content presentation with a better choice of text, images or videos. The features that will make personalized e-learning even more attractive are:

*Adaptive learning* will be even more popular in the academic sector for its capability to improve overall learner performance and prevent failure and drop out. Adaptive platforms not only record marks and learning achievements, but measure metrics such as time spent in aligned social media environments, attendance at lectures, and work submission patterns.

*User generated content* - learners, at any level, are ready to start creating and share their own content following the same training path that they have passively followed till now. It is going to be really effective in the environment of significantly growing **social learning and mobile learning**, especially in combination.

*Interactive video* - the increase in people using video. New solutions allow users to host, serve, secure and track their learning video globally at a reasonable cost and quality.

*Badges*, particularly Open Badges, are a breakthrough in the education market as they play a role in supporting and rewarding learners. They will boost learners' desire to manage and publish their own digital credentials and achievements in social media (Sikora, UNIT4 Software Engineering).

E-learning is not a matter of coincidence. E-learning should be intentional on the part of the university or organization that implements it or it will not work. Students' success depends on it.

This projections for year 2016 about development of e-learning in the world are prepared by Docebo company. *The Report by Docebo March 2014* presents new technologies for e-learning, their functions and how rapidly they develop. Yet, Polish universities and schools of higher education still talk more about the barriers to implementation or development of e-learning systems rather than positive perspective and successful, profitable activity.

## **1. CONDITIONS FOR E-LEARNING DEVELOPMENT IN POLISH UNIVERSITIES AND SCHOOLS OF HIGHER EDUCATION.**

Theory and practice of e-learning in Polish universities is built up mainly on a basis of publications and conference presentations. There is still a lack of systematic, fully available information about the scale and forms of e-learning activity. To cover this gap, Association of Academic E-learning (SEA) was founded to create e-learning databases for Polish universities. The aim is to: collect and popularize information about e-learning activities, compile reports and perform an analysis of Polish high e-education and popularize using new IT technologies in the learning process (SEA).

Two leading Polish universities successfully implemented their original models of using IT technology for learning: University of Economics E-learning Centre in Cracow (CeL) and Centre of Open and Multimedia Education in Warsaw University (COME) (Dąbrowski, Zajac 2010). The achievements and findings of the experts from these universities may serve as a guidance for others to change a status quo.

Universities aim at providing interdisciplinary not only specialist and professional education, so they are forced to take some actions: extend the educational offer, make education more available and interdisciplinary, flexible and of better quality. To make these ideas realistic they implemented new IT technologies and created their original e-learning models.

COME – an interdepartmental unit in Warsaw University (UW) is responsible for popularization of new educational forms. Its Interdisciplinary Database of Academic Courses (IBIZA) offers e-courses on subjects and disciplines other than currently studied ones, e.g.: *Mathematics for humanists*, *The introduction to macro and microeconomics*, *Law for non-lawyers*, *Elements of Excel*.

The offer includes also:

- language-courses – replacing traditional courses. There are about 100 virtual groups in a semester, mainly for English, but also a few for German, Russian, Croatian, and Czech. The courses are run with a blended-learning method,
- regular courses which support traditional learning
- training courses for first-year students: compulsory Industrial safety course and Library course (*Virtual University 2015*).

COME coordinates also projects, research and analysis on needs, developing e-learning methodology and curriculum. The partners are Jagiellonian University, Warsaw Technical University.

Initiators of e-UEK (E-learning Centre of the University of Economics in Cracow) projects followed five principles:

- principle of equal rights of e-learning and traditional learning methods,
- principle of coherence of e-learning system, which implies defining some rules to include e-courses in a regular curriculum, creating a catalog of approved forms and methods to calculate working hours for teachers,
- principle of professional and systemic actions, which means any e-learning initiative is performed as a project with defined goals, priorities and actions and evaluated according to defined methodology of quality management,
- principle of quality, i.e. e-learning projects should meet university quality standards,
- principle of central project management, i.e. that any university project is coordinated and completed by a special unit – The Centre of e-Learning (CeL).

The E-learning Centre of the University of Economics in Cracow provides:

- support for learning units in University of Economics in Cracow with systemic and systematic course planning and organization,
- training courses for teachers on preparing and running courses on the Internet,
- support teachers with preparing e-teaching materials,

- support students participating in e-courses.

The Centre also:

- administers the UEK e-platform,
- creates new and developing existing applications,
- promotes new teaching forms applying multimedia,
- participates in European e-learning projects,
- conducts research on methodology of designing and running e-courses, managing e-learning projects and also performs the ROI analysis.

Their achievements and experience helped the experts in both academic e-centers formulate the following findings:

- although e-learning won its position in UW (as it is included in the process of problem-solving), is still marginal element in teaching process itself,
- specific isolation of university departments thwarts the university efforts to provide interdisciplinary education and constitute a serious barrier to promote changes suggested by the center,
- implementation of e-learning system in universities is a slow, long process which should be performed gradually,
- e-learning will be a crucial element of an education system if introduced thoughtfully to solve defined problems typical of a given university. Then, people will understand the need for change and will approve and appreciate this new way of organizing and teaching .

These findings are supported by UEK experts, who claim that the university will benefit from changing the model of education if all actions will be based on the coherent rules or “pillars of good academy”: perspective legislative policy, codification of flexible types and forms of e-courses, effective quality evaluation system, system of support for teachers and students and research and development of e-education. These pillars implies also coherent academic culture, support, high educational standards, e-course certification (assigning responsibilities to teachers, and managers), promoting positive approach to technology, creating mechanism to prevent misuse and treating e-learning as an excuse for lower teaching standards (ethical issues).

Experts in both universities unanimously emphasize that successful implementation of e-learning depends on professional and in-depth organizational changes in the whole university which will guarantee free co-operation, co-existence and merge of both teaching models: traditional and distance.

One of the reasons for which organizational changes appear to be a top priority is that implementing efficient e-learning model is a complex process which requires

co-operation of experts at many fields. This is reflected by the structure of E-learning centre:

- Manager of the Centre (a plenipotentiary of Rector),
- Team for E-process management,
- Team for E-learning methodology,
- Team for E-learning technology,
- The Policy Council supervises professional performance of projects (SEA).

Preparation of e-learning project requires the team of different experts to cooperate: an author of content, methodology expert, graphic designer, language proofreader, reader, IT specialist, programmer, tester.

### **Conditions of e-learning development in private schools of higher education.**

On the basis of observations and experience, the authors may summarize the conditions of e-learning systems in private schools of higher education as following:

- Ineffective spending of EU funds assigned for e-learning development,
- lack of financial means, human resources and tools to create project teams,
- Lack of organizational integration – management barriers,
- Lack of motivation and strategy of e-learning development also because of generally poor performance of schools.

## **3. BUSINESS PROCESS MANAGEMENT – A SOLUTION TO SUPPORT E-LEARNING**

The analysis of achievements and performance of e-learning centers indicates the areas for improvements but also the needs of Polish universities in general. The solution which would meet the needs and foster implementation and development of e-learning system is *Business Process management* (BPM).

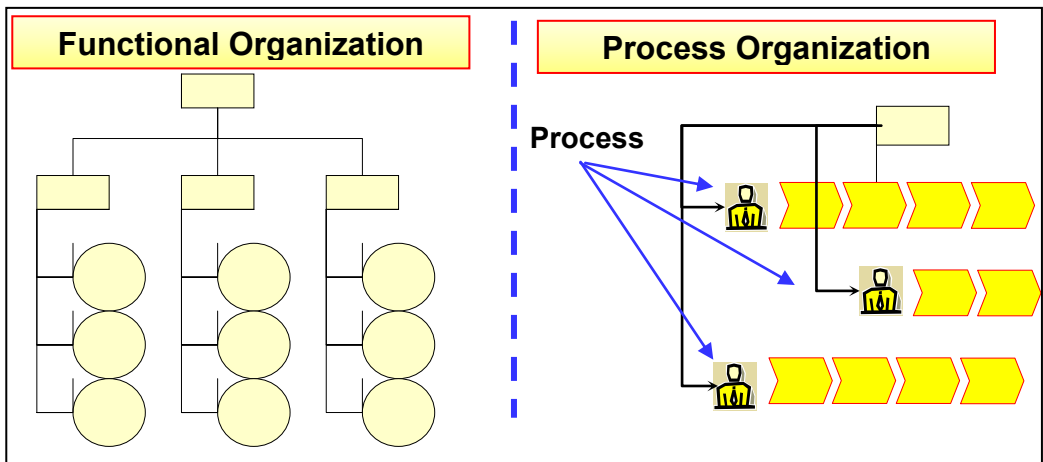
***“Business Process Management (BPM) is a discipline involving any combination of modeling, automation, execution, control, measurement and optimization of business activity flows, in support of enterprise goals, spanning systems, employees, customers and partners within and beyond the enterprise boundaries. (Palmer 2015)”***

The following analysis should provide a better insight into BPM:

- BPM is a discipline; it is a practice; it is something you do.
- Business means commercially viable and profitable work which provides value to customers.

- Process means a flow of business activities which are connected toward the achievement of some business transaction. Flow may be loose: the order may or may not be strictly defined.
- A process should be considered at the scope of interrelated business activities which holistically cooperate to fulfill a business objective. This is the key difference from a functional view of business where each function might be optimized independent of the other functions. In a complex system like an organization (university), local optimization of a part of the system will rarely lead to good overall results. A BPM practitioner should consider the metrics of the entire system while evaluating a specific process.

The Figure presents the difference in structure of functional “fragmented” organization and a holistic process organization.



**Figure 2. The structures of functional” organization and a process organization.**

*Source: Elaborated on the basis of J.Kuck, 2013, p.68, Nowoczesne technologie w logistyce, AON, Warszawa 2013*

Another valuable clue Nathaniel Palmer gives is that **BPM is about improving processes** - the idea behind is that you view business as a set of processes, and BPM is the act of improving those processes.

An enterprise-wide *BPM* initiative has three “tiers”.

### **Tier 1 - Process Understanding**

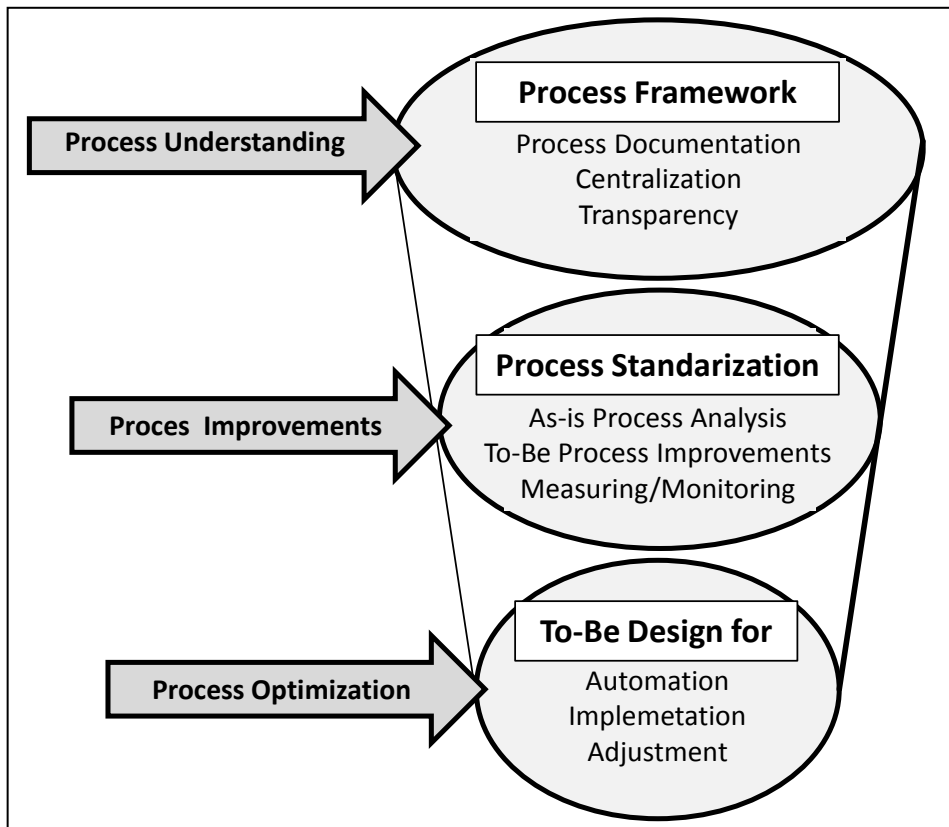
Processes with a focus on the core processes are documented according to a Using a process framework. Creating a central repository is another ingredient at this level.

## Tier 2 - Process Improvement

In terms of improvement, here is where a formal methodology may be applied. This level is about team working in workshops to dissect their business processes, identify inefficiencies, then recommend and implement process improvements.

## Tier 3 - Process Automation/Optimization

Once a method for improvement has been established and improvements applied, a subset of processes can benefit from technology and various applications. Workflow can enforce the processes performance. Process monitoring can track and audit work and provide insights to process problems. Automation can eliminate activities performed by people as well as eliminate human mistakes.



**Figure 3. Comprehensive Approach to business Processes**

*Source: Elaborated on the basis of BPM Methodology. Practical Guidance. [http://www.what-is-bpm.com/get\\_started/bpm\\_methodology.html](http://www.what-is-bpm.com/get_started/bpm_methodology.html) (accessed 23 August 2015)*



The most important advantages of process improvement in an organization are:

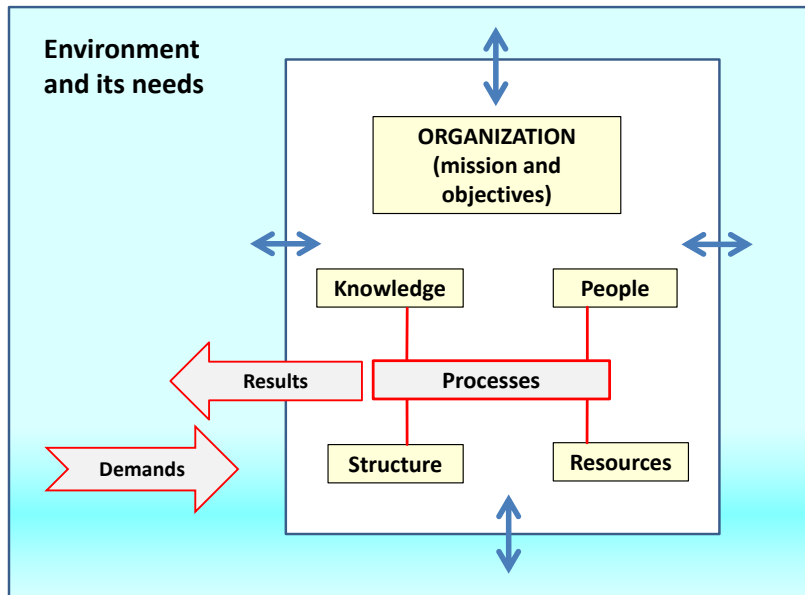
- a) copying the current processes and the structure of their connections
- b) presenting logical and time connections of activities in a process, facilitating identification of the following limitations:
  - lack of data integration
  - lack of processes integration
  - time extended single-minute exchange of die (SMED) for some functions, transport, data processing;
  - lack of transparency and effectiveness of processes
  - repetition of the same functions in a process,
  - too much of feedback
  - excessive costs
  - partial responsibility of people for the whole process,
  - too many functions creating no value,
  - too much time in a process, which does not influence value creation
  - too many changes of organizational units within one process.
- c) Assigning other functions of the process to positions or people responsible for a given function;
- d) Designing the system for measuring the process effectiveness;
- e) Defining what information should be transformed in a process and what information should be received after completion of a process;
- f) Developing interfaces for other processes, i.e. connections with other processes. It is essential to define time needed to transfer a given result of this process to a client or to connect together partial models built on different levels of detail. IT tools facilitate fluent navigation between different models of processes, which is not possible with traditional paper documents (Kuck 2013).

### **Processes in a university**

For BPM implementation needs, university should be understood as an educational organization.

Organization (also educational organization) is a system consisting of five basic interrelated elements: objectives, knowledge, people, structure and resources (Tomaszewski 2014). It is an open system with the specific environment which

influences this organization. The Figure below illustrates the elements of the organization.



**Figure 4. Organization and business environment.**

*Source: Elaborated on the basis of A. Tomaszewski, 2014, p. 48, Organizacje publiczne i ich otoczenie [w] red. S. Sirko, 2014, Zarządzanie organizacjami publicznymi, AON, Warszawa 2014.*

To define the idea of process, first its elements should be explained.

*Activity* – is a key element of a process. George Hostelet (1960: 56), the leading praxiologist explains that act reasonably means changing reality more or less consciously, pursuing a defined goal in specific conditions, using resources to reach the condition suitable for a defined goal.

Max Weber claims that "...in 'action' is included all human behavior. He emphasized the difference between this minimally meaningful conventional action and innovative action, Weber analyzed the sense, or meaning, of human action at many levels, three of which may be considered basic, The three levels have to do, respectively, with the components of material interest, feelings of affinity, and authority in social relationships.

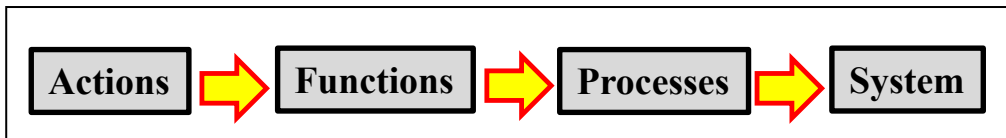
## Process

Michael Porter defines a process as the value chain. The idea of organization as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of resources - money, labour, materials, equipment, buildings, land, administration and management. How value chain activities are carried out determines costs and affects profits (Porter 1985).

*ISO 9000:2000 standard definition is:* a process uses resources to transform inputs into outputs. In every case, inputs are turned into outputs because some kind of work, activity, or function is carried out. Processes can be administrative, industrial, agricultural, governmental, chemical, mechanical, electrical, and so on.

*A process* is a sequence of interdependent and linked procedures which begin and end, they have clearly defined inputs as well as the end result. In other words, a process is a series of defined actions that lead to a particular result. A business process, designed to reach goals defined by an organization, institution or company, involves connections between suppliers, clients and other entities, business partners, etc. A single change in a business process is a function. Decomposition of a function transforms the function into a sub-process. With the equal access to resources, technologies and suppliers, organizations compete through efficiency of processes. Measures of process efficiency are: time, cost and quality of the result provided to a client (Kuck 2015).

Richard Boulton and Barry Libert claim that processes constitute a real functioning of an organization: they are a sequence of operations, methods, tasks and functions that produce some goods or services<sup>1</sup>. Figure 5 presents the hierarchy of elements in a process.



**Figure 5. Hierarchy of Elements in a Process.**

*Source: Elaborated on the basis of B. Badirui B. Ayeni, [In] Skrzypek, M. Hofman, 2010, p.35, Zarządzanie procesami przedsiębiorstwie, Oficyna a Wolters Kluwer business, Warszawa 2010*

Main characteristics of the process are:

- process is a set of actions
- process is ordered, i.e. actions are performed in a specific order,
- actions in a process should lead to the result.

The needs of a particular organization determine the number and nature of processes. There are three different types of business processes:

- core processes (also called primary, essential, operational processes)
- support processes, designed to provide support for primary processes, and performed within an organization
- system processes (management) support and improve the whole management system in an organization.

Core processes often called main processes, are composed of actions, decisions, information and materials taken together. They have the biggest influence on organization performance and (for a company) its competitive position on the market. Core processes create value, have a strategic meaning, and run through many departments connecting suppliers with the clients. Support processes do not have any strategic meaning and should be clearly separated from the primary ones. They can be accomplished effectively by outer companies (Kuck 2013).

The literature provides a variety of classifications of processes:

- operational, support (Brilman 2002);
- mega processes, main processes and sub processes (Zimniewicz 2003);
- operating processes (main), support processes (American Productivity & Quality Center).

(Kreuz 1996) categorizes processes into four types:

- key processes ensure the success of an organization, institution or a company by emphasis on high quality of a product or service oriented towards competitors;
- “leverage” processes that recognize time, costs and quality and optimize them;
- opportunistic processes deal with different approach to clients, promoting those with whom cooperation generates best profits;
- supporting processes support the key processes, should maximize effectiveness and eliminate redundant work.

The processes may also be divided by:

- a) decision-making positions:
  - managing (system) processes,
  - executive processes;
- b) importance for an organization:
  - strategic processes,
  - operational processes;

c) submission:

- main processes,
- minor processes.

The processes to be effective should be performed by aware workers who undergo proper training and change the way of thinking and perceiving of organization and its functioning. Organizational culture and holistic way of thinking are crucial. Concentration on speed, efficiency and correctness without understanding the meaning of actions is a perfect recipe for a potential disaster. Objective – based management should prevent this disaster.

**System of processes** in an organization is a set of interrelated processes. Some obstacles and disturbances on the verges of processes decrease the efficiency of the whole system

The whole system may be characterized as follows:

- system of processes is artificial – it is created to accomplish a specific goal,
- system of processes is coherent – change of one element may trigger change in other elements
- system of processes is open – the environment influences the system,
- System of processes is complex – its structure comprises: a subsystem of goals, a subsystem of measures, a subsystem of process owner's responsibilities. These subsystems are interrelated.

Considering specific activity of a university (educational organization) the following processes were defined: main – student-oriented processes, supportive processes and management processes.

**Table 1.**

**Processes in an Educational Organization**

<b>Research and Development Process</b>	<b>Goals</b>		<b>Structure</b>	
International cooperation	Exchange knowledge and experience	information,	Research projects	
			Conferences, seminars	
			Publications	
			Students Exchange programs	

Business contacts	Cooperation Exchange information, knowledge and experience Licenses and copyrights for research results Development of practical education Mobility of staff	R&D cooperation Research projects Implementation of innovations E-courses for business sector
Teaching process	Goals	Structure
Teaching	Preparation and realization of a teaching process for Bachelor's and Master 's studies. Teaching skills and providing knowledge appreciated by future employers	Developing a student's profile Planning studies (educational offer) Planning a semester Teaching Planning training/apprenticeship Evaluation
Language competence	Preparation, performance and evaluation of language courses	Placement test Completing and evaluating courses Evaluating language skills of students
E-learning	Preparation, performance and evaluation of e- learning courses	Accepting an order Creating a project team Preparation of e-courses Implementation Evaluation
Employment guidance	Providing guidance to a student in finding the first job	Trainings about employment market Writing CV and preparation to a job interview

Supportive processes	Goals	Structure
Recruitment	Organization and completion of recruitment	Defining requirements Completing recruitment process Providing efficient service for candidates Announcing the results of recruitment process on time
Organization of studies	Organizing studies, ensuring efficient teaching process completion Preparing documentation of the process	Preparing documents of studies Planning and organizing courses schedule Making decisions about grants Providing teachers and students service Monitoring and controlling full completion of courses Monitoring financial means
Administration	Providing and maintaining equipment and resources	Maintaining infrastructure, resources, accommodation, transport Office work
IT service	Providing and maintaining application and IT tools for teachers and students	Providing service of IT systems, completing documentation, creating new applications
Human resources	Monitoring vacancies and employees' qualifications	Staff recruitment Adapting and training new employees Evaluating their performance Monitoring experience and professional development of employees

Library	Providing and expanding library book collections	Round o'clock access to the library catalog Monitoring number of titles Informing about new publications Short time of order-completion Cooperation with other libraries
Accountancy and finance	Controlling financial means	Controlling grants, funds Controlling spendings on conferences, courses, projects Controlling current expenditures
Analysis	Defining standards of quality for teaching process, level of students and teachers' service.	Statistical analysis Providing analyzed and reliable data about needs and requirements of university clients.
Managing processes	Goals	Structure
Monitoring Quality system management	Controlling documentation, monitoring and optimizing processes	Controlling documentation Audit Controlling faulty products/service
Managing the university	Efficient decision-making processes Defining strategy and goals Correcting mistakes in decision processes by continuous improvement	Supervision and controlling by top-management board Decision-making Prevention and correction of mistakes

*Source: Own work*

Public organization management still adapts functional-process solutions, where departments play a key role in organization and employees' minds. Figure6 presents the main teaching process and Figure e-learning process in a functional-process organization.



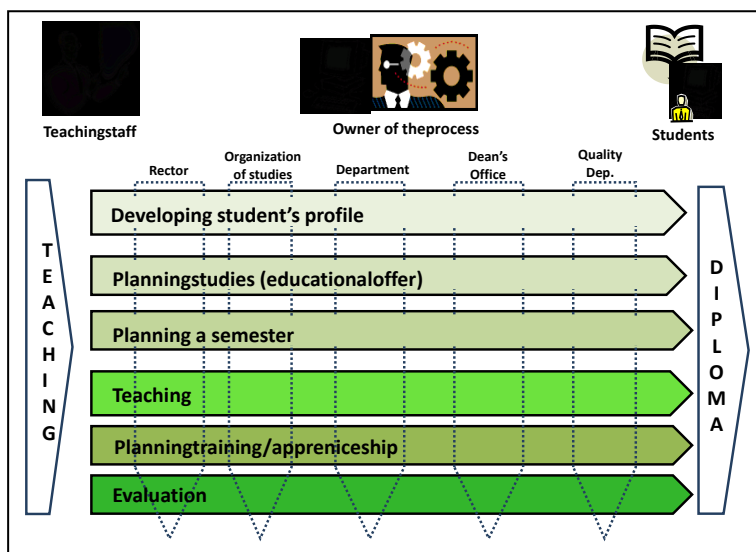


Figure 6. Teaching process in a functional-process organization.

Source: Own work

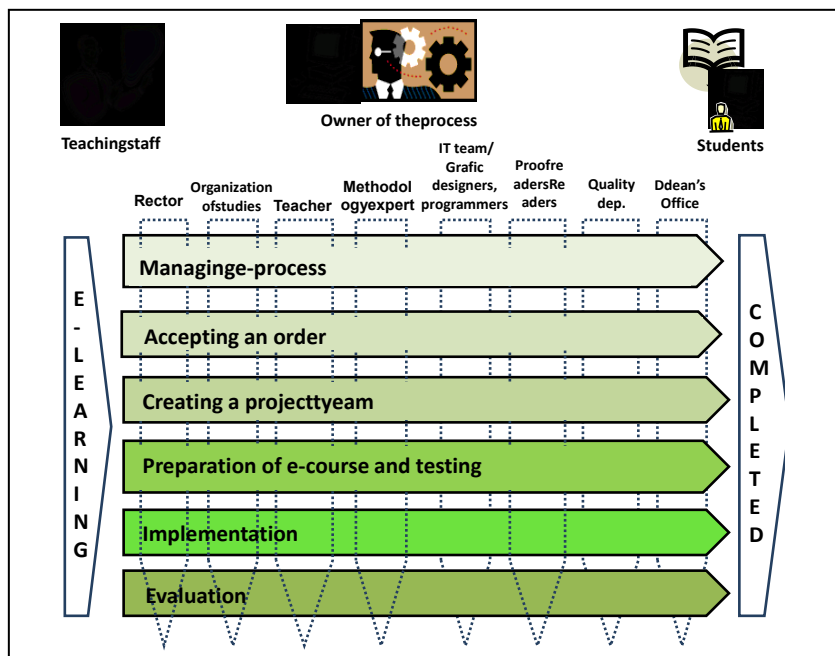


Figure 7. E-learning process in a functional-process organization.

Source: Own work

This functional-process model of organization will be evolving in time to the model of process organization as presented in Figure 2 above.

## CONCLUSION

The presented analysis of conditions for e-learning development in Polish universities leads to the conclusion that the model of process organization (BPM) meets requirements of contemporary university- educational organization. *Business Process Management* offers gradual implementation or reorganization of the educational system to provide any possible selection of teaching methods and project teams for meeting students needs. This solution defines a clear strategy and goal-oriented actions, foster developing effective system of research and development, evaluation and quality standards, continuous professional development of employees focusing also on proper organizational culture.

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# ACADEMIC SCHOLARS' VIEW ON THE CONTRIBUTION OF ICT TO THE ENHANCEMENT OF DISTANCE LEARNING ELEMENTS OF UNIVERSITY STUDIES

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***Abstract:** The study defines the basic constructs which are used in the university distance learning theories and practice. Distance learning is currently linked with eLearning and is becoming to be titled “online distance learning”. The research on a representative sample of the University of Ostrava students, which was carried out within the scope of the 7th FP IRNet project, was aimed at how the individual components of the electronic learning environment, which enhance university distance learning elements, can be used.*

**Keywords:** open and distance learning (ODL), online learning, university education management, massive open online course (MOOC), open educational resources (OER), equal opportunities

## INTRODUCTION

As educational institutions, universities react to the development of modern educational technologies and to the development of educational and learning theories. The higher level of ICT literacy of students – high school graduates or people who already work – who start studying at universities is demonstrated by their higher expectations concerning teaching methods and the organization of studies (mainly concerning the use of the current ICT technologies). Massification of university education results in both the daily attendance (DA) and combined study (CS) students studying and working at the same time, which means that they prefer the curriculum to be presented in a more distance manner, which does not require their direct presence in the classroom. When dealing with the mentioned phenomena, university teachers intend to (according to their capabilities and qualification) adapt their classes to students' expectations and possibilities and thus ensure the quality of their study outcomes. Online education, which can be understood as the interconnection of distance education and eLearning, has the

potential to take the abovementioned facts into account. The possible utilization of the potential can be influenced by a number of organizational, managerial, pedagogical and technical factors, the analyses of which are the subject of the annually issued reports on the situation of online education and universities in the U.S.A. These analyses are inspiring and draw attention to the critical parts of online learning and its development trends. Within the scope of the 7<sup>th</sup> EU framework program called IRNet (*International research network for study and development of new tools and methods for advanced pedagogical science in the field of ICT instruments, e-learning and intercultural competences*), a questionnaire research was conducted in each of the nine countries of the research consortium which was aimed at finding how important the university teachers consider the use of electronic resources in education, for goals of which they use them, which resources they use most often, how they help them influence students' activities and what they do to ensure that they are useful to all students. The paper presents the results of the research for the Czech Republic.

## 1. ONLINE DISTANCE LEARNING

The title of the chapter suggests that today online technologies are used in distance education. A large number of universities use online technologies to demonstrate that they offer study programs or individual courses realized mostly or entirely without direct contact with the teacher.

Essential elements and advantages of distance learning and its specific features concerning universities should not only be mentioned but also looked at from the point of view of its connections to both eLearning and online learning.

Distance learning (Průcha, Veteška 2012) is a form of study based on managed self-study with the use of information and communication technologies. It is a form of education with multimedia elements which is mostly used for the realization of university study programs and for further education (upskilling). However, it is used less often for the realization of high school study programs.

Zlámalová (2008) argues that the main goal of distance learning is to provide education to those students who – for some reason – cannot participate in daily attendance study programs (distance from the university, workload, family responsibilities, medical or social handicaps).

The so-called tutor – the student's advisor, who methodically arranges their education and evaluates going tasks – is the typical representative of distance learning. The student's self-study guided by the tutor and based on their (mostly electronic) communication is the basic principle of this form of study. Quality technological background, communication means and study materials (both printed and electronic) are essential for the successful realization of distance learning. Printed texts (study supports), which are significantly different from the text used in the DA study programs, are the basic study material. The distance study supports are

problem-oriented – full of questions, text gaps, exercise subjects, short tests, summaries, case study assignments, etc. (Eger, Dvořáková 2003).

Lojda (1999) argues that the changing social and technological conditions increase the attractiveness of distance study, which results in the increased availability of this form of study for potential students. As far as the new competitive environment is concerned, the use of ICT results in the approximation of the DA and CS forms of study in terms of multimodality. However, he also argues that the written text still is the basis for the successful study and that ICT is used only as a means of its distribution. Kopek (1999, in Eger, Dvořáková) explains that undoubtedly the multimedia part of distance learning is an important element of this form of education, but the main advantage lies in the quality methodology for the processing of study materials. Lojda (1999) adds that there also needs to be quality organization in terms of study management. He stresses that the organization of distance learning does not lie only in the evidence and administration of students and study materials, which are being distributed to students. He mentions the importance of a friendly study environment, support for study, encouragement, counseling, explaining the evaluation process to the student, etc.

Midgley (2015) offers an interesting look at distance learning in Great Britain when he argues that “Distance learning is a way of learning remotely without being in regular face-to-face contact with a teacher in the classroom. In the UK such learning has its roots in students learning through correspondence courses. More than 270,000 undergraduate students are taking their first degrees via distance learning, together with some 108,000 postgraduate students. In recent years the advent of the Internet and widespread use of the computer has led to a huge growth in distantly delivered tuition and study. At undergraduate level distance learning usually means students engaging with learning materials at home or work. These materials are produced by the university, college or learning provider and are either sent directly to the student or more usually today accessed via the Internet. Tutorial support is provided via a virtual learning environment, telephone, email or other electronic means. There may be occasional face-to-face encounters with tutors and attendance at week-long summer schools”.

He further specifies the advantages and disadvantages – why choose distance learning. The main advantage of distance learning is that it allows you to fit your learning around your work and home life. You can usually also set your own pace of study. It is your decision as to when and where you study. It doesn't matter where you live – you can gain a degree from anywhere in the world. As with a full-time degree, students may find that they gain useful, transferable skills, such as planning and research. A distance learning course often costs less than a full-time degree. The downside is that you will not enjoy the conviviality of being on a campus and rubbing shoulders with fellow students on a daily basis. Loneliness and feelings of isolation should be avoided, however, by frequent online contact with tutors and taking part in virtual forums, virtual help groups and discussion rooms. Distance

learning providers usually offer dedicated support to their online or distance learning students.

In the Czech Republic distance learning is most commonly associated with eLearning. According to Průcha and Veteška (2012), it is an educational process that uses information and communication technologies for the creation and distribution of study content, communication between students and teachers, evaluation of educational results and the organization and management of study. It is realized mainly through computer networks such as the Internet or Intranet.

Mužík (2011) offers a similar perspective and adds that eLearning constitutes a segment of didactics and that it is popular with both teachers and students.

Eger (2005) characterizes eLearning as education which is provided in an electronic form, needs a computer with software and a browser in the Internet or Intranet network and contains a multimedia platform based on the use of CD or DVD. Primarily, however, it uses a computer and a network as an interactive environment with the possibility of visual contact.

Various types of eLearning are becoming the subject of research with the results being equally important for both teachers and students. Individual teaching methods and technological solutions are developing as one gadget is being replaced by another. The student frequently chooses the teaching method according to their technical options, capabilities and the suitability of the educational product. According to Mužík (2012), the advantages of eLearning are as follows: the quality of the didactical-methodical level of study materials, the possibility of enhancing the content of the curriculum, relatively easy contact with the tutor. As far as the disadvantages of eLearning are concerned, he states a lower level of computer literacy, limited time to open some of the products on the monitor and reluctance toward interactive learning. The author further presents a simplified general overview of the possible variants of eLearning.

- Electronic media on the basis of television – the disadvantages are insufficient interactivity and feedback;
- Courses on CD-ROM and DVD – the student is not online and uses the multimedia elements of the study material (graphics, video, audio, animations);
- E-courses on the Internet/Intranet – teachers upload them on various educational portals and they can be studied online or downloaded for offline study;
- Virtual classroom (webinar) – interactive web tool which enables people to meet in a virtual space, communicate, cooperate without them having to be physically present. This variant puts pressure on the student as they need to be able to plan, organize and adjust their studies.

Zounek (2006) argues that the advantages of eLearning are as follows: flexible learning, individualization of study, support of the development of the student's ability to self-study and their sense of responsibility for their own learning. Moreover, the student can participate in the creation or development of study content. As far as the disadvantages of eLearning are concerned, he states limited or no contact of the teacher and students (mainly in distance learning), the preparation and realization of eLearning courses being time-consuming and the choice of improper information resources and didactic methods. He also sees a problem in students with insufficient competence for self-motivation and learning.

The recent rise of ICT and the expansion of electronic networks have resulted in the change of people's behaviour on the Internet and the change of their working and education styles. While in the past people were only passive consumers of the information on the Internet, today there are a large number of tools for active use of the Internet which enable communication, publishing, sharing, discussion about the best practice and learning. eLearning, however, plays a key role not only in informal education but also in informal learning concerning mastering computer work (Zounek 2009).

The development of online education within the classification of the methodological realization of taught courses or entire educational programs mentioned below shows the need for specific preparation of teachers for the realization of blended learning. As a result, appropriate qualification frameworks are being created (e.g. iNACOL Blended Learning Teacher Competency Framework, see Powell et al., 2015). The mentioned framework has four main domains: Mindsets, Qualities, Adaptive Skills and Technical Skills. Each domain has defined competences which are being specified by a particular standard. For each standard there is a detailed description with the study resources. This standard could inspire the preparation of university teachers for online education.

## **2. RESEARCHES OF ONLINE DISTANCE LEARNING AT UNIVERSITIES**

As far as the (low number) of such focused resources are concerned, it is necessary to mention annual reports on online education in the U.S.A. The 2010 report (Allen and Seaman 2010) collected data from 2,500 dormitories and universities (i.e. from 57.3% of all tertiary institutions). It provides the classification of university courses from the point of view of their didactic interpretation, i.e. the methods used, which was created on the basis on the comparison of classification approaches of the interviewed institutions. The traditional type of courses has a zero share of the online presented content. The web facilitated course can have a 1-29% share of the



online presented content. The blended/hybrid<sup>1</sup> course has a 30-79% share of the online presented content. The online course has a share higher than 80% while it has no share of direct instruction. 63% of all the interviewed institutions consider online education an integral part of their long-term strategy.

5.6 million students (nearly 30% of all university students; the number continues to rise) studied at least one online course in the year the research took place. The number of leaders of academic institutions, who consider the study results of online education the same or better than the results of traditional education, is also rising (from 57% in 2003 to 66% in 2010). More than 75% of public school leaders state that online education is the same or better than traditional (face-to-face) education. 75% of institutions state that economic decline increases the requirements for online courses and programs.

The 2011 report (Allen and Seaman 2011) shows only small shifts concerning the application of online education. The number of university students who study at least one online course has increased to 6.1 million, which is 31% of all students. The number of leaders of academic institutions, who consider the study results of online education the same or better than the results of traditional education, has increased to 67%. Academic leaders at institutions with online offerings have a much more favorable opinion of the relative learning outcomes for online courses than do those at institutions with no online courses or programs. It is interesting that over the past eight years the acceptance of online education almost has not changed and that it is different at different types of schools in spite of the fact that the number of online programs and courses is still rising. Only less than one-third of leading academic scholars believe that their department accepts the values and justness of online education. The departments profusely support the development of online education by combining mentoring and optional courses, which ensures pleasant and successful realization of online courses.

Omitting the three following reports, the 2015 report (Allen and Seaman, 2015) includes the summary of incorporation or planning of Massive Open Online Courses (MOOCs), which already exist in 8% of institutions. The percent of higher education institutions that currently have a MOOC: Many institutions (39.9%) report they are still undecided about MOOCs, while the single largest group (46.5%) says they have no plans for a MOOC. Only 16.3% of academic leaders believe that MOOCs represent a sustainable method of offering online courses (down from 28.3% in 2012). Decreasing numbers of leaders see MOOCs as a way for institutions to learn about online pedagogy: 27.9% this year, down from 49.8% and 44.0% for the last two years. The acceptance of online education decreased to 28%, this slightly declining trend is permanent. The report once again deals with a question whether or not ... *do Students Require More Discipline to Complete Online Courses?* *Academic*

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<sup>1</sup> Blended learning may fall into four basic models: Rotation model (with variants: rotation, lab rotation, flipped rotation and individual rotation), Flex model, a La carte model and Enriched virtual model (see Powell et al., 2015)

*leaders have been consistent in their belief that "Students need more discipline to succeed in an online course than in a face-to-face course." In 2005, a majority of respondents (64.7%) agreed with this statement. By 2013, the proportion had grown to 68.9%, and it now stands at 68.3% for the current 2014 results.*

Moreover, the report pursues the identification of the development barriers of online education. It argues that "When online education first arrived on the scene one of the hopes was that teaching with technology would be more efficient than current methods. Perhaps faculty could teach more students with improved quality by taking advantage of the new technology. This has not proven to be the case. Academic leaders have continued to report that it takes more time and effort for a faculty member to teach an online course than to teach a corresponding face-to-face course (Allen and Seaman 2015: 26). Unfortunately, „A majority of leaders report that the additional effort required to deliver an online course represents a barrier for online instruction. New technologies, faculty experience with teaching online, and expanded and improved institutional support services have not had any effect in reducing this problem. The level of concern in 2014, with 78.0% reporting it as an "Important" or "Very Important" barrier to the adoption of online instruction, is higher than it was in 2008 (76.3%).

It seems that the technical support of university teachers in using online education alone cannot limit the perception of this way of education as more demanding compared to the traditional way, which can result in the teachers' lack of motivation concerning online education and its application.

Moreover, the report also showed considerable variability concerning the perception of the term Open Educational Resources (OER), which is caused by the lack of terminological uniformity. It mentions the findings of the previous reports (Allen and Seaman, 2012), which came to two crucial conclusions:

“Nearly two-thirds of all chief academic officers agreed that open educational resources have the potential to reduce costs for their institution. There was wide agreement among academic leaders that open educational resources will save time in the development of new courses”. (Allen and Seaman 2015: 28)

On the other hand, the result of faculty awareness of open educational resources is surprising. “A bit more than one-third claimed to have some level of awareness. Just over 5% reported that they were very aware (“I am very aware of OER and know how they can be used in the classroom”), with around three times that many (15.2%) saying that they were aware (“I am aware of OER and some of their use cases”). An additional 13.8% of faculty reported that they were only somewhat aware (“I am somewhat aware of OER but I am not sure how they can be used”). This left nearly two-thirds of faculty reporting that they were generally unaware of OER (“I am not aware of OER” or “I have heard of OER, but don't know much about them”). (Allen and Seaman 2015: 29)

Another remarkable issue, which was part of the latest report, was the retention of students in online courses. “There is a growing concern among academic leaders on the issue of student retention. A total of 44.6% of chief academic officers reported that they agreed that retaining students was a greater problem for online courses than for face-to-face courses. This compares to rates of 40.6% in 2013, 28.4% in 2009 and 27.2% in 2004 for the same question”. (Allen and Seaman 2015: 24)

The authors of the report explain the issue by stating that the students choose online courses because they are not able to attend traditional courses because of work, family or other commitments. The essential answer, however, can be more complex: *“If students are more likely to drop out of an online course because of work or family commitments, does that reflect on the nature of the course, or the nature of the student?”* (Allen and Seaman 2015: 24). In any event, *two-thirds of all academic leaders continue to consider retention of online students a critical issue for the future of online education.*

### **3. RESEARCH ON THE USE OF ICT FOR THE ENHANCEMENT OF DISTANCE LEARNING ELEMENTS OF UNIVERSITY STUDIES**

At the end of the 2014/15 academic year, the collecting of data from a questionnaire research among academic scholars took place. The aim of the questionnaire research was to present the real picture of the current situation concerning university teachers' opinions on online education and the current situation concerning the use of the basic components of the university electronic environment for educational purposes.

The main research problem was unfamiliarity with the academic scholars' opinions on the instruments ensuring online education and the absence of relevant data concerning their actual use in the education process and for managed self-education of students.

Through the questionnaire compiled by the consortium of the project solvers answers to nine formulated questions were acquired, which can provide a more detailed picture of the researched issue.

#### **3.1 Research file and data collecting**

The research file consisted of 40 university teachers working at the Pedagogical Faculty of the University of Ostrava, 26 of which were men (65%) and 14 women (35%). 38% of the entire number of 106 academic scholars working at the Faculty participated in the research. The majority of respondents were Assistant Professors (72.5%), the rest were Docents and Professors. The majority of them were aged 41-50 (35%) and 31-40 (25%) while 62.5% of the respondents were no older than 50. As far as the level of ICT use is concerned, 7.5% of the respondents considered themselves beginners, 62.5% considered themselves intermediate users and 30%

considered themselves advanced users. The questionnaire was sent via email to all 106 teachers of the Pedagogical Faculty of the University of Ostrava. They were asked to fill it out in the Google environment. It was up to the addressed teachers whether or not they wanted to participate in the research. Therefore, it can be said that the selection of respondents was random.

### 3.2 Research results

The research results (after being statistically processed) are presented in the form of answers to partial research questions.

#### ***Research question 1 results:***

*How important do university teachers find the use of electronic resources in selected parts of university education?*

Using the five-point scale the respondents were asked to evaluate the significance of the use of six given electronic resources in education (1 means low significance and 5 means high significance). Values in Table 1 and Figure 1, respectively show that teachers consider the possibility to provide students with study materials and organize their group, collective or individual work to be the most significant.

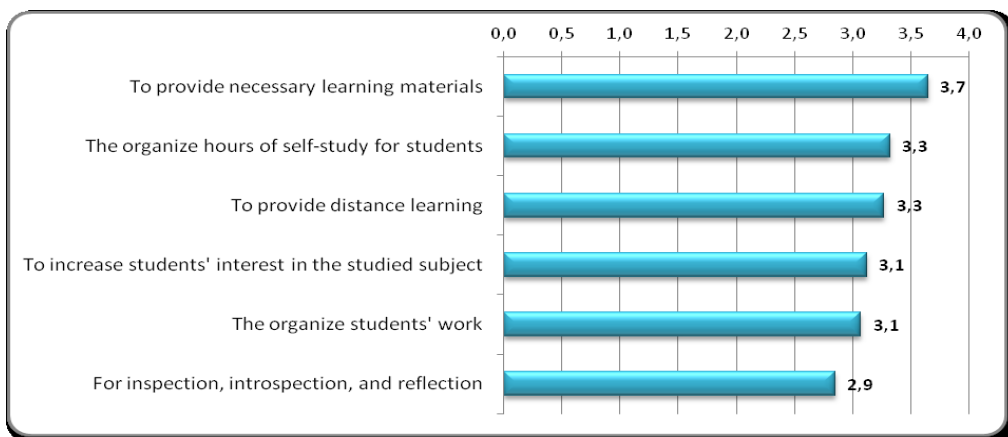
**Table 1.**

#### **Examination of the significance of the use of electronic resources in the selected parts of university education**

<b>Item</b>	<b>Mean</b>	<b>Std. Deviation</b>
To provide necessary study materials	3,65	1,292
To organize classes of self-study for students	3,33	1,328
To provide distance learning	3,28	1,485
To increase students' interest in the studied subject	3,13	1,265
To organize students' work	3,08	1,163
For inspection, introspection, and reflection	2,85	1,210

*Source: Own work*

It was not possible to compare the averages (the data are not normally distributed). As a result, medians had to be compared through Friedman's test. The result of Friedman's test (significance = 0.000) proved that the opinions of academic scholars on the significance of the use of the mentioned resources differ. They consider some resources to be more significant than other (see Table 1 and Figure 1, respectively).



**Figure 1. Examination of the significance of the use of electronic resources in the selected parts of university education**

*Source: Own work*

### ***Research question 2 results:***

*According to university teachers, which goals should be achieved through the use of electronic communication means in education?*

The respondents were asked to select those of the eight proposed goals that – according to them – could be achieved through the use of electronic communication means. They were allowed to choose as many goals as they wished.

The data in Table 2 and Figure 2, respectively show that 65.5% of all teachers are convinced that the electronic communication means are suitable for student consultations, 60% of them think that they should be used for evaluation of and comments on students' tasks and 40% think they should be used in discussions about study problems, preferably in online mode.

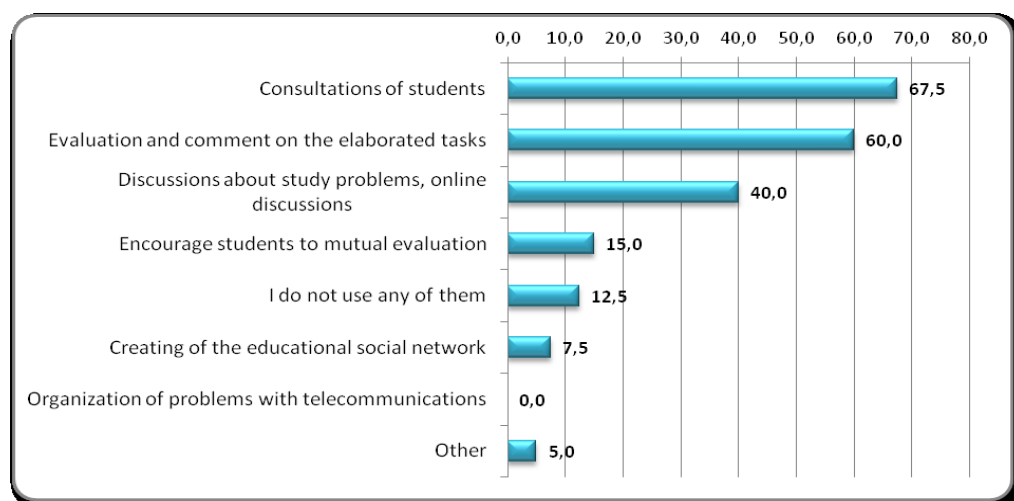
**Table 2.**

**Goals which could be achieved through the use of electronic communication means**

Items	Frequency	Percent of teachers	Percent of cases
Student consultations	27	67,5	32,5
Evaluation of and comments on elaborated tasks	24	60,0	28,9
Discussions about study problems, online discussions	16	40,0	19,3

Encourage students to mutual evaluation	6	15,0	7,2
I do not use any of them	5	12,5	6,0
Creation of the educational social network	3	7,5	3,6
Other	2	5,0	2,4
Organization of problems with telecommunications	0	0,0	0,0
Total	83	207,5	100,0

*Source: Own work*



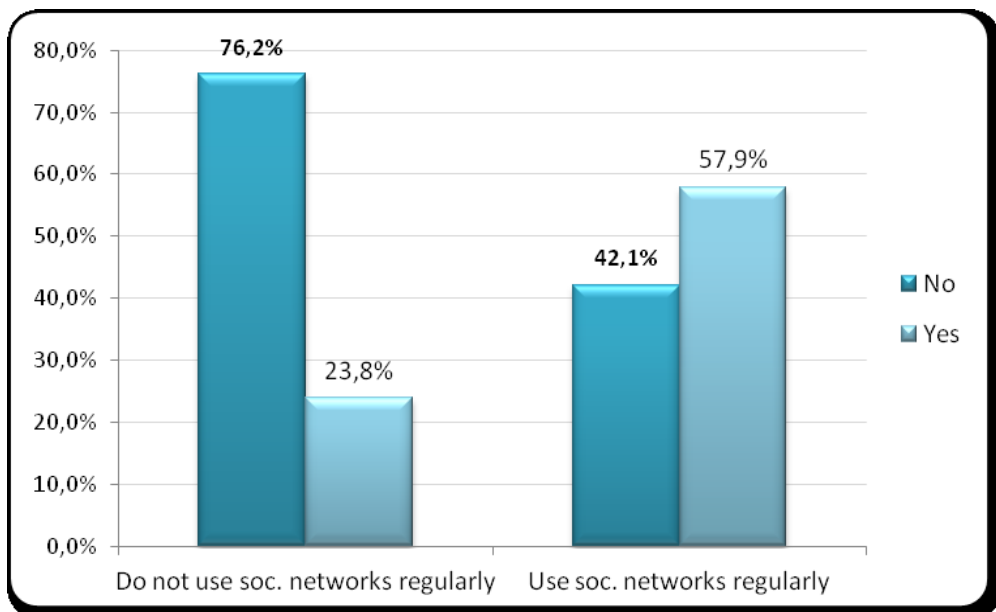
**Figure 2. Goals which could be achieved through the use of electronic communication means**

*Source: Own work*

When testing the hypothesis whether or not teachers prefer some entries to others, a statistically important difference was determined at a level of less than 1%. Therefore, it can be stated that the interviewed teachers have different opinions on the role of the mentioned electronic means in achieving educational goals (see the results in Table 2 and Figure 2, respectively).

When testing the hypothesis whether or not the opinions of teachers up to 50 years of age and over 50 years of age on which goals should be achieved through the use of electronic communication means in education differ, no significant difference between the two groups of teachers was determined. However, a difference was

determined in the question whether or not the instruments should be used in the discussion about study problems (based on whether or not the teachers regularly use social networks):



**Figure 3. Evaluation of the contribution of online discussions about study problems according the regularity of the use of social networks**

*Source: Own work*

As far as the contribution of online discussions about study problems to the successful education process is concerned, opinions of those who use social networks regularly and those who do not are significantly different (chi-squared significance = 0.028). The teachers who regularly use social networks consider online discussions beneficial (see Figure 3).

### **Research question 3 results:**

*Which resources do the teachers use the most for the preparation and realization of education?*

The respondents were asked to select those of the fifteen proposed resources which they use in education. They were allowed to choose as many resources as they wished.

The teachers preparing electronic content for their courses (probably in the form of PowerPoint presentation) represented one-fourth of the 106 selected answers. The majority of teachers (87.5%) do so. It is followed by the preparation of film fragments and television or radio shows (12.9% of all answers and 45% of all

teachers) and the preparation of digital materials for self-study (12.1% of all answers and 42.5% of all teachers). Another frequented answer was that the teachers prepare thematic websites (11.4% of all answers and 40% of all teachers). Other applications are presented in Table 3 and Figure 4, respectively.

**Table 3.**

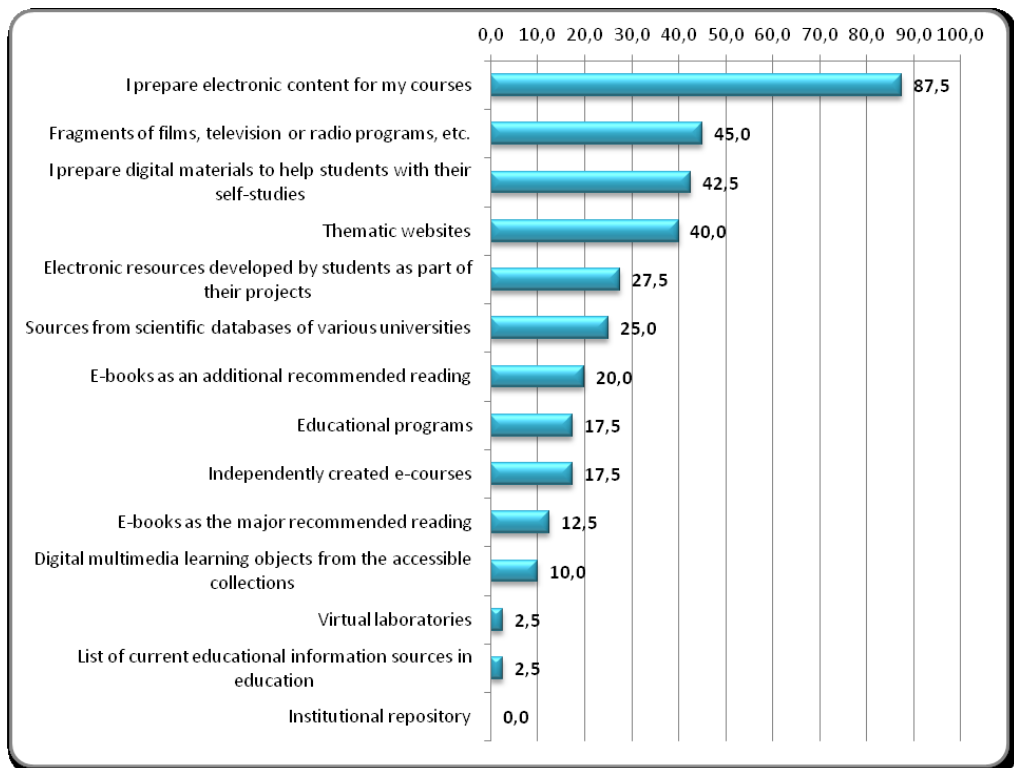
**The most frequently used resources for the preparation and realization of education**

<b>Items</b>	<b>Frequency</b>	<b>Percent of teachers</b>	<b>Percent of cases</b>
I prepare electronic content for my courses	35	87,5	25,0
Fragments of films, television or radio programs, etc.	18	45,0	12,9
I prepare digital materials to help students with self-study	17	42,5	12,1
Thematic websites	16	40,0	11,4
Electronic resources developed by students as part of their projects	11	27,5	7,9
Sources from scientific databases of various universities	10	25,0	7,1
E-books as an additional recommended reading	8	20,0	5,7
Educational programs	7	17,5	5,0
Independently created e-courses	7	17,5	5,0
E-books as the major recommended reading	5	12,5	3,6
Digital multimedia learning objects from the accessible collections	4	10,0	2,9
Virtual laboratories	1	2,5	0,7
List of current educational information resources in education	1	2,5	0,7
Institutional repository	0	0,0	0,0
<b>Total</b>	<b>140</b>	<b>350,0</b>	<b>100,0</b>

*Source: Own work*



Also tested was the hypothesis that the use of individual resources is influenced by subjectively felt ICT skill level of university teachers about which they were asked. They could evaluate themselves as advanced users, intermediate users or as beginners. Considering the low number of teacher respondents, the beginner and intermediate user categories were merged.



**Figure 4. The most frequently used resources for the preparation and realization of education**

*Source: Own work*

The advanced users' evaluation of the use of three entries is different from beginners or intermediate users (see Table 4): "I prepare digital materials to help students with self-study" (chi-squared significance = 0.43), "Thematic websites" (Fisher's test significance = 0.037, chi-squared could not be used due to a high number of low expected frequencies), "Independently created e-courses" (Fisher's test significance = 0.001). All three entries are used more frequently by the advanced users.

**Table 4****Influence of ICT skill level on the use of individual resources**

Item		Advanced users	Beginners	Total	Sig.	Test
			or intermediate users			
I prepare digital materials to help students with self-study	Count	8	9	17	,043	Pearson Chi-Square
	%	66,7%	32,1%	42,5%		
Thematic websites	Count	8	8	16	,037	Fisher's Exact Test
	%	66,7%	28,6%	40,0%		
Independently created e-courses	Count	6	1	7	,001	Fisher's Exact Test
	%	50,0%	3,6%	17,5%		

**Research question 4 results:**

*To what extent (how often) do university teachers use the three established quality levels of the application of ICT in university education?*

The first level is represented by the following answer: partial use of information instruments in teaching (presentation in class, computer tests, exchange of information via email, etc.).

The second level is represented by the following answer: Creation of eLearning courses, the use of information technologies in the system.

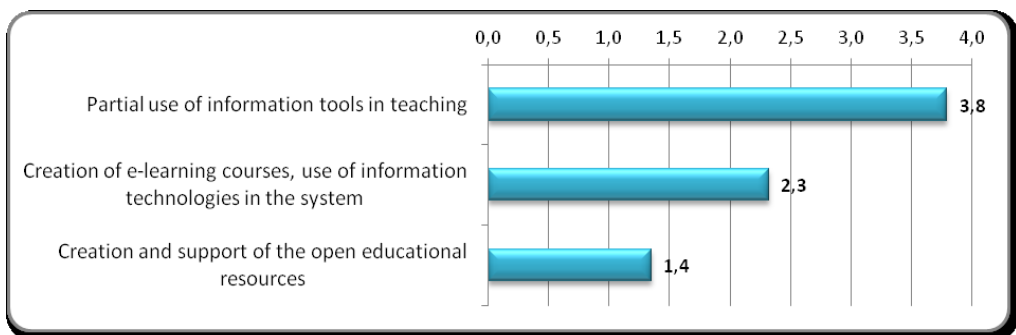
The third level is represented by the following answer: Creation and support of open educational resources (MOOC – massive open online course, personal open online resources – e-portfolio).

Using the five-point scale the respondents were asked to evaluate the three levels according to the frequency of use (1 means low degree of use and 5 means high degree of use).

The “first level” of the application of ICT was evaluated above average (3.8). The degree of the “second level” of the use of ICT was significantly lower. The application in the form of massive open online courses or open education resources was rare (see Table 5 and Figure 5, respectively).

**Table 5****Frequency of the application of ICT in education according to three quality levels**

Item	Mean	Std. Deviation
Partial use of information instruments in teaching	3,8	1,42
Creation of e-learning courses, use of information technologies in the system	2,3	1,44
Creation and support of the open educational resources	1,4	0,92

*Source: Own work***Figure 5. Frequency of the application of ICT in education according to three quality levels***Source: Own work*

Subsequently, the hypothesis that “the user level” of teachers concerning ICT influences the level of their application was tested (see Table 6). The comparison was made through the Mann-Whitney U test. However, no statistically significant difference was determined. Therefore, with regard to the respondents’ user level, their answers concerning this group of answers are uniform.

**Table 6.****Influence of the user level of teachers in the ICT field on the level of ICT use in education**

ICT competence		Partial use of information instruments in teaching	Creation of e-learning courses, use of information technologies in the system	Creation and support of the open educational resources
Advanced users	Mean	3,92	2,92	1,58
	Std. Deviation	1,443	1,782	1,084
Beginners or intermediate users	Mean	3,75	2,07	1,25
	Std. Deviation	1,430	1,215	,844
Total	Mean	3,80	2,33	1,35
	Std. Deviation	1,418	1,439	,921
Sig. (M.-W. test)		,637	,135	,244

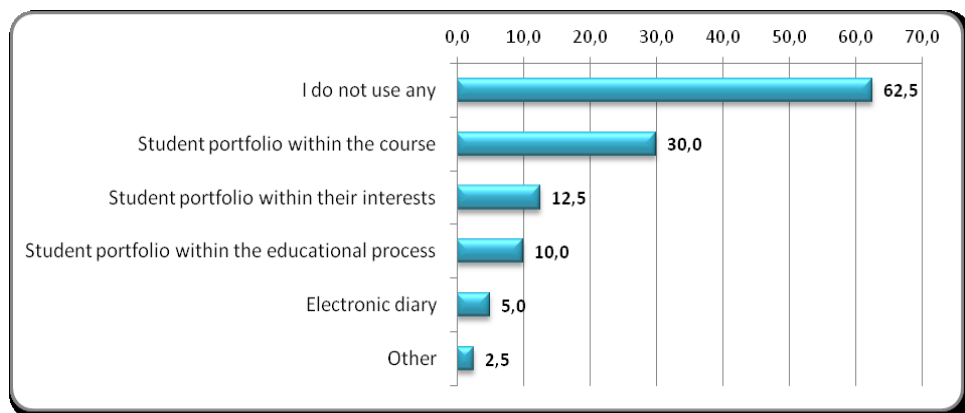
*Source: Own work***Research question 5 results:**

*Which instruments do university teachers use if they want to change the trajectory of students' study activities?*

The respondents were asked to choose those instruments which they use if they want to change the trajectory of students' study activities. They could choose more than one of the six possible answers. The majority of teachers do not use electronic instruments for the stated purpose (62.5% of all teachers). 30% of all teachers stated that they use individual student portfolios within the course. Every eighth teacher uses the individual portfolio within students' study or social interests and every tenth teacher uses the individual portfolio within the education process. However, the differences in the three types of portfolios were not specified to the teachers. As a result, it could happen that the teachers could not notice the differences. If we merged the use of the three types of portfolios into one group of answers, it would be used by more than 40% of all teachers (42.9%).

**Table 7.****Instruments used by teachers to change the trajectory of students' study activities**

Items	Frequency	Percent of teachers	Percent of cases
I do not use any	25	62,5	51,0
Student portfolio within the course	12	30,0	24,5
Student portfolio within their interests	5	12,5	10,2
Student portfolio within the education process	4	10,0	8,2
Electronic diary	2	5,0	4,1
Other	1	2,5	2,0
Total	49	122,5	100,0

*Source: Own work***Figure 7. Instruments used by teachers to change the trajectory of students' study activities***Source: Own work*

A number of hypotheses were being verified concerning the relation of answers to this question and the remaining parts of the questionnaire. However, no relation was found between any of the positive answers and the fact that the teachers participate in social networks. Moreover, no other criteria influence the respondents' answers to this question.

**Research question 6 results:**

*According to the level of their specialty, to what extent (how often) do university teachers use particular programs in university education?*

Using the five-point scale the respondents were asked to evaluate the use of the four presented computer programs, which differed in the degree of commonness or specialization for university education (1 means less often and 5 means very often).

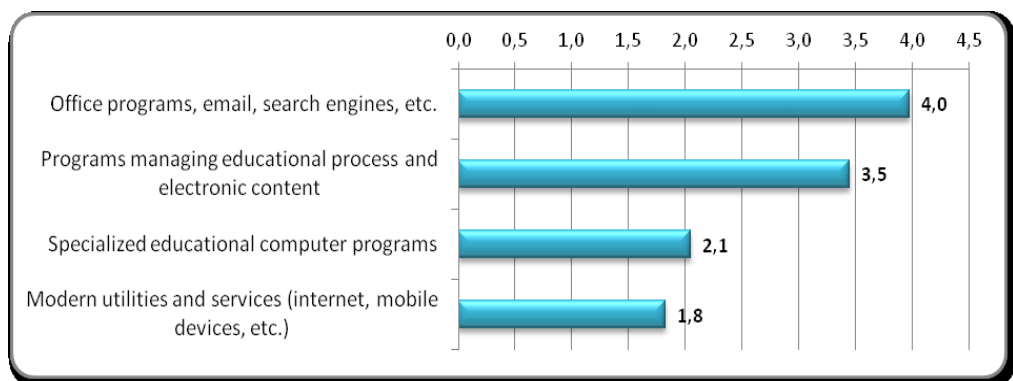
The data presented in Table 8 and Figure 8, respectively show that the more specialized a program is, the less often it is used. In other words, non-specific office programs are used very often while programs managing the education process and the choice of its content are used rarely.

**Table 8.**

Item	Mean	Std. Deviation
Office programs, email, search engines, etc.	3,98	1,387
Programs managing the education process and electronic content	3,45	1,501
Specialized educational computer programs	2,05	1,395
Modern utilities and services (the Internet, mobile devices, etc.)	1,83	1,130

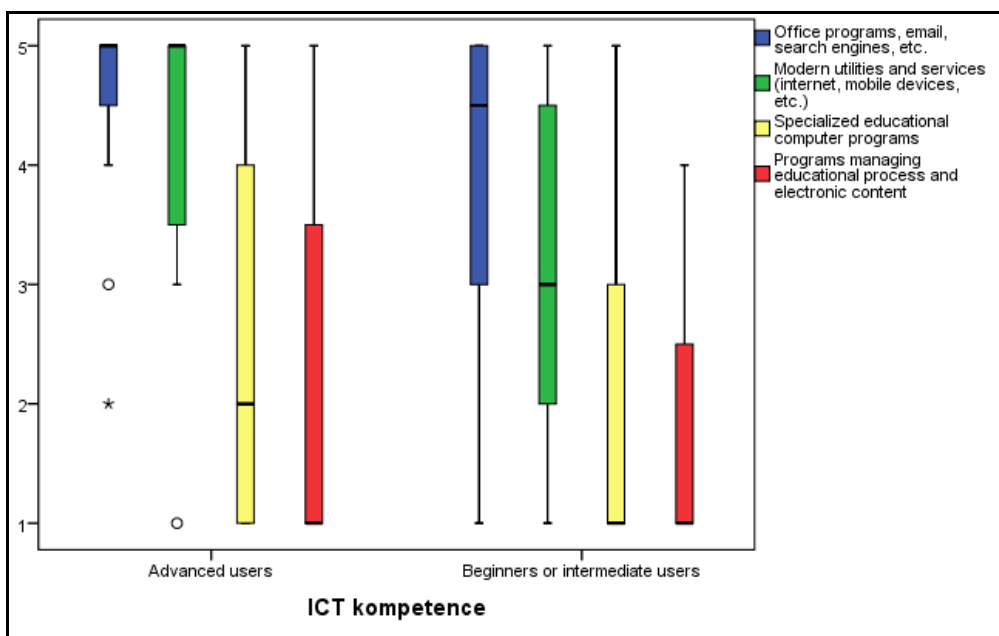
**Frequency of teachers' use of determined groups of programs in education**

*Source: Own work*

**Figure 8. Frequency of teachers' use of determined groups of programs in education**

*Source: Own work*

The hypothesis was tested (through the Mann-Whitney U test – non-parametric version of t-test) that the advanced users use all four groups of programs more than the intermediate users and beginners. As far as the advanced users are concerned, they differed from the others in that they used modern tools and services in education more often (significance = 0.040) (see Figure 9).



**Figure 9. The use of the defined groups of programs according to teachers' ICT competencies**

*Source: Own work*

### **Research question 7 results:**

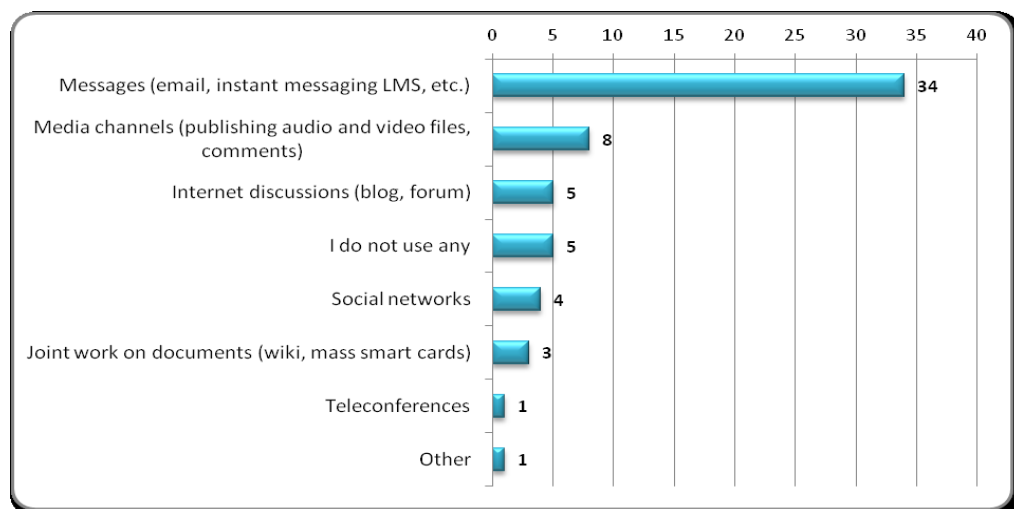
*Which electronic communication means do university teachers use most often for communication with their students?*

The respondents could choose more than one of the 8 possible answers. The results are summarized in Table 9 and Figure 10, respectively.

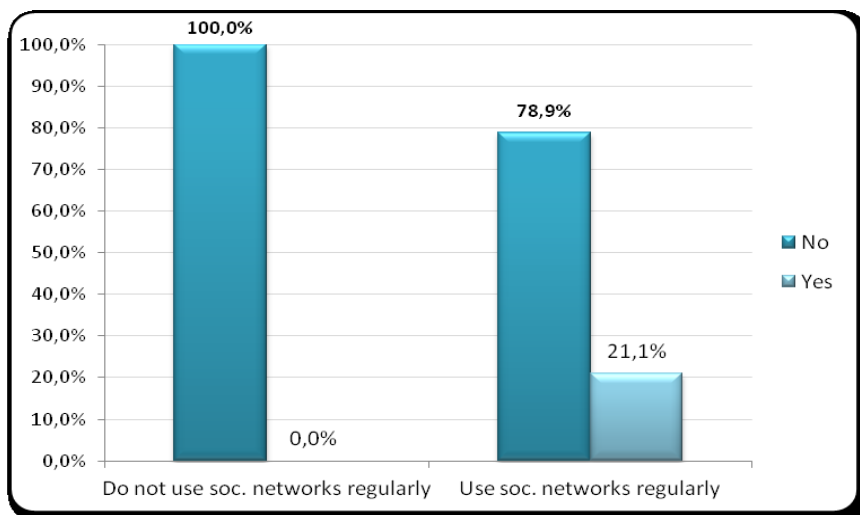
When communicating with their students, university teachers from the research file prefer emails and relevant LMS tools (85% of all teachers and 55.7% of all answers). 20% of all teachers use medial channels and 12.5% of all teachers use Internet discussions. Every eighth teacher, however, does not use any of the electronic communication instruments yet. Four teachers use one of the social networks and one teacher uses teleconferences for communication with his students.

**Table 9.****Electronic communication instruments used in education**

<b>Items</b>	<b>Frequency</b>	<b>Percent of teachers</b>	<b>Percent of cases</b>
Messages (email, instant messaging, LMS, etc.)	34	85,0	55,7
Media channels (publishing audio and video files, comments)	8	20,0	13,1
Internet discussions (blog, forum)	5	12,5	8,2
I do not use any	5	12,5	8,2
Social networks	4	10,0	6,6
Joint work on documents (wiki, mass smart cards)	3	7,5	4,9
Teleconferences	1	2,5	1,6
Other	1	2,5	1,6
<b>Total</b>	<b>61</b>	<b>152,5</b>	<b>100,0</b>

*Source: Own work***Figure 10. Electronic communication instruments used in education***Source: Own work*





**Figure 11. Influence of teachers' involvement in social networks on their use of social networks for communication with their students**

*Source: Own work*

The respondents, who stated that they use social networks regularly, also stated more often that they use social networks in the education process (Fisher's test significance = 0.042; chi-squared could not be used due to a high number of low expected frequencies). As far as the remaining answers to this question are concerned, no significant difference was determined between frequent and infrequent users of social networks.

### ***Research question 8 results:***

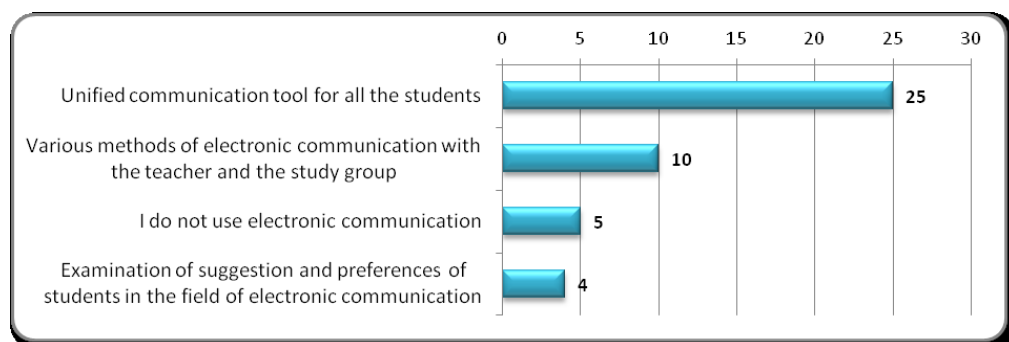
*Which of the following possibilities do university teachers consider to be the most suitable way of electronic communication with the teacher, in group (the student can choose)?*

The respondents could choose more than one of the 4 possible answers. However, they mostly chose only one of them. The results are summarized in Table 10 and Figure 12, respectively.

The results prove that the teachers prefer a unified communication instrument for communication with their students (62.5% of all teachers). Moreover, 25% of all teachers prefer various methods of electronic communication with the teacher or in the study group, which the students themselves can choose. Every tenth teacher would choose the way of communication based on students' preferences.

**Table 10.****Teachers' preferred ways of electronic communication with their students**

Items	Frequency	Percent of teachers	Percent of cases
Unified communication instrument for all the students	25	62,5	56,8
Various methods of electronic communication with the teacher or in the study group	10	25,0	22,7
I do not use electronic communication	5	12,5	11,4
Examination of suggestions and preferences of students in the field of electronic communication	4	10,0	9,1
Total	44	110,0	100,0

*Source: Own work***Figure 12. Teachers' preferred ways of electronic communication with their students***Source: Own work*

A series of hypotheses trying to determine the factors influencing the choice of preferred ways of communication with students was tested through statistical methods.

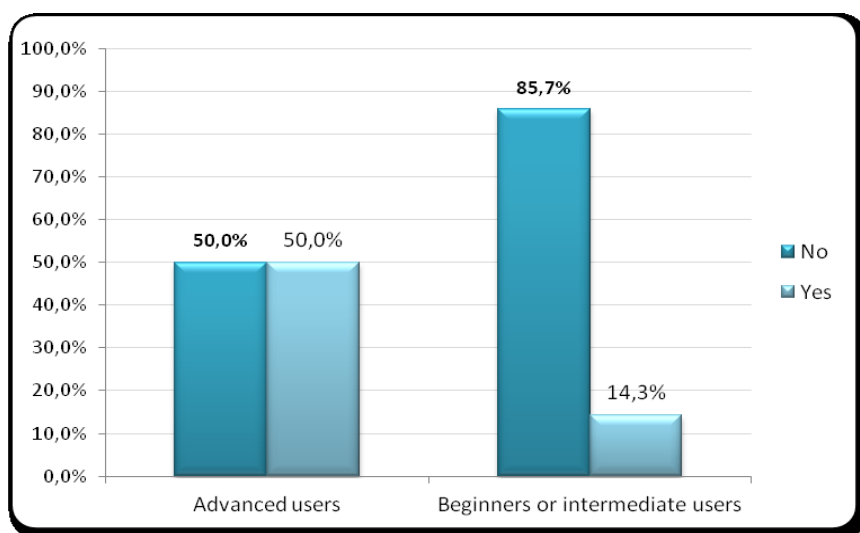
As far as the respondents' age is concerned, no difference was determined. However, in one of the entries there was a difference with regard to users' competencies and whether or not the respondents regularly use social networks (see Table 11).

**Table 11.**

**Influence of selected factors on the preferences concerning various methods of electronic communication with the teacher or in the study group**

<b>Various methods of electronic communication with the teacher or in the study group</b>	<b>Count</b>	<b>Percent</b>	<b>Sig. (Fishers Exact Test)</b>
Do not use social networks	2	9,5	,028
Use social networks regularly	8	42,1	
Total	10	25,0	
Advanced users	6	50,0	,041
Beginners or intermediate users	4	14,3	
Total	10	25,0	

*Source: Own work*

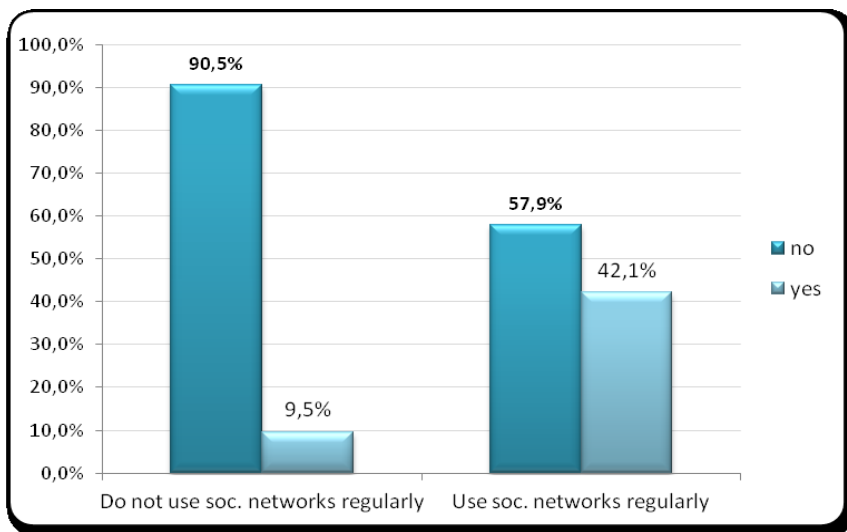


**Figure 13. Influence of teachers' ICT competence on the preferences concerning various methods of electronic communication with the teacher or in the study group**

*Source: Own work*

As far as the evaluation of the “Various methods of electronic communication with the teacher or in the study group” entry is concerned, a statistically important

difference was determined between the advanced users and the intermediate users or beginners (Fisher's test significance = 0.041; chi-squared could not be used due to a high number of low expected frequencies). Beginners and intermediate users chose this entry significantly less often than the advanced users (see Table 11 and Figure 13, respectively). In the same entry, a significant difference was determined between the evaluation of those who do not use social networks regularly and those who do so (Fisher's test significance = 0.028; chi-squared could not be used due to a high number of low expected frequencies). The respondents, who stated that they use social networks regularly, chose this entry significantly more often (see Table 11 and Figure 14, respectively).



**Figure 14. Influence of teachers' involvement in social networks on the preferences concerning various methods of electronic communication with the teacher or in the study group**

*Source: Own work*

### **Research question 9 results:**

*Which of the presented possibilities do university teachers consider the best way to ensure that the electronic resources are useful to all students?*

Two important features of university studies were incorporated into this question: to offer all students equal opportunities and conditions for personalized learning. The respondents could choose more than one of the 5 possible answers. The teachers chose 1-2 answers (65 chosen variants altogether). The interesting results are presented in Table 12 and Figure 15, respectively. A slight majority of teachers (55%) consider offering all students the same set of tools to be the best way to ensure that the electronic resources are useful to all students. Half of the teachers

consider the best way of providing students with electronic resources one that takes students' knowledge and skills into account (The question is, if this possibility is realistic or theoretical considering that the adaptive or personalized systems of online education are in the phase of being transferred from theoretical solutions to practical applications). Nearly one-third of all teachers (30%) stated that it would be best if electronic resources could take students' learning styles into account. The comment made for the previous answer also applies to this answer. The answers show that university teachers reflect current principles of respective educational policy and are able to imagine their application in the research field.

**Table 12.**

**Preferences concerning the best way to ensure that the electronic resources are useful to all students**

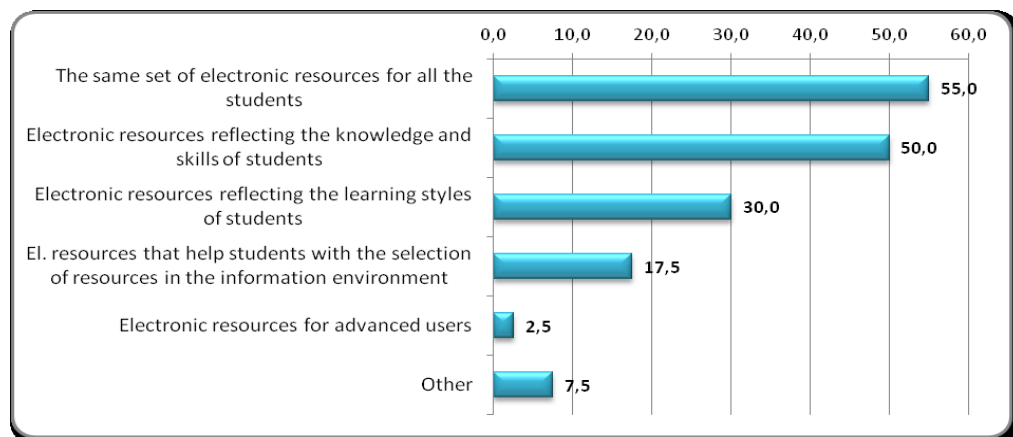
Items	Frequency	Percent teachers	of Percent of cases
The same set of electronic resources for all students	22	55,0	33,8
Electronic resources reflecting the knowledge and skills of students	20	50,0	30,8
Electronic resources reflecting the learning styles of students	12	30,0	18,5
Electronic resources that help students with the selection of resources in the information environment	7	17,5	10,8
Other	3	7,5	4,6
Electronic resources for advanced users	1	2,5	1,5
Total	65	162,5	100,0

*Source: Own work*

The deep analysis of the data did not show differences between the respondents with regard to their age. However, it showed differences concerning their ICT competency level when choosing the answer that the provided “electronic resources should take students' learning styles into account”.

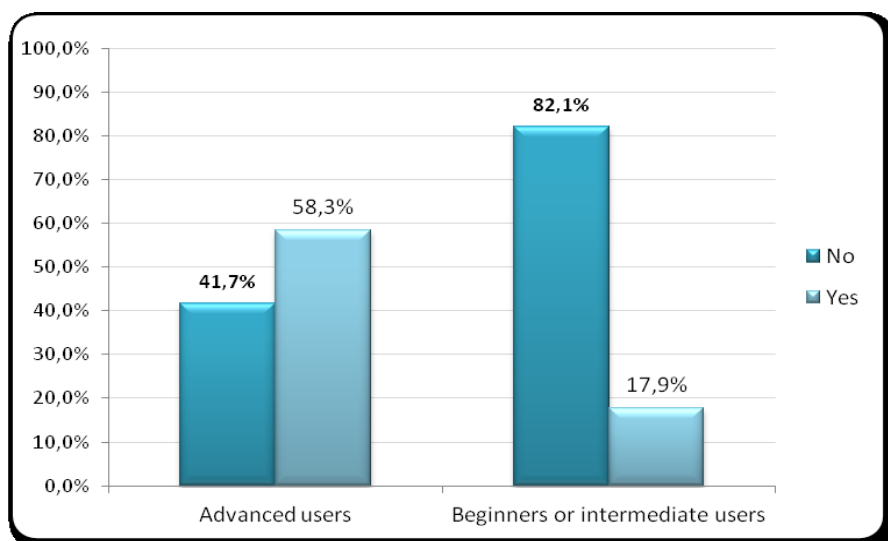
As far as the choice of the “Electronic resources reflecting students' learning styles” entry is concerned, a statistically important difference was determined between the advanced users and the intermediate users or beginners (Fisher's test significance = 0.028; chi-squared could not be used due to a high number of low expected frequencies). The advanced users, contrary to the less experienced users, consider this entry to be the best way to ensure that the electronic resources are useful to all

students (see Figure 16). The teachers' ICT user level seems to also represent the level of knowledge about the potential of current instruments of electronic systems or environments and the confidence that they can be used in personalized learning which reflects university students' learning styles preferences.



**Figure 15. Preferences concerning the best way to ensure that the electronic resources are useful to all students**

*Source: Own work*



**Figure 16. Influence of teachers' ICT competence on the choice of the answer that the provided electronic resources should reflect students' learning styles**

*Source: Own work*

## CONCLUSION

The research results showed that, within the scope of blended learning, university teachers use a number of electronic instruments for the realization of education, the management of students' self-study and study communication to enhance the elements of online distance learning. Its actual choice or potential preference is not much influenced by teachers' age but rather by their ICT competence user level and in some cases also by their involvement in social networks. So far, teachers use fewer specific educational applications and prefer generally user-defined instruments. So far, they use or contemplate using electronic instruments for the preparation and realization of education or for consultations with students rather than for the organization of students' study activities and online learning. Even though they prefer the incorporation of individual communication instruments for all students, the higher the ICT competence user level, the more diverse their preference concerning instruments which would reflect students' learning styles when providing them with electronic resources.

In the following phase of realization of the IRNet project the results of the questionnaire research acquired in the Czech Republic will be included in a comparative study containing data acquired in the other solving countries. On the basis of the results generally applicable conclusions can be made concerning the application of electronic information resources in university education with varying degrees of the use of online education.

## ACKNOWLEDGEMENT

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*Note: The authors declare that the paper which is being sent to be published in the Monograph is their own original work which has not been published before in the same form in other sources.*

# PREPARING STUDENTS FOR THE USE OF E-LEARNING IN HIGHER EDUCATION

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**Abstract:** *The article showcases the results of the research on the level of preparation for using e-learning methods by students starting higher education. The process of learning using modern information and communication technologies is significantly different than the traditional learning approach. In a much wider range it is based on the student's own work, it forces a bigger responsibility of the learning results and their own development. The inner motivation and the ability of time management are increased. The effectiveness of distance education and mobile learning in didactic practices in academic education will be determined mostly by the attitude of the students rather than by modern digital devices.*

**Keywords:** e-learning, distance learning, e-learning methods, learning skills, effectiveness of e-learning methods, experience of the students in using e-learning

## INTRODUCTION

The share of e-learning methods in higher education used in the didactic process is increasing gradually. The character of the learning process is also changing. In lower tier schools it was mostly the teacher who took the responsibility of the learning results, he organized the educational process and took care of the proper learning environment. In higher education there is much more emphasis on individual work, individual gathering of knowledge and preparing for future employment. It is directly connected to developing key competences that prepare the students to function in the job market and for lifelong learning. Gathering knowledge and skills is a crucial condition that is necessary to function properly in a dynamically developing world where technological advancements are becoming increasingly essential.

## **1. USING E-LEARNING METHODS IN HIGHER EDUCATION**

### **1.1 Learning process and new technologies**

Supporting learning by using modern digital technologies includes two key elements. The first key element is using specific media devices such as computers, mobile devices, computer networks which are used for acquiring and presenting didactic materials. The second element is matching learning and teaching methods to a specific medium. The latter aspect of learning, connected with selecting the proper methods, using technology has not been extensively covered in literature. Only contemporary research shows that the effectiveness of the learning process is more of an outcome of the chosen method rather than the used learning medium.

In the 90s and at the turn of the 20th century, the designers of the learning process focused mainly on the new usage for computer tools in the learning process. The fascination with information and communication technologies was evident because they offered possibilities unknown at that time. It was also the time of the dynamic development of the Internet that allowed introducing new standards in distance learning and teaching.

Today, upon acquiring experience in implementing new forms of learning based on electronic devices, the approach that started prevailing is the one that focuses on the needs of the students and teachers as well as on the specifics of the didactic process aided by technology. However, there has been no major breakthrough in the improvement of the effectiveness of the learning process due to introducing new technologies - as some researchers have optimistically anticipated. There are also no signs of a significant transformation in learning techniques (Mayer, 2013). On the other hand there is a progressing virtualization of the educational resources that are replacing traditional forms (textual and visual) with digital. There is a significant increase in using computer networks for communication purposes in the didactic process and the new available information tools on the web are being adapted for the purposes of the learning process on all levels.

The specifics of the education aided with new technologies require, however, proper competences in learners and teachers. The information competences are very important - the ability to move freely in cyberspace. The interconnected computer competences acknowledge skills in using ICT technologies, including using computer equipment and telecommunications systems (Internet, local networks). Media competences, including knowledge and skills essential to understanding media messages, familiarity with formats in which data is saved, stored, communicated and presented. These competences constitute the foundation for the individual learning process and are the pillars of lifelong learning (Lau 2011).

### **1.2 Problems faced by e-learning students**

Experts involved in introducing e-learning in practice notice a number of significant problems faced by e-learning students (Kumar 2015).

The first problem involves the need to adapt to the new virtual conditions of learning. Using computer based learning and on-line teaching requires proper competences and a certain proficiency in using new technologies. The specifics of learning in a traditional classroom and in a virtual class are clearly different and many people find it difficult to adjust to the on-line learning environment. The habits formed in the traditional education often involve a passive approach of the recipient of the information. Passive listening and taking notes is still the dominant form of activity in many classrooms and is significantly different from the educational activities on which a properly designed e-learning course should be based.

Another problem is connected with access to a proper technical infrastructure. Learning using technology requires specific devices, unlimited Internet access and access to its many services. Students learning on-line usually lack technical support, thus they encounter technical problems that severely hinder learning.

Not always do the learners meet the requirement of having digital and information competences. Basic computer skills are no longer sufficient. Advanced knowledge of electronic sources of information and information tools (utility programs, networks applications, mobile devices) is necessary as well as using them proficiently.

Among the difficulties indicated by the users of e-learning and distance learning systems is effective time management devoted to learning. Despite the easy access to the course at any time, e-learning requires a significant amount of work as well as being systematic and dutiful. Creating the appropriate amount of time is one of the most important factors deciding on the effectiveness of the on-line education method.

The motivational aspect and the problem of time management are inseparable. Practice shows that many learners starting e-learning courses do not finish them. They lack motivation and the will to continue their individual effort of self-study. The participants of on-line learning give up too often. To increase the quality of learning in this respect is to introduce clearly defined goals, constant monitoring of progress and support from the teacher and friends. These are the elements that the designers of e-learning systems should focus on.

Despite the arising difficulties, the universal character of e-learning methods will make them more popular on a wider scale, particularly in lifelong learning and just-in-time learning. That is why universities training their students for the modern economy should also teach them to use e-learning methods and provide them with the necessary competences and introduce self-study.

## 2. PREPARING STUDENTS TO USE E-LEARNING METHODS

### 2.1 Goals, issues and methodology

The popularity of e-learning methods in higher education, although used not as dynamically as at the turn of the 20th century, is still rising. Many universities use this method in order to cut costs. However, the question is whether the students are ready to use the proposed forms and methods of education and do they see them as convenient and effective. That is why the goal of this research was to gather the information on the level of preparation of the learners starting higher education to use e-learning methods in their education. The obtained results allow us to answer the following research questions:

1. What is the experience of the students starting higher education in using e-learning?
2. How do the students evaluate e-learning methods?
3. What methods of learning do the students consider the most effective?
4. What factors, according to the students, contribute to the motivation in the learning process in the context of using new technologies?

The survey research (using an on-line form) was conducted from January to June 2015. The recipients were first year students from the universities in Cracow in the social and humanistic studies programmes. 153 answers were received.

The characteristics of the researched group are in Table 1.

**Table 1.**

Characteristics of the researched group		
No.	Category	Number of respondents
1.	<b>Gender:</b>	
	woman	119
	man	33
2.	<b>Age group:</b>	
	from 19 to 21	105
	from 22 to 25	36
	from 26 to 30	4
	above 30	7

3. **Student status:**

full-time	110
part-time	42

4. **Place of residence:**

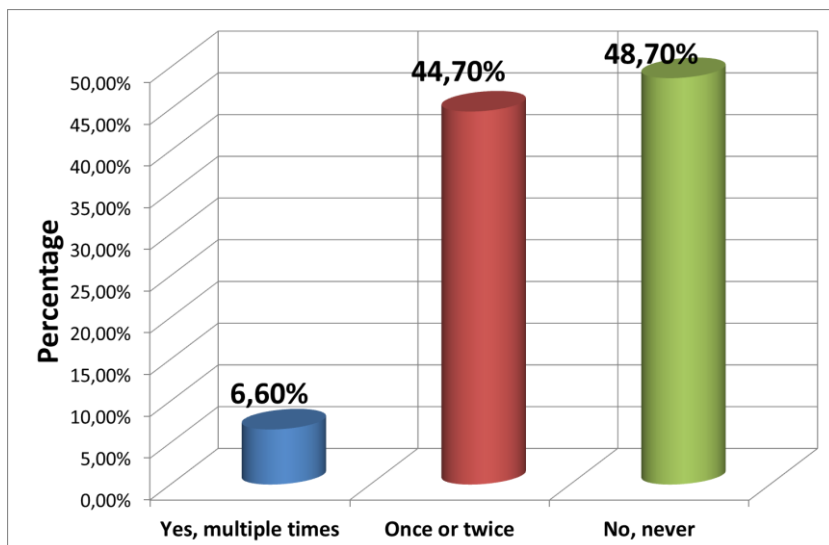
town	77
city (up to 100.000 citizens)	30
large city (more than 100.000 citizens)	45

*Source: own research*

## 2.2 RESEARCH RESULTS

### 2.2.1 Educational experience of the respondents in e-learning.

One of the basic factors that shape the opinions on e-learning methods are past experiences. Participating in one of the e-learning forms of education allows to make an initial evaluation, formulate an opinion and to realize one's preferences. As the results show about a half of the respondents (51%) admitted they have encountered mobile learning, aided by technology. From this group, however, only 6% participated more than once in various forms of learning using e-learning methods



(Figure 1)

**Figure 1. Participation in e-learning courses**

*Source: own research*

Detailed data on the respondents who participated in one of the e-learning methods is presented in Table 2. The obtained results show that the share of e-learning and distance learning is tied to a specific age group. In each age category the share of people who had some experience in this area was similar. This can be surprising, however - according to the respondents - full time students were more likely to participate in courses using new information and communication technologies.

**Table 2.**

**Participation in e-learning courses in each category**

<b>Participation in e-learning courses</b>	<b>Many times</b>		<b>Once or twice</b>		<b>Never</b>		<b>Sum</b>	
	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>
<b>Age group:</b>								
from 19 to 21	4	4%	48	46%	53	50%	105	100%
from 22 to 25	3	8%	17	47%	16	44%	36	100%
from 26 to 30	1	25%	1	25%	2	50%	4	100%
above 30	2	29%	2	29%	3	43%	7	100%
<b>Student status:</b>								
full-time	6	5%	58	53%	46	42%	110	100%
part-time	4	10%	10	24%	28	67%	42	100%

*Source: own research*

The forms of distance learning that the respondents used were usually short training sessions on the web. Some of the respondents also used blended learning in high school as a supplementary method.

### **2.2.2 Opinions of the respondents on e-learning methods.**

Whether the students will use new technologies for learning purposes will be largely determined by their individual opinion on the usefulness and effectiveness of these solutions in education. In part it is based on previous educational experiences but also in the statements of the respondents, where one can see common convictions, stereotypes and objections towards e-learning. It is evident particularly in the group that has not used e-learning methods.

The respondents were asked to name the advantages and disadvantages of e-learning methods that were the most relevant. The answers are presented in Table 3 and 4.

The most frequently mentioned disadvantage was the lack of physical contact with the teacher. It was indicated as a negative factor by one-third of the respondents. The lack of the opportunity to ask questions and the lack of support from the teacher makes the learning process - according to the respondents - much more difficult, slows it down and deteriorates motivation. Difficulty to focus with full attention and commitment is what the respondents highlighted. In e-learning problems with regularity arise. Self-control is much more needed.

**Table 3.****Disadvantages of e-learning forms according to the respondents**

No.	Disadvantages	Number of answers	Percentage of answers
1.	Inability to contact the lecturer/teacher personally	51	33%
2.	Lack of motivation (will to act, engagement, focus)	40	26%
3.	Unreliable method of verifying the learning outcomes (used grading systems)	21	14%
4.	Low effectiveness of education	19	12%
5.	No contact with peers	17	11%
6.	No direct control	15	10%
7.	Problems with regular work	5	3%

*Source: own research*

About one-fifth of the respondents said that many e-learning courses use unreliable grading systems, not reflecting the true state of knowledge and skills.

Similarly, as the presence of the teacher is important, so is the supporting peer group. As the results of the research show some students using individual on-line learning were bothered by the lack of interaction with other participants of the didactic process - their peers (11%). Today, in the modern distance learning practice, the dominant methods of learning specific content are largely based on assimilating existing knowledge.

On the other hand, the most important advantage of learning aided by technology mentioned by the respondents is the convenience of home study (37%).

The justifications for this opinion were mixed, from savings on commuting to the comforts of studying at home. Among the advantages of e-learning the respondents



mentioned flexible study time, adjusted to their individual needs (18%) as well as mobility, which is the ability to study anywhere, without the need of going to school or university. Another argument that was particularly interesting was that the e-learning methods decrease stress levels in comparison to traditional classes. Some respondents admitted that the anonymous grading system used in e-learning courses suits them better than being graded directly by the teacher or the lecturer during face to face meetings.

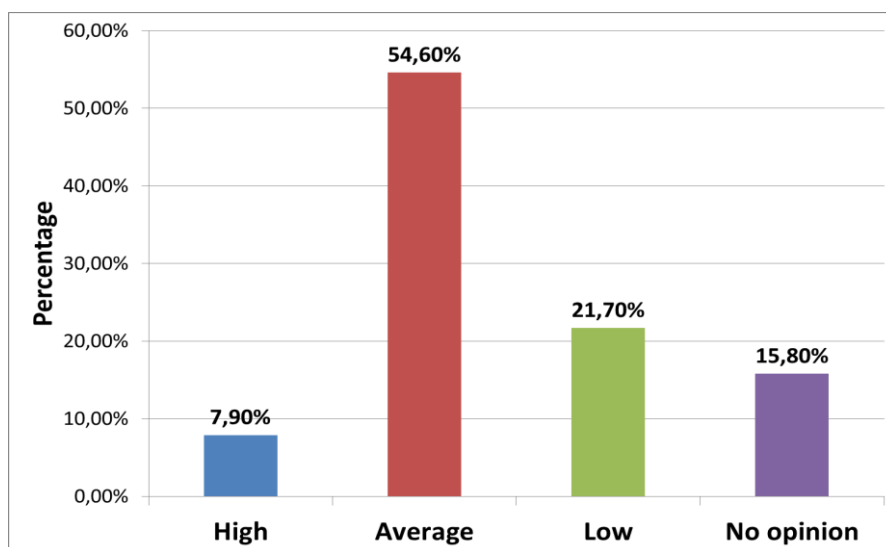
**Table 4.****Advantages of e-learning forms of education according to the respondents**

No.	Advantages	Number of answers	Percentage of answers
1.	Home-study (convenience, learning-friendly conditions, savings on commuting)	56	37%
2.	Flexible time of learning	27	18%
3.	The possibility of learning anywhere (mobility)	17	11%
4.	Lower stress levels	17	11%
5.	Individual approach	8	5%
6.	Neutrality and anonymity of the grade	5	3%

*Source: own research*

Such answers may suggest that the students are not fully convinced to the usefulness of e-learning methods - they value their advantages but the disadvantages still dominate their responses.

The majority of the respondents evaluated the general effectiveness of e-learning methods as average (54%). More than 20% of the respondents see these methods as ineffective and a vast majority (16%) does not have an opinion.



**Figure 2. Effectiveness of e-learning methods according to the respondents**

*Source: own research*

The obtained results show, however, that the respondents who said the effectiveness of e-learning methods is low are persons who did not use them at all (about 40% indicated that they are effective). Among the respondents who participated in on-line courses at least once more than 80% indicated that they are highly effective and 14% indicated low effectiveness.

**Table 5.**

**Evaluation of the effectiveness of e-learning methods according to the respondents, depending on past experiences**

Participation in e-learning courses		
	Yes	No
Evaluation of the effectiveness:		
high	14%	2%
average	71%	58%
low	14%	40%

*Source: own research*

The preconceptions of the respondents regarding the effectiveness of e-learning methods influence their choices. The group that has a negative attitude towards distance learning will not choose this solution when such an opportunity arises.

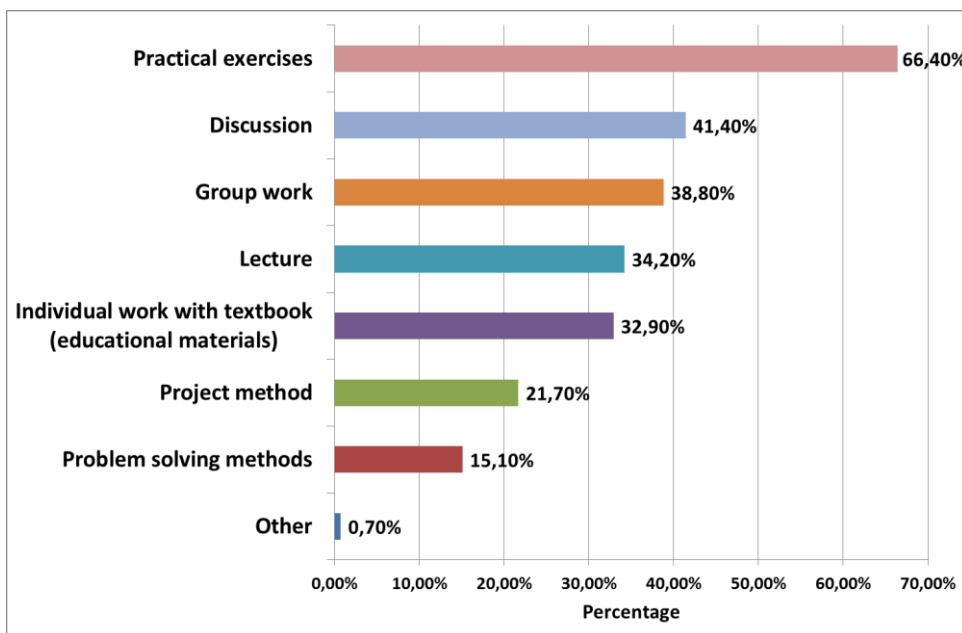
### 2.2.2 Effectiveness of learning in using different learning methods.

The respondents were asked to specify which learning methods commonly used in education are the most effective according to them. The obtained results are presented in Figure 3

The answers of the respondents show that the best results are obtained using learning methods based on practical exercises - as many as 66% indicated this group of methods. The second best methods on the list were methods that allow sharing personal views - discussion was found to be the most effective learning method by 41% of the respondents and group work by nearly 39%.

About one-third of the respondents said that the lecture was the best method and 32% of the respondents mentioned individual work with textbook. The fact that the project method and the problem solving method group scored very low may be surprising.

The above mentioned results show that for the contemporary e-education to be valued highly there needs to be a higher involvement of tools that allow a wide range of interactions between the teachers and the students as well as among the students themselves.



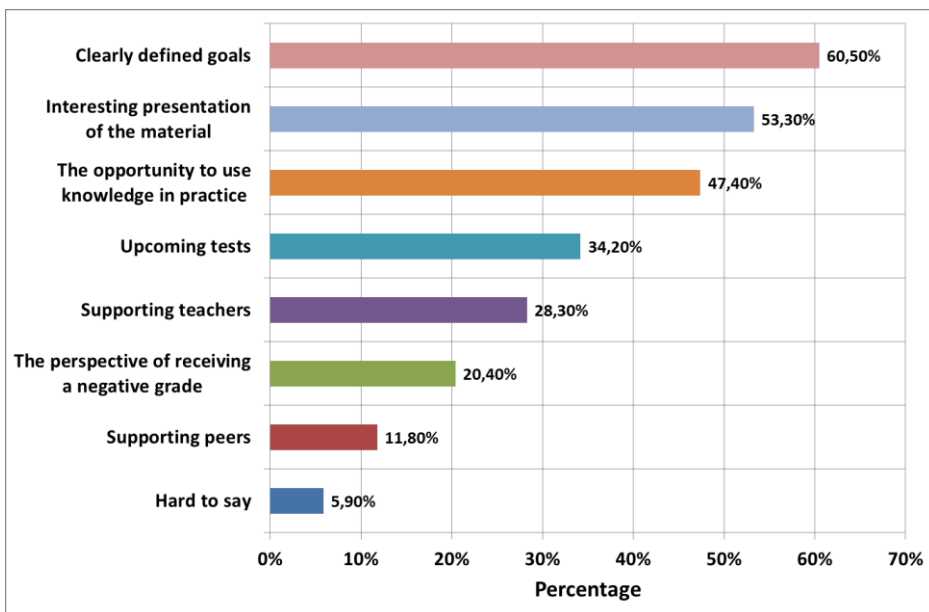
**Figure 3. Effectiveness of commonly used teaching and learning methods in the opinions of the respondents**

*Source: own research*

### 2.2.3 Factors contributing to the motivation in the learning process

Today using computer based learning and on-line learning the student works mainly alone, the contact with the teacher and peers is limited - that is why the individual motivation to learn is so important. The ability to mobilize and plan during the learning process is the basic pillar in e-learning and translates into success or defeat in learning.

Among the most important factors contributing to the increase in motivation in e-learning (Figure 4) the respondents mentioned clearly defined learning goals (60%), interesting way of presenting the educational material (53%) and using theoretical knowledge in practice (47%). They also highlighted the role of the teacher and peers in building the motivation to learn. Mobilization is facilitated by constant supervision of the progress of the students and feedback on the results of learning.



**Figure 4. Factors contributing to the increases in motivation in learning.**

*Source: own research.*

## 3. CONCLUDING REMARKS

Summarizing the presented results of the research it can be stated that about a half of the respondents starting higher education already had experience in using e-learning. Opinions on the usefulness and effectiveness of the computer and web based learning are mixed. The respondents who indicated that e-learning methods are effective are those who had previous experience with them during traditional school

education and individual courses. The respondents who did not participate in on-line education have views with stereotypes on new forms of learning and usually consider them least effective in practice. The respondents highlighted that the most effective methods are based on practical activities and interactions with others - therefore e-learning courses should be designed to incorporate this postulate as much as possible. Another important problem faced by the e-learning users is the motivation to learn and that is why the factors contributing to the individual engagement of the learner during the learning process should be taken into consideration when planning to use distance learning methods in higher education. They are clearly defined learning goals, content presented in an attractive form to the learner as well as appropriate supervision of the progress that creates regular feedback.

The method that will allow to introduce the students to distance learning is blended learning. It can be stated that using hybrid learning in higher education on a wider scale than ever before will allow to develop essential time management skills for learning purposes, shaping crucial habits and attitudes and will prepare them to take responsibility for their individual development.

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# INFORMATION SOCIETY AND THE NECESSARY DIGITAL SKILLS

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***Abstract:** The article presents chosen issues of terminology and circumstances of the information society and especially points out difficulties in preparing a uniform and widely accepted definition of the information society. The authors identify ICT skills of the modern society and differences in using contemporary technology between generations.*

**Keywords:** information society, digital skills, ICT skills

## INTRODUCTION

The process of creating the information society has been, is and will relentlessly be a complex and multi-stage process requiring a comprehensive insight into the human life. At the beginning it was considered that communication engineers and IT specialists should deal with the scholarly reflection on the development of the information society. Over the years the issues have been many times considered in separate analyses by economists, politicians, psychologists, educationalists or sociologists in their academic and popular science publications. As the research has intensified over the last years and, consequently, more and more new issues and questions have been appearing, the need has arisen for more research, and of a more multidisciplinary, interdisciplinary or even transdisciplinary character. M. Castells (2013) is the author who approached the problem in a considerably broader way than the researchers who perceive the basis for the rise and growth of the information society only in the intensive development of IT tools. His concept of the net society was an attempt at a comprehensive analysis of changes happening in the global world of today. In his opinion the transformations occurred as a result of three independent processes: the IT revolution, the economic crisis of capitalism and Soviet socialism, and development of cultural social movements.

## 1. CONDITIONS AND GENESIS OF THE INFORMATION SOCIETY NOTION

The information society is a new society type formed mainly in highly developed countries where information management, its quality and the information transfer speed are essential factors of competition in both, industry and services, and the progress requires new methods of collecting, processing, transferring and using information (The Republic of Poland Communications Ministry 2001).

Thus, it comes as no surprise that the quickest development of micro-engineering, being the basis for digital technology, occurred in Japan and led to the first records on the information technology occurring already in the mid-1960s. The term *johoka shakai* meaning the society communicating via a computer or just the Information Society, IS for short, was used for the first time in 1963 by Tadao Umesao, a journalist of the Japanese daily “Hoso Asaki” in his article on the evolutionary theory of the society based on information. The expression was also used by professor Yonei Masuda at the beginning of the 1970s in his work on social transformations connected to the development of the information sector and telecommunications (Nowak 2005).

Unlike in Japan and the USA, the issues of transformation from the industrial to information society were not considered in Europe. Only in 1978 in their report prepared for the French government S. Nora and A. Minc embarked on describing the developmental trends of social systems in the post-industrial society. To a large extent the information society concept was made popular following the publication of M. Bangemann’s report. The report of the EU Commissioner for Development issued in 1994 “Europe and the global information society” considered issues of social development in European countries. The created information society was proposed to be based on private sector finances and market mechanisms, while the public sector should focus on legal regulations, protection of citizens and consumers and improving awareness of the society. The document makes a few major recommendations that determined the EU policy in the sphere for the years to come, i.e.:

- development of the information society should be based on the free market, i.e. conditions of fair competition should be created in the sphere of ICT services,
- services, interoperability of IT software, services and applications should be freely available to the public within the EU,
- financial means for the information society development should mostly come from the private sector,
- protection and promotion of language and cultural differences throughout the EU,
- protection of privacy and secure information flow,

- development of cooperation with less developed countries of Central and Eastern Europe,
- society's awareness of the new possibilities brought about by the information society and access to suitable training at all levels of education (Casey 2001).

Appearance of the new society type has brought about many changes within the social, cultural, economic and political spheres. Numerous definitions of the information society have been put forward in literature in Poland and worldwide and their authors, while attempting to come up with the valid description, have referred to technical, professional, spatial, cultural and economic grounds. J. Gnitecki (2005) pointed out the complexity of this definition as, in his opinion, the concept describes a society in which knowledge and information are fundamental; the new technological civilisation moves beyond the technological, information and organisational systems as they used to be, the civilisation generates new processes of creating, collecting, distributing and using information; the civilisation is based on information-processing methods and exceeding the present awareness condition; the civilisation is based on the process of human perfection being updated in the course of processing bit, qubit or sub-qubit information; changes within the bit, qubit or sub-qubit IT are sources of civilisation transformations. Unfortunately, despite the multitude of definitions, none has been specific enough. The need for compiling an appropriate definition covering all possible aspects has been pointed out by A. Bógdoł-Brzezińska and M. F. Gawrycki (2003) who however consider it an "unrewarding (task) as the notion of the information society is a catch-all one and thus indistinct and vague".

A proposition put forward by Polish authors is a definition which describes the information society as "a society which not only has the means to process information and to communicate, but also for which processing information is the basis for creating the national income providing livelihood for the majority of the society" (Goban-Klas, Sienkiewicz 1999). Another definition identifies "the information society as the society in which information is intensively used in the economic, social, cultural and political life; it is the society which has abundant communication and information-processing means being the basis for creating the majority of the national income and providing livelihood to the majority of people" (Krzysztofek, Szepański 2002).

Analysis of the numerous definitions allows identification of four fundamental pillars of the information society, namely: "(a) a technological one: created by ICT, i.e. hardware and software, accessibility; (b) an economic one: the strength of which is directly proportional to the share of sectors taking part in creating and processing information, and the participation of information technologies in economy and in the GDP distribution; (c) a social one: the stability of which is strictly related to the new technology users index and, in most cases, is related to the society education level and inversely proportional to the digital divide indexes; (d) a cultural one: the feature most often unjustly neglected as the



information culture should not be ignored, as the aspect includes the acceptance of information as a form of goods and products; discussing the information culture one should keep in mind its vital ingredient, namely IT culture related to the level of skills of using software and hardware” (Stachowiak 2012).

The Polish Office of the Committee for European Integration provides basic conditions to be met to acknowledge a society as the information one. They include an extensive modern telecommunications network that should include all citizens within its range and available to the broad public information resources. Another important aspect is educating the society for further development so as every citizen could stand the chance of taking full advantage of the opportunities provided by means of mass communication and information. To account for that, members of the information society have to be provided with essential IT skills. The concept of the so called *IT skills* results from the development of information society. The skills are recognized as one of the most important in the 21st century. An OECD document on education in the digital era treats them as the skills of searching for and interpreting information. The necessity for teaching ICT skills was also the subject of the World Summit on the Information Society organised by the UN in 2003 in Geneva (qtd. in Derfert-Wolf 2005).

## 2. CHOSEN ICT SKILLS OF THE SOCIETY

The new media culture embraces communication and information. The contact of those two important spheres results in preparing the society for skilfully moving around in the ICT world. The fact that ICT (*Information and Communication Technology*), comprising three domains: computers, the Internet and multimedia, is so widespread is of major importance not only for individuals but also for groups and the society. In Polish literature ICT is called “*technologia komunikacyjno-informacyjna*” (communication and information technology). In brief, ICT is an intelligent tool allowing the net society to communicate freely owing to the unlimited Internet access. The net society, also referred to as the Internet society, comprises people establishing the social relations network on the Internet. The core of the net society is unforced engagement in different activities on the Internet. Finding themselves in the ICT environment facilitates the process of creating digital natives which is the name for the new generation brought up in the IT-communication-information technology. This way they have developed the so called multitasking, i. e. an elementary ability of dealing with many tasks at the same time. People using new technologies send emails, chat, surf the net, learn, etc. all at the same time (Siuda 2015). According to Marc Prensky (2001), educated Digital Natives are the opposite of Digital Immigrants whose perception of the modern world overflowing with information much differs from that of youth (Kuruliszwili 2014). The young are referred to as Generation Y if they were born after 1980 or Generation Z – those born after 1995. In this context digital skills are of fundamental importance as they are the

skills for the future. The increase of e-skills significance in the future resulted in signing *the Broad Agreement on Digital Skills in Poland* on 17 July 2013. Development of technologies enabling Internet access is intensive, however, it does not mean the digital skills are developing in the same way. Simultaneously, irregularities have been observed concerning using new technologies for criminal activities. To avoid pathologization of the digital sphere the society should be educated to develop the skills protecting itself from the Internet-related dangers. Characteristics of the information society skills and the already mentioned division into digital natives and digital immigrants is not however indisputable. Malwina Popiołek (2014), referring to research of David Buckingham (2006), Sue Bennett, Karl Maton and Lisa Kervin (2008), Rolf Schulmeister, Anoush Margaryan, Allison Littlejohn and Gabrielle Vojt (2011) and her own analyses, describes controversies concerning digital skills of different age groups. Mateusz Muchacki (2013) and Tadeusz Piątek (2004) also point out the youth's preparation for using IT. The discourse indicates noticeable differentiation between the digital skills in possession of the young and adults.

Digital skills are a very broad concept referring to easy navigation within the Internet environment. The present article stresses the sphere of information and communication. The information contains data and signals interpreted by the recipient. An Internet user is looking for data from all spheres of life. However, the communication in the contemporary sense is perceived as transferring information from sender to the recipient in which the sender is aware of the recipient's existence. Aspects revealed in the process of sending information are particularly stressed in communication. Thus, two basic social processes occur, those of allocution and exchange. Allocution means social processes of transmission and the exchange refers to consultation, registration and conversation. The core of communication in the new media is the information passed from a sender to a recipient who create common meanings for signals arising in the process. Individuals taking part in the communication process by means of the new media are immersed in the social context (Dijk 2010). Digitalization of the world is considered to be of substantial importance, however, the so called "productivity paradox" is observed in which the technology playing mainly an informational role does not bring the assumed profits in the service domain. At present a seeming contradiction is observed as men produce and collect much different information about the environment but at the same time have less and less up to date knowledge about it. It is the result of one of the dangers as an individual has problems filtering information that is continuously provided to him irrespective of his wishes or wants (Siemieniecki 2003). Digital technology has rendered accessible the unreachable before opportunities for acquiring knowledge but has not produced any mechanisms preparing people for its reception and selection. Referring to Dijk's analyses one should also cite discussions by J. Bruner and D. Olson who believe that three ways of experiencing the reality correspond to three types of learning. As follows, using information provided by the new media requires greater and

greater selection of information. It is thus necessary to know how to take advantage of available IT tools (Dijk 2010). Therefore, a basic question about the existence of differences between generations arises. Sergio Kurulishwili specifies three groups of differences, namely ways of perception and reception of information, habits and attitudes, and IT competencies. Juxtaposition of the mentioned differences and the differentiation of the digital skills levels within particular age groups allows identification of skills indispensable in the third millennium. The main skills necessary in every individual's life include using ICT technologies. The key ICT skills are: effective and efficient use of modern tools continuously perfected by technology; taking advantage of modern means of collecting, processing, generating and transferring information; effective direct and indirect communication using up-to-date communication software; critical reception of multimedia information and its use in the process of education or at work; proficiency in cooperation and collaboration in a variety of task groups, the skill of working towards the group success; the ability to present team work results; ease of self-presentation (Furmanek 2002). The first environment facilitating acquisition of the knowledge and skills is a family, and then a school. Focusing on the school, in accordance with the National Curriculum, the main task of teachers is to provide students with conditions for shaping their skills of searching for, ordering and using information from different sources and using ICT effectively. What is crucial here is the ability of creative thinking as the elementary mission of every man at work. A contemporary man necessary on the labour market is a non-routine individual generating new knowledge. Consequently, young people should be prepared for creating new knowledge. The people who cannot manage either in the public or in the market sector will transfer to the third sector created by local government organisations within which interpersonal relations are given priority (Muraszkiewicz 2004).

Results of empirical research into skills of communication by means of social forums, blogs and into specific skills connected with the process of education, i.e. sending tasks and messages to pupils and students, communicating via mail or electronic school register systems, are not optimistic. Teachers not very often make assessment using specialist software, look for didactic materials, contact parents sending emails, use a laptop or a projector at classes. At the same time, few of them take advantage of utility programs (word processors, spreadsheets, slide show presentation programs). They often are not able to move freely within the sphere of educational programs. Only few teachers have those skills and, as a result, use them in their educational activities (Noga 2011, Siuda 2015). The research pointed out to shortcomings of teachers. Other studies describe teenagers and children's skills in reaching information by means of a computer, smartphone or other devices, decoding, deciding on, collecting, processing and taking advantage of it. In this way the continuous learning develops resulting in the implementation for lifelong learning. Incessant schooling, professional training will not be confusing for those young people (Juszczak 2007). Development of ICT technologies has forced teachers to acquire knowledge of modern technology

perceived by teenagers in a completely different way as, having contact with the technology since their early days, they are not apprehensive of it. Contemporary teachers should take care of their own ICT education and, as far as their students are concerned, prepare for cooperation and team working on implementing tasks.

## CONCLUSION

The information society of the third millennium is in the course of creation. Comparison of studies on levels of skills in different age groups is not optimistic. It is difficult to divide the society into groups of digital natives and immigrants, generation Y and Z. It seems that there still exist other groups specialised in using chosen tools or programs. Doing the job of e.g. an accountant, a scholar or a student enforces people to acquire skills of using specific software. A student unable to use the Moodle platform is not able to study anymore as the platform contains not only lectures, timetables or curricula but also examination tests. The analysis of empirical data has revealed a diversity of skills possessed by teenagers and adults, skills that are among key competencies of the modern world. Although the mentioned above research should not be generalised, it certainly specifies important areas for further research.

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# ONE YEAR EXPERIENCE OF DISTANCE EDUCATION AT ABANT IZZET BAYSAL UNIVERSITY

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**Abstract:** *The aim of this study is to introduce the features of the learning management system (LMS) used in the online learning environment at Abant Izzet Baysal University (AIBU) and provide the number of users in and usage of the LMS. Distance education at AIBU in Turkey started in the fall semester of the academic year-2014-2015. Regarding all the conditions of the university and characteristics of both open source and commercial learning management systems (LMS), an LMS integrated with an online conference tool was purchased from a private company. The LMS has basic features such as the most well-known LMSs except social media tools like blogs, wikis, etc. Also, the LMS was used by 8798 students and 44 instructors for four courses in the spring semester. However, although all instructors created synchronous sessions on a weekly basis regularly, the percentage of students' attendance to synchronous activities is 10.*

**Keywords:** *distance education, higher education, learning management system*

## INTRODUCTION

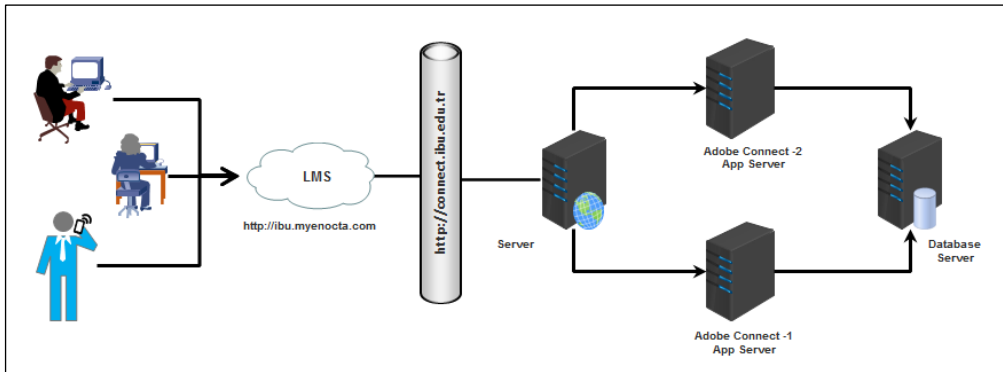
Khan (2001) defined online learning environment as the system which embraces the learner and the instructor socially and technically. In order to operate this system, Learning Management Systems (LMS) software which supports the online learning activities is required. LMS is described as the “software application that automates the administration, tracking, and reporting of training events” (Ellis, 2009). The basic set components of LMSs are course content, course documents, supplementary internet resources, synchronous and asynchronous communication tools, assessment and evaluation tools, and user tracking tools. Also with the development of Web 2.0 technology, social media and networking tools are integrated with LMSs.

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Online learning applications were started at Abant İzzet Baysal University (AIBU) in Turkey in August, 2014. In order to support online education environment, an LMS was purchased from a private company in Turkey. This institution is one of the leading companies dealing with online education in Turkey, and creates LMSs and online course contents for private and governmental organizations. After analysis and evaluation of both open source and commercial LMSs with a team consisting of experts in instructional technology department at the university and regarding the requirements of the university conditions such as budget, the number of students, teachers and information technology experts at the university, an agreement was made with the company and LMS was hired for 10,000 students. The LMS was installed in a cloud computing environment provided by the company. Also, a web conferencing tool was purchased and it was installed into two server computers at the computing service of the university, integrated with the LMS and could be used by 2,000 users at the same time. Also the company ensured that they respond to any failure in the LMS and the integration of LMS with the web conferencing tool (Figure 1).



**Figure 1.** Infrastructure of Learning Management System

## COMPONENTS OF LMS AT AIBU

The LMS is composed of several modules in order to help the application of learning and instruction in online learning environment. In this part, the modules of the LMS (Figure 2) and roles of users in the LMS are introduced.

*Course content:* The asynchronous content of the courses are provided with this module. The system administrators can create courses and add course content using the text editor integrated into LMS and add files in PPT and PDF formats. Teachers can only add PPT and PDF files as course content. The content uploaded into LMS transforms into SCORM compliant files.

*Question bank:* The head of the departments and the instructors can create and store their questions under this module. Also the questions could be shared among the

instructor. The question types that could be used to create questions are multiple choice, true-false, multiple-answer, matching, essay, and fill-in-the-blank. While creating the questions, the instructor can upload different type of files to their questions such as images, animations, videos etc.

*Quiz:* Using questions in the question database, the instructors can prepare quizzes and present them to their students in groups or individually. The instructors can select the questions, give points to each question, determine the duration as well as start and end date of the quiz. Also the instructor determines whether the students could examine their results and retake the quiz.



**Figure 2.** Components of the LMS

*Assignment:* Following the syllabus of the course, the instructor can add assignments for the course requirements into the LMS, determine the due date for the assignment, and the students have to upload their assignment files to the LMS. The instructor can examine basic information about students' assignments such as the date of the file

uploaded, the size of the file etc. In addition, the instructor can download all files individually or in group, and grade them.

*File sharing:* The LMS allows teachers to share their digital files in all types and categorize them according to the subjects defined in the syllabus.

*Web conferencing:* The LMS was integrated with an online web conferencing tool. When the instructor schedules a synchronous online meeting, the LMS sends e-mail to students and reminds of the meeting the day before it. As the tool can record the synchronous meeting, students can watch the lesson again and again. The reports about students' acts such as the time during which they are connected to the tool, the duration of the students' synchronous and asynchronous connection to the tool are stored in the LMS. The teachers, head of departments and the system administrators have the authority to see the reports.

*User track:* Student logs are recorded by the LMS. System administrators can see the full and detailed records of all log entries. However, teachers' and head of departments' authority over user logs is restricted. The teachers can monitor students' access and achievement on course content, their attendance and attendance duration in the online meetings both synchronous and asynchronous. Also, head of departments can analyze reports about teachers' start and end of online meetings, how many online messages the teachers send and respond, how many online discussions they organized, and how many assignments they assigned and graded.

*Announcement:* The system administrators, department heads and instructors can make announcements and can respond to an announcement. The announcements made by the administrators and the teachers are seen on students' screen and are e-mailed to the students. Also, the students can respond to an announcement.

*Messaging:* Messaging for the LMS refers to both users' conversations among them and automatic alerts from the LMS about new assignment submission and synchronous web conferencing scheduling. Messages in the system can be sent as e-mail through the system.

*Discussion:* The discussion module is an activity where administrators, teachers and students can exchange their ideas by posting comments.

## USERS AND THEIR ROLES

In order to restrict system access to authorized users, role-based access control approach is adopted while creating the LMS. The roles described in the LMS are system administrator, head of department, department secretary, teacher, and student. In the LMS, one user has only one role.

*System administrator:* The administrator can open and close semesters, create and delete courses and upload their content into the LMS, create and delete users individually and in group in the LMS and assign their roles and courses, follow the

detailed logs of users and all records, search in the LMS using the SQL commands, and customize several features of the LMS.

*Head of department:* The department head can monitor teachers' activities and get reports about their activities while they are using LMS. Also, instructors follow their students' progress in the course.

*Secretary:* The department secretary can open sections for courses, assign the instructors and students to sections, and get reports of teachers' and students' basic activities such as the attendance in online web conferencing and grades in the LMS.

*Teacher:* The teacher can upload course content and documents and share it with students and other teachers, prepare the syllabus of the course, schedule the synchronous online meetings, assign projects and assignments to students individually and in group and grade them, create questions for question bank and prepare online quizzes by customizing the features of the quiz, and get reports about students' progress in the online learning environment.

*Student:* The students can view the online content, see their progress on the content, see the syllabus developed by the teacher, attend to the synchronous online classrooms, upload their assignment to the LMS, and send messages to each user through the LMS.

## NUMBER OF ONLINE COURSES AND USERS

Distance education applications at AIBU started in August, 2014. With the decisions and directives of the upper chamber of rector ship, three compulsory common courses (Ataturk's Principles and History of Turkey, Turkish Language, and Foreign Language – English) were decided to be presented fully online. Then the LMS integrated with an online conference tool was purchased with the consideration of university conditions such as the number of students, the budget and technological infrastructure and after the supervision of experts in Computer Education and Instructional Technology department. After presenting the three compulsory courses online in the fall semester, in the spring semester the faculty of education administration decided to present one of the elective courses named Using Technology in Education fully online. The number of online classes and students in compulsory courses and one elective course is presented in Table 1.

At the spring semester of the academic year 2014-2015, a total of 5,735 students registered to the Ataturk's Principles and History of Turkey (APHT) course, 5,810 students had the Turkish Language (TL) course, and 4791 students were presented the Foreign Language – English (FLE) course. In addition, 1,000 students had the Using Technology in Education course fully online. Individually, 8,798 students registered to at least one online course. In order to present online courses a total of 44 instructors were assigned. Ataturk's Principles and History of Turkey, Turkish

Language, Foreign Language – English, and Using Technology in Education courses were held by 9, 12, 13 and 10 instructors respectively (Table 1).

**Table 1.**

**Number of classes and students according to courses**

2014 – 2015 Spring Semester	Ataturk’s Principles and History of Turkey		Turkish Language (TL)		Foreign Language (English)	Using Technology in Education		
School Type	# of Classes	# of Students	# of Classes	# of Students	# of Classes	# of Students	# of Classes	# of Students
Faculty	52	2,659	54	2,741	46	2,227	22	1,000
High Schools	56	3,076	57	3,069	49	2,564		
Total	108	5,735	111	5,810	95	4,791	22	1,000

At the end of the spring semester of the academic year 2014-2015, when the data about instructors' scheduling of online classrooms and students' attendance (Table 2) was analyzed, it is observed that the number of synchronous classrooms in TL is higher than the others because of the number of sections in that course. Although the average number of students in a classroom is more than 50, the average number of students in a synchronous course is slightly higher than 5. Namely, the percentage of students' attendance to synchronous activities is 10.

**Table 2.**

**Statistics about synchronous classrooms and students' attendance**

<b>Course name</b>	<b>Total # of synchronous classrooms</b>	<b><math>\bar{X}</math> (number of students in a class)</b>	<b><math>\bar{X}</math> (number of students in a synchronous class)</b>
APTH	1378	52,95	5,86
TL	1417	52,61	6,17
FLE	1235	50,37	5,02

## CONCLUSION

This study described one year experience of distance education applications at AIBU focusing on the LMS purchased for online learning at the university and basic numbers about the online education. Institutions use LMSs in order to implement teaching and learning activities. Although LMSs today differ in many characteristics, LMSs – open source or commercial – contain many common modules such as communication, assignment, social media and etc. Also most of the LMSs have mobile applications. AIBU started distance education applications in August 2014 when it purchased an LMS developed by a private company. Although this LMS has common properties with many LMSs, it lacks basic modules such as social media applications which are in the LMSs today, and lacks the mobile application. In addition to Web 2.0 applications such as blogs, wikis, and discussion forums social media applications such as Facebook and twitter accounts were not integrated within this LMSs. So, in order to enrich the learning environments in terms of instructional technology, different tools were provided in the classroom and benefit taken from the advantages of Web 2.0 in education (An & Williams, 2010; Hew & Cheung, 2013; Rogers-Estable, 2014), Web 2.0 and social media tools should be built in the LMS.

At AIBU, 8,793 students were registered to at least one fully online course in spring semester of the academic year 2014-2015. To implement the online courses a total of 44 instructors were assigned, and they organize synchronous online courses on a weekly basis. Although they get prepared for online meetings every week, only 10% of students in a classroom attended online meetings. This shows that students' attendance in the meetings was low (Gürer, Tekinarslan, & Yavuzalp, 2015), and instructors should design different online learning activities so that the students' motivation level increase and their attendance as well.

Ongoing research should focus on the reasons for the students' low attendance in online courses, students' participation in the classrooms and examining the instructional activities and the strategies implemented by the online teachers.

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# **III. THEORETICAL, METHODOLOGICAL AND PRACTICAL ASPECTS OF DISTANCE LEARNING**

## **FORMATION OF ICT COMPETENCES THROUGH THE SYSTEM OF COMPETENCY TASKS: FROM IDEA TO PRACTICAL IMPLEMENTATION**

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***Abstract.** The approaches to the organization of the educational process aimed at the formation of the ICT competence and development of life competencies at different levels of education - from primary school to the first year at the universities are discovered in the article. As an example of instrument for the proposed approach the system of competency task that provides content, technological, structural, active and instrumental component is proposed. The results of approbation of the proposed system show a positive trend of forming students' soft skills.*



**Keywords:** ICT competence, competency tasks, level of competency tasks, model of competency task.

## INTRODUCTION

Social and technological changes are a sign of the 21st century; they are causing a change of paradigms (Kuhn 1962), including in the field of education. Today the paradigm of “education for life” has changed to “lifelong learning”, and accordingly the main elements of the education system have also changed.

Modern requirements to a specialist (Future Work Skills 2011) formed under the influence of the situation on the labour market, accelerating the pace of development of society and the widespread of information, cause replacement of authoritarian and reproductive education oriented at obtaining knowledge by the system of productive collaboration and communication, including networks, for development and production of new (objective or subjective) knowledge.

Competence-based approach is interpreted as one that not only affects the structure of knowledge, but also the quality of education in general (Korzhova 2012). Taking into account the fact that the quality of specialist training largely depends on the ability and willingness to use ICT to obtain the necessary knowledge and producing new knowledge, ICT competence is regarded by scientists as a key (Golovan 2007). International organizations that are currently working in the field of education, in recent decades have been studying the problems associated with the emergence of a competence-based education; among them are UNESCO (UNESCO Recommendation 2013), UNICEF, UNDP, Council of Europe, European Commission, Organization for Economic Cooperation and Development (OECD), the International Standards Department and others. The issues of implementation of the competence-based approach in the education system and the formation of information competencies (Zymnaya 2012, Morze 2008, Morze 2011, Ovcharuk 2013, Ovcharuk 2015, Pometun 2004, Smyrnova-Trybulska 2007, Spirin 2009, Khutorskyi 2005, Hansen 2015 and others) are discovered in a significant number of scientific publications.

However, the need to develop a system to support a process of acquiring ICT competences by the subjects of educational process (pupils, students, teachers, coaches), including forming a system of competency tasks and methods of their use in the learning process, does not lose the relevance.

*The purpose* of this article is to analyze the approaches to the development of ICT competence through competency tasks and to propose an example of their implementation in the process of comprehensive study of computer science.

## **1. ICT COMPETENCE AND APPROACHES TO CREATION OF COMPETENCY TASKS.**

Scientists distinguish substantive and key ICT competence. Key information and communication competence is an ability to use effectively ICT in teaching, research and daily activities for solving information and professional problems. Subject ICT competence is determined as an ability of a pupil (student) to apply in a particular life, educational and research situation, including problematic, acquired knowledge, abilities, skills, ways of working for selection of appropriate ICT and their usage for searching the necessary data, analysis, organization, conversion, storage, transmission of ethical and legal norms and solving problems in subject area.

Formation of ICT competencies involves the development of universal critical thinking skills, including the ability to observe and make logical conclusions, using information models, to analyze the situation, to understand the overall content of the message and its hidden meaning. These competencies include the following components (skills and abilities):

- the ability to search, collect, create, organize electronic data, systematize received data and concepts, the ability to distinguish subjective from objective, real from virtual, relevant from irrelevant;
- to use the appropriate means (presentations, graphs, charts, maps, knowledge, social networks) for a comprehensive understanding and presentation of data;
- to search and find needed websites and to use Internet services like forums and e-mail, and services based on Web 2.0 technologies;
- to use information technology for critical reflection of what is happening, innovation in different contexts at home, at work (school, college) and leisure.

ICT competencies also include the following attitudes to ICT: habit to use ICT independently and while working in a team, the ability to determine the value of certain data and information; positive attitude to the rules of safe and responsible online experience, including personal issues and understanding of cultural differences between people; interest to expand the horizons of using ICT by participating in various communities, including cultural, social, etc. (Defining Key 21st Century Skills 2012).

In a process of learning computer science at school or disciplines of IT cycle at the university ICT competence is considered both as a subject and as a key.

General characteristics of the educational competence-based and authors' proposals for its support are given in Table 1.

**Table 1.****Scientific and technological matrix of support of a learning competence-based process**

No	Technological component	Indicators	Scientific basis
1.	Description of signs and the expected (target) level of competence in a determined subject area	Availability of educational standards, including standards for ICT competence, curriculum of the new model	Structure of the ICT Competency of teachers. (UNESCO Recommendation 2013)
2.	Determining the necessary and sufficient set of learning tasks, situations, the sequence of which is built according to the growth of completeness, problematic, specificity, innovation, vitality, practicality, creativity, reflection and self-examination, examination and decisions approval, necessity of combining fundamental and applied knowledge	System of competency tasks, availability of bank of tasks from various subject areas	System of training tasks D. Tolingerovoi (Tolingerova 1970)
3.	Technology of process, including the sequence of presenting s to students task and situations of different types and levels	Developed methodology of application of competency tasks in teaching a particular subject or integrated courses, practical training, organization of research activities, etc.	Taxonomy of educational objectives by B. Bloom
4.	Algorithms and heuristic schemes that organize pupils' (students') activities to overcome difficult situations	Developed criteria of evaluation both as the intended result, and the activities of its receipt; instructions on how to perform certain stages; examples and templates	The strategy of solving IT problems "big seven" (Burmakina 2007)
5.	Technology of guidance, counseling and support for pupils (students) in the process of performing a system tasks	Developed online system for support tasks performing and communication of subjects of educational process: students, teachers, external consultants	The concept of zone of proximal development (ZPD) by L.S. Vygotsky (Makarova 2012) Formation situation of success by Ermakov (Ermakov 2006)

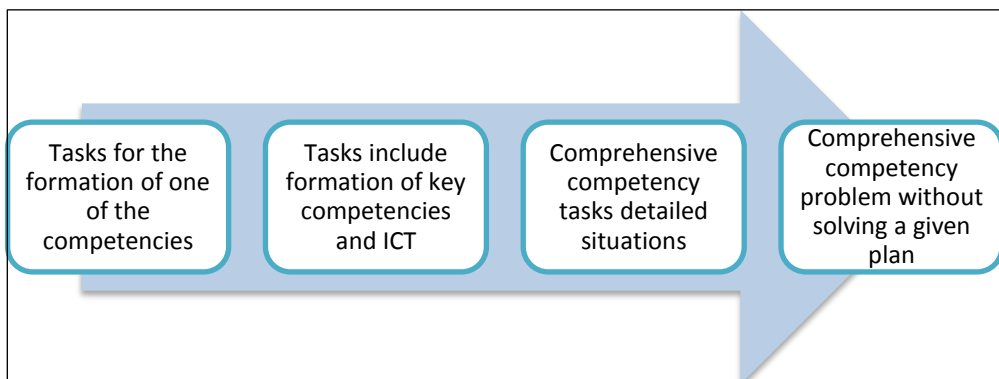
6.	Technology of monitoring, evaluation and adjustment of the educational process	Developed checklists, control tasks, tools for evaluation and discussion, etc.	Information literacy indicators. UNESCO (Catts R & Lau J (2008))
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*Source: Own work*

Educational activities aimed at building ICT competence involves the development and use of competency problems for which it is mandatory to use modern ICT as a mean of solving, providing multi-level assistance and evaluation criteria both as a final result, and ways of its receiving (Kuzminska 2011). In general, the approach “from general to specific”, meaning from the formation of generalized patterns of intellectual activity to their usage in a specific subject matter, is a ground of a system of development competency tasks and in implemented in practice by applying project method, appropriate selected tasks, taxonomy of educational tasks based on theory of stage formation of mental actions (Morze, Kuzminska 2008).

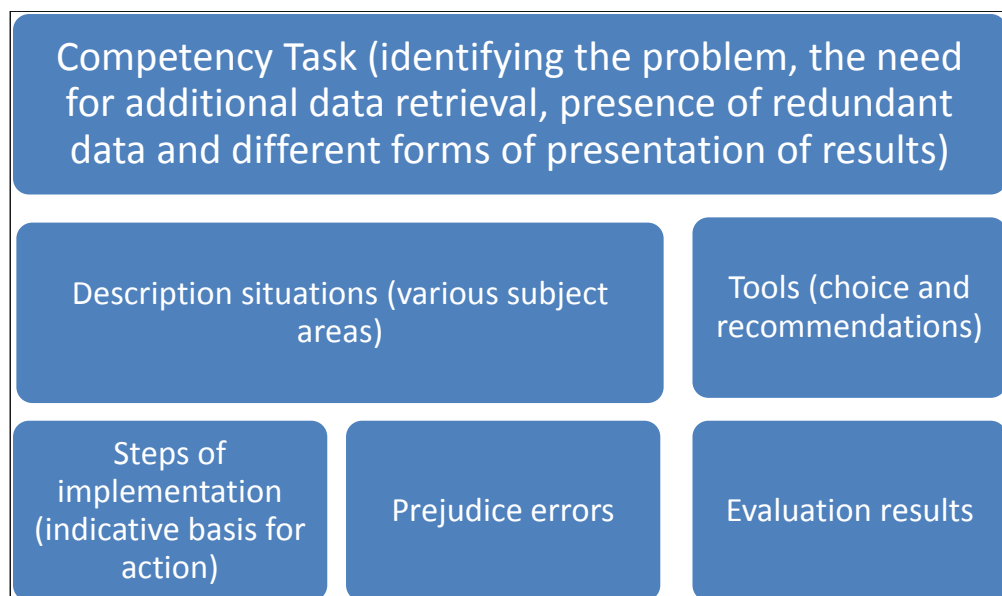
To form skills for solving competency tasks in the classroom it is useful to use the following tasks at various levels, from simple to complex, from the tasks aimed at the development of one of the competencies to integrated problems without a given plan of solving a problem (Figure 1).

Creation of integrated competency tasks that combine knowledge and activity components should include the following steps: description of the content of the problem situation based on previously learned knowledge or personal experience of students; formulation of requirements to determine initial and boundary conditions of the flow of learning activities; development of performance criteria for implementation of phases of the assignment and the resulting products of the students' activities; development of assistance in the form of questions, tasks or exercises aimed at the specification of the content of the situation, specification of formulated requirements, updating of basic knowledge and intensification of the association and causal connections needed to find ways to solve the problem; development guidelines for quality performance of certain tasks (Figure 2).



**Figure 1. Usage of competency tasks to form competencies**

*Source: Own work*



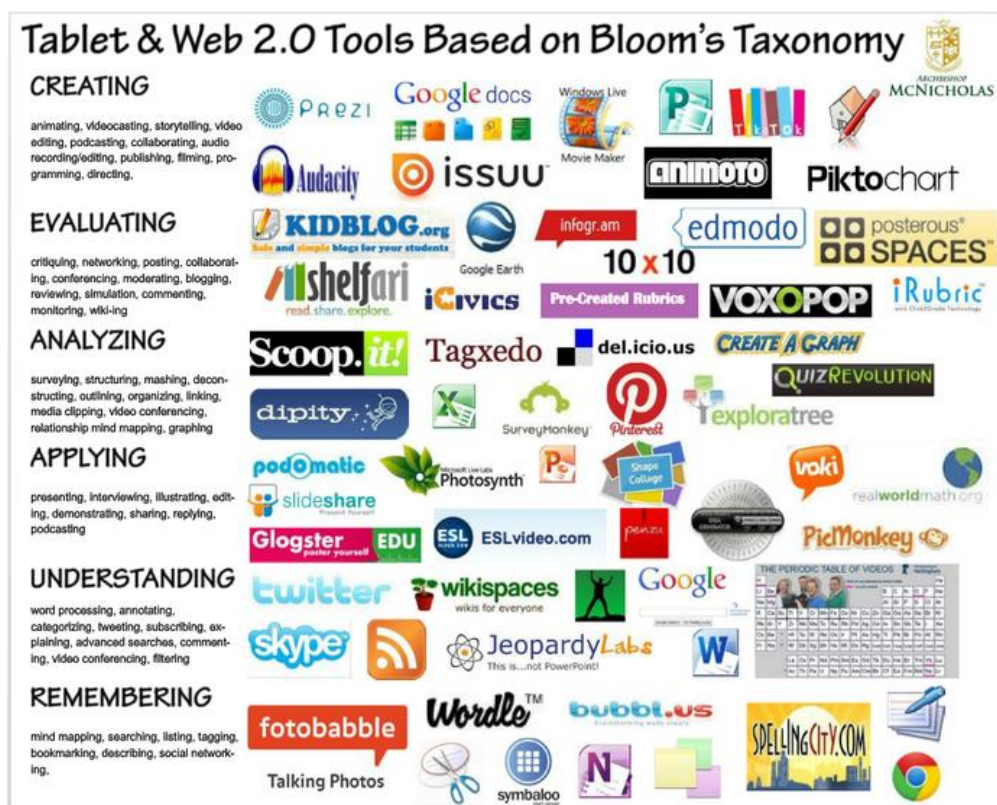
**Figure 2. Model integrated competency task**

*Source: Own work*

In problems of this type direct product is a conscious assimilation of knowledge and skills to form a strategy for solving competency tasks, plan the process of solving, monitor its accuracy and efficiency, detect and correct errors. Depending on the degree of generalization these tasks can be divided into substantive, group (that provide pair or group interaction of students), interdisciplinary, fundamental. In these conditions pupils (students) exhibit intellectual activity and independence both in the process of solving, and evaluation (self-evaluation, mutual evaluation) of intellectual tasks and demonstrate the ability for goal-setting, evaluation, effective action and reflection.

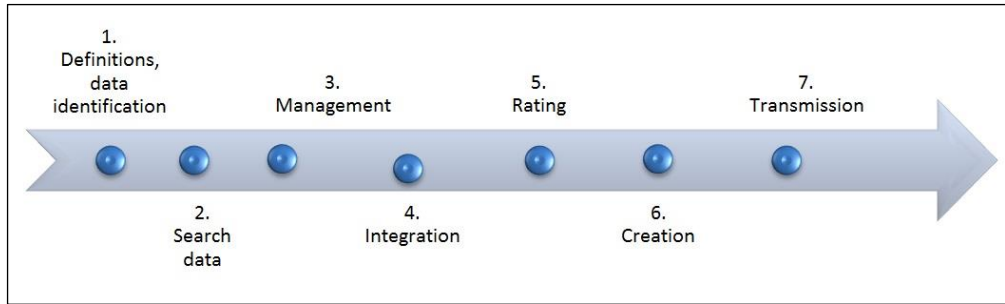
To prepare pupils (students) for solving such tasks it is useful to use appropriate taxonomy of educational objectives by B. Bloom, implemented by means of selected learning tasks according to 6 categories of educational goals: knowledge, comprehension, application, analysis, synthesis, evaluation; organization of pupils' (students') activity; use of ICT (Figure 3).

To determine the semantic component we can use a system of learning tasks by D. Tolingerova (Tolingerova 1970) containing learning objectives in five categories, ranked in increasing cognitive complexity and operating values (Morze, Kuzminska 2011).



**Figure 3. Taxonomy of educational objectives by B. Bloom: setting activities and ICT-support**

At the stage of designing the process of solving by pupils (students) of integrated competency tasks and formulating learning situations and guidelines, it is appropriate to discover a strategy for solving IT problems “big seven” (Burmakina 2007). This is a strategy of integration in systematic process focused on solving a wide range of practical tasks of universal skills of search and data processing by the means of modern ICT (Figure 4).



**Figure 4. Stages solving competency tasks**

*Source: Own work based on Ermakov 2006*

At the stage of monitoring the formation of competences in the process of creating and using competency tasks in the learning process it is also should be taken into account that in addition to the subject and ICT competence it is important to form life competencies that include: technology, communication, willingness to use information resources, self-study, problem solving and social interaction (Ermakov 2006).

## **2. COMPETENCE TASKS IN COMPUTER SCIENCE: PRACTICAL IMPLEMENTATION**

It is logical to anticipate that a significant role in the formation of a person as intelligent, mobile and competent subject is given to such educational discipline as computer science, as ICT competence today is invariant component: knowledge, skills and abilities relating to information and communication technology in everyday life do not depend on the content of the specialist's future professional activity. An exceptional role is played by science and education to prepare pupils (students) to continue their education and professional self-determination in terms of increasing demands for continual process and results of work in the information society.

However, data of monitoring study (the study was conducted in 2010 and included 1,200 students from all regions of Ukraine (Morze 2011)) on forming graduates' of secondary schools skills in using information and communication technologies (ICT) in practice showed that more than 50% of students do not have a formed ICT competence, relating to:

- *access to data and information*: they cannot exclude inappropriate and irrelevant information (53%);

- *evaluating the data*: they cannot correctly determine in the task incoming and outgoing data and its quantity (53, 5%); can't explain the criteria for selection of results (67.78%);

- *creation of data and information*: they cannot justify the selection of the form for presenting results (63, 39%); they do not know how to choose the right means of data for solving problem (79.61%); they do not understand the purpose of different types of diagrams, they cannot consciously choose the type of chart and argue their choice (60, 14%);

- *data management*: they are not able to submit data in visual form to perform comparisons (64.90%); they cannot take into account the features of the final destination of the document (56.93%);

- *notification of data and information*: they cannot summarize correctly and logically express conclusions on the results obtained (71.53%); they cannot substantiate its findings (62.41%); they do not know how to structure a document created in order to enhance the credibility of findings (66.41%); they are not able to issue their opinion correctly, to build sentences properly (59.12%);

- *integration of data*: they do not have developed critical thinking (68.03%).

In connection to this in 2010-2015 the authors have conducted a study of the effectiveness of the competency approach in teaching computer science in schools of Ukraine and in cycle of disciplines in higher educational institutions, including “Methods of teaching science” (<http://elr.tnpu.edu.ua/>) (Ternopil National Pedagogical University); “Information technologies” (<http://elearn.nubip.edu.ua/course/view.php?id=232>), “Methods of teaching disciplines of IT cycle, <http://human.nauu.kiev.ua/course/view.php?id=242>” (NUBiP Ukraine), “Information education technology” (Borys Grinchenko Kyiv University).

Experiment distribution on higher educational institutions was caused by the survey (conducted by the authors in 2012-2014) of the first year students of these universities (the survey covered 350 students from different fields: computer science, social pedagogy, informatics), namely: DPA in computer science at school made up less than 5% (in Ukraine this examination is selective), competency tasks at computer science lessons were solved no more than by 3% of students, feel the practical significance of learning outcomes of teaching computer science at school - 34%. The results of the input testing of teaching disciplines of IT cycle that was based on the tasks of a state final certification, do not significantly differ from the results of the monitoring on forming the graduates’ of secondary schools skills in using information and communication technologies (ICT) in practice.

As a result of the research a system of competency tasks to implement comprehensive study of computer science and a teaching support were created:

- Textbooks on computer science (publishing house *Osvita*);
- Copybooks to test competencies (publishing house *Osvita*);
- Blogs of methodological support (eg <http://inf5-m.blogspot.com/>)
- Collections for the state final certification in computer science (Center of educational literature 2014);



- E-learning courses to support teaching disciplines of IT cycle and methods of their teaching in universities (e.g. <http://elearn.nubip.edu.ua/course/view.php?id=232>).

The special features of formulation of various levels of competency tasks include the following:

- Computer science (3-6 grades): *aim*: formation of ICT competencies (propaedeutics); *instruments*: proposed by the program learning environment; *assistance*: tips and examples of implementation;

- Computer science (7-9 grades): *aim*: formation of ICT competencies; *instruments*: multiple, base - proposed by the program learning environment; *assistance*: different options, tips, suggestions to justify the choice;

- Computer science (State final examination, 9, 11 grades): *aim*: measurement the level of ICT competencies; *instruments*: student chooses the environment; *assistance*: evaluation criteria;

- Information technology (the subjects are taught in high schools): *aim*: creation and measurement of the level of ICT competence as a subject and key; *instruments*: student chooses the environment, the use of a wide range of tools for starting cooperation, communication and dissemination of the results; *assistance*: motivational articles, videos, etc. that encourage to develop new technologies and tools, evaluation criteria, experts examination.

In a current program in computer science (<http://www.mon.gov.ua/activity/education/zagalna-serednya/navchalni-programy.html>) the school provides a solution to problems of competence, ranging from the 7<sup>th</sup> grade. Thus a teacher can choose one of two approaches:

- 1) competency tasks are solved with one block at the end of the course in Computer science for 7 grade;

- 2) while training in computer science the additional lesson for generalization and systematization of each topic where students solve competency tasks appears.

However, it is recommended to use propaedeutics of solving competency tasks from 3-6 grades. For this purpose the following models of their usage are proposed:

- at the lesson as a comprehensive task over a series of lessons
- at the reserve lessons as a lesson of generalization and systematization;
- as integrated practical task for domestic implementation with the current discussion and consulting by a teacher;
- as a task to organize practical training, summer camps, extracurricular activities.

Specificity of disciplines of information technology cycle (for example, <http://elearn.nubip.edu.ua/course/view.php?id=232> ) involves

determining of ICT competence as a subject and a key. The level of a subject competence is determined by testing students and laboratory work according to the curriculum. As a key ICT competence is the ability to use effectively ICT in teaching, research, professional and daily activities, to assess the level usage of competency tasks (individual work) and educational projects (group work). In addition, competency tasks are used to organize practice and independent work of students (Morze, Kuzminska 2013).

The structure of competence tasks is also different. Solving of competency tasks offered to pupils of the 3-7 grades, is based on the method of selected tasks. In accordance to this method, the task is divided into subtasks-situations that specify the principal, giving a pupil the plan for solving the problem and pointing to the development of pupil's readiness to apply the acquired knowledge and skills in a new situation close to normal living environment. Each of the proposed situations revealed in tasks that serve as the oriented basis of actions, tips to direct a pupil to the area of actual performance. For this we can offer both tests to choose one correct answer, multiple choice answers, sequencing, matching, classification etc. and tasks designed to use various computer applications and information technology.

For example, when teaching computer science in the 5th grade in a chapter "Computer Basics" we offer such a task: "Lena is a 5<sup>th</sup> grade pupil. Her grandmother decided to buy a computer and learn to work with it. Help her to do this" and details:

*Situation 1.* In a store grandmother saw various devices and now wants to determine what computers are and which one she should choose. Help her to understand what devices are computers and how they are called.

*Situation 2.* Grandmother decided to choose a stationary computer, but does not know what input and output devices will be necessary for work. She plans to store favorite recipes in the computer, view photos and videos, listen to audio books, communicate with her relatives and is not going to play computer games. Help her to choose the required input and output devices.

*Situation 3.* After buying the computer grandmother turned it on and saw various objects on the desktop. Lena explained to her that many programs have been installed. Without programs you cannot do anything on your computer and for downloading the needed program you can use the main menu or program icons on the desktop. Grandmother wants to use the calculator to calculate the cost of purchases. Help her.

*Situation 4.* Lena created on the desktop of her grandmother's computer folder Photos where she saved in different folders photos from the first ball, the New Year and birthday party. Help grandmother to learn how to view the contents of folders that contain pictures.

*Situation 5.* For a long time grandmother is looking at the keyboard trying to find needed letters and numbers when writing a text. Advise her how to learn to enter quickly any characters from the keyboard.

In tasks proposed for use in state final certification in computer science at school and in training the relevant disciplines in universities the detailed tasks are absent, but they would enhance the semantic direction of the formation of professional competencies, self-conscious and social interaction.

For example, the task *“Choice of profession”*. After reading the study of labour market of IT professionals (e.g., according to LuxoftPersonnel), you decide to make a spreadsheet to track changes in the market of IT professionals with time. Develop a table structure independently. Analyze the dynamics of vacancies in information technology, particularly in Ukraine, determine which programming languages you need to know to be a competitive software developer and look for proposals (sites of training agencies and centers) of training in the field of a web developer and developer of Java Net projects. Express assumptions about the prospects for certain IT fields. Post your results in a convenient form for analysis and comments.

As in the study of the concept of competence much attention is paid to the readiness for entry into individual components and involvement in the formation process (Ermakov 2006), in addition to evaluation of the graduates' ICT competences (according to the requirements of the curriculum) and students' (in accordance to developed universities standards on ICT competence, for example, <http://moodle.nauu.kiev.ua/mod/lesson/view.php?id=421>), students of various disciplines were offered tools for self-assessment of their acquisition of life competencies by Ermakov.

Reflections after the course “Information Technology”, during which the students were offered competency tasks and methods of their solving, showed a significant increase of students' skills classified as «soft skills»:

- the ability to manage their time, set goals, prioritize - 35%;
- to use modern IT technology to solve problems and solving tasks - 39%;
- communication skills, teamwork - 27%;
- leadership - by 23%;
- the ability to present their ideas and results - 32%;
- skills to manage the project - 25%;
- cognitive skills, creative thinking - by 32%.

## CONCLUSIONS

The received results allow for making a conclusion about a need to include a module of solving competency tasks in a cycle of training of future teachers in order to develop their ICT and life competencies that are needed for a specialist today.

However, analysis of educational training programs revealed insufficient attention to the formation of the ICT competency of teachers - usually teachers attend in-service

courses for increasing the level of subject competence. Development of curriculums, training and technical support of the formation of the ICT competence and development of soft skills is a subject of further authors' research.

The specifics of computer science as a science and spheres of human activity is that it provides with its methods, tools, technologies other branches of knowledge, cognitive and practical human activity. Skills and abilities that are formed while learning science at school and subjects of information technology cycle at the university, in modern conditions are generally academic, general intellectual and can be transferred to the study of other subjects in order to create integrated information space of knowledge of pupils (students) and the formation of key competencies according to the social order of the information society.

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# MEDICAL DISTANCE EDUCATION - GOOD PRACTICES

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**Abstract:** *The article presents good practices for medical distance education based only on results of evaluation of blended-learning classes by 231 Polish second year Medicine students. The article was written on the basis of the review of answers given by students to an open-ended question. The article presents good practices as seen from the perspective of a medical student, thus suggesting their priorities in distance education. Not only does it provide material for analysis for knowledge providers and organizers of distance education at a medical school, but it may also serve as an example for other fields of study within natural sciences, health sciences or physical culture studies. The final conclusion supports the interdisciplinary character of the distance education process, and points to the cooperation between the implementing persons (teams). Thus, a certain model of good practices is being built, defined by the authors within three topical areas: work organization on an LCMS (Learning Content Management System) portal, organization and types of learning materials and implemented technologies.*

**Keywords:** blended-learning, distance education, medical education, evaluation, open-ended question, good practices

## INTRODUCTION

### Motivation

The article presents good practices for medical distance education based only on the results of the evaluation of blended-learning classes by 2nd year medicine students.



The article was written on the basis of the review of answers given by students to an open-ended question. They have become an inspiration for those elements of teaching and the organization of classes involving distance education that are important and valuable for students of medical faculties. The authors attempted to build such a model of good practices only on the basis of an open-ended question; such questions often serve an auxiliary purpose instead of a primary element of evaluation surveys.

## **Application**

The article presents good practices as seen from the perspective of a medical student, thus suggesting their priorities in distance education. These opinions represent students' expectations and provide material for discussion on medical education and a basis for implementing changes in that education. The article may become a kind of case study for distance education, illustrating the characteristics of classes in primary subjects during the first years of medical studies as well as the characteristics of learners. Not only does it provide material for analysis for knowledge providers and organizers of distance education at a medical school, but it may also serve as an example for other fields of study within natural sciences, health sciences or physical culture studies.

The conclusions obtained by the authors can also be compared with the distance education model adopted by knowledge providers before the start of classes, and verified for support in the students' opinions. If these claims are not supported, we should determine to what extent and why the adopted model diverges from the expectations of education recipients.

## **1. DISTANCE EDUCATION. MEDICAL DISTANCE EDUCATION**

### **1.1 Idea**

The implementation of distance education is based on interdisciplinary collaboration within the professional team in charge of the educational resources and class moderation and personnel with IT competences who are responsible for the technical and technological aspect (Kołodziejczak, B., Roszak, M., Ren-Kurc, A., Bręborowicz, A., Kowalewski, W., 2015). The entire work takes place on an LCMS portal, which is the basis for the implementation of distance education.

Distance education is frequently perceived as a "simpler" teaching method than traditional education (Roszak, M., Kołodziejczak, B., Kowalewski, W., Ren-Kurc, A., 2013). Many teachers believe that a well designed and executed e-course can serve its purpose for years without any need for correction for multiple learning groups. Thus, it should offer savings in terms of time and money, as well as an opportunity to reduce the teaching staff in comparison to traditional education. Are these claims supported by students' opinions?

## 1.2 Material, methods

The data used for analysis in the article comprises opinions of 231 Polish second year students at the Faculty of Medicine, Poznań University of Medical Sciences, who attended a blended-learning course in pathophysiology. These are the opinions of 58% of the class participants who agreed to express their opinions through answering an open-ended question. Two editions of the course were held: the first one during the academic year of 2013-2014 and the second one in 2014-2015. 155 first edition students and 246 second edition participants were surveyed. 60 students (39%) and 171 students (70%) taking part in the first and the second edition, respectively, answered the open-ended question. The open-ended question taken as a basis by the authors of this article was one of several questions included in the class evaluation survey. The following question was asked in the first and second edition of the class, respectively:

- a) In your opinion, what should be changed/added/corrected within the ESTUDENT portal to improve this online learning support system?
- b) In your opinion, what should be changed/added within the ESTUDENT portal to make it more helpful in studying pathophysiology?

## 2. RESULTS AND DISCUSSION

It is not the purpose of this article to evaluate the gathered opinions, nor to study them in detail in the context of the study subject. On the basis of the material obtained, the authors are trying to demonstrate a more general learning aspect through indicating those topical areas which are important for the targets of medical education. In this way, they also attempt at defining a general model of good practices as viewed by medical students.

Below is a presentation of the study findings after two course editions. The second edition of the course was extended with audio resources (subject-matter commentary from teachers) as preparation for seminars in the subject, as well as resources for lectures delivered locally. The entire knowledge evaluation and communication process involved LCMS portal tools.

### 2.1

Research findings obtained after the first edition of the course. The sequence of data presentation depends on the frequency of occurrence, in descending order (Table 1).

**Table 1.****Opinions of students who participated in the first edition of the course**

<b>Item</b>	<b>Opinions of students who participated in the first edition of the course (60 persons, corresponding to)</b>	<b>No. of opinions (%)</b>
1	Extension of self-tests with short clarifications of the correct answers to test questions, or adding hints to the questions to direct students to the actual problem under review. Presentation of a detailed report after the test is completed, covering the answers given to the specific questions	23 (38%)
2	Possibility of asking the teacher questions and consulting the teacher on selected matters outside the specified time limit	5 (8%)
3	Verification of professional accuracy of self-test questions database. If an answer wrongly recognized as correct is encountered, the student will waste their time making sure whether there are any more errors in other questions.	5 (8%)
4	Availability of refresher tests before the exam, with availability period exceeding 24h, and presentation of exact dates and times in the course schedule well in advance	5 (8%)
5	Online publication in the portal of resources used by teachers during local classes (practice, lectures). This will enable students to prepare better for classes and to take a more active part in the classes, without having to take notes. Publication of other additional learning resources before every test	4 (7%)
6	The contents of questions in the self-test database deviates from the resources/course books used by students, the advancement level of the questions is beyond the range of presented literature	3 (5%)
7	Test questions may be sometimes unclear, concerning some minor tidbits	2 (3%)
8	Duplicated questions in the self-test database. There should be more questions on each topic	2 (3%)
9	Self-test database questions should not be the same as those in the knowledge testing database. This discourages students from learning, enhancing their knowledge, as they are given the opportunity to take the shortcut and just "complete the questions" from the database which will be repeated during the actual exam.	3 (5%)
10	Availability and assistance from the technical team responsible for the portal would be appreciated	2 (3%)
11	It would be reasonable to distribute further information (apart from the schedule and calendar) concerning the availability times of specific resources (particularly tests) so that the students are not surprised when	1 (2%)

	the tests are "closing" at midnight	
12	Change the exam progress parameters, particularly in the case of a large number of test questions	1 (2%)
13	Add interactive clinical cases	1 (2%)
14	It would be reasonable to add resources summing up the knowledge learned in class and knowledge acquired from reading.	1 (2%)
15	First we read the materials covering the given subject and then we do the self-tests	1 (2%)
16	Self-tests are 100% useful as long as they are not mandatory, they are used as self-help, to consolidate knowledge and not to become obligatory homework which will be checked	1 (2%)
17	Praise: the portal is transparent, user-friendly, such classes are a very interesting initiative, everything is working properly, the course was very well prepared, communication via the portal is modern, efficient and useful - congratulations to the author of the idea!	17 (28%)

*Source: Own elaboration*

Opinions expressed by students after the first edition of the course can be grouped under the following headings:

- A. Learning materials - 31 (52%) opinions (items: 1, 5, 8, 13, 14) that comprise information about the students' opinions on additional materials that should be added to the course, which will help them participate in classes more efficiently and organize their learning process better.
- B. Subject-matter content - 5 (8%) opinions (items: 6, 7) concerning the level of materials made available within the course. Such suggestions merit certain attention; however, major changes should only be made to the exam questions database after carrying out statistical analysis of test results, with special emphasis on questions with a minimum and maximum score.
- C. Customization of learning materials, testing - 31 (52%) opinions (items: 1, 4, 8, 12).
- D. Communication within the course, method of moderation - 11 (18%) opinions (items: 2, 4, 11).
- E. Adjustments, updates - 8 (13%) opinions (items: 3, 9).
- F. Appreciative opinions (praise) consist of acceptance of blended-learning methodology and work on the LCMS portal - 21 (35%) opinions (items: 10, 15, 16, 17).

Summing up, we can see that items A and B are concerned with the learning materials (education content) as such, for which the professional team in charge of implementing the courses are responsible. Items D, E and partly C can be defined as

class organization and teaching methodology, for which course teachers are responsible. This depends on LCMS portal tools and the course teachers' ability to use them in practice. Items C and E are put into practice mainly by the IT team, in coordination with the professional personnel and course responsible personnel.

## 2. 2

The results obtained after the second edition of the course are presented in Table 2 in descending order.

**Table 2.**

**Opinions of students who participated in the second edition of the course**

<b>Item</b>	<b>Opinions of students who participated in the second edition of the course (171 persons, corresponding to)</b>	<b>No. of opinions (%)</b>
1	Replace the speech synthesizer with the teacher's voice	66 (39%)
2	Add a file with the presentation contents to the course with audio materials	33 (19%)
3	Extension of self-tests with clarifications of the correct answers to test questions, or adding hints to questions. Presentation of a detailed report after the test is completed, covering the answers given to the specific questions	24 (14%)
4	Publishing files with contents of presentations (audio materials) as printable PDF files	18 (11%)
5	Missing option to reverse audio files (only pause) - some students waste their time listening to the given fragments from the beginning several times	18 (11%)
6	The contents of materials published for local lectures should be printable so that students can add their notes during the actual lecture	10 (6%)
7	Speech synthesizer's accent prevents listeners from focusing on the subject or capturing the essential information, the voice is monotonous, unnatural, makes you tired and drowsy, no intervals between sentences, a distraction, interference with understanding the material	9 (5%)
8	Errors in self-tests, contrary to literature or course materials	9 (5%)
9	Ability to open subject materials and self-testing materials at the same time	6 (4%)

10	More options to take self-tests	5 (3%)
11	Students write down the contents that are read to them; therefore, a text file with the contents of the audio files would facilitate learning. Visual learners are unable to learn by only listening, without seeing the actual contents, and they take notes anyway	4 (2.3%)
12	Ability to use the course throughout the whole semester and not only for the duration of the class	4 (2.3%)
13	Audio comments to text materials should be relatively short; a 3-minute commentary is too long	4 (2.3%)
14	Too high of self-test questions repeatability rate	3 (2%)
15	Course availability should take into account the retake date (after the end of the course)	3 (2%)
16	Possibility of using the materials on tablets	3 (2%)
17	Add audio comments to lecture materials - these will be helpful in case you have not had enough time to take notes during a local lecture	3 (2%)
18	Add a note of whether the reader says exactly the same as shown in the material or adds some extra content so that students do not waste their time listening again, which is time consuming	3 (2%)
19	More text and less reading because more medical students are visual learners, rather than audio learners	2 (1.2%)
20	Add searchable text of the audio files to the course - you can then quickly find the right answer to the question	1 (0.6%)
21	Voice reading out the presentation too fast	1 (0.6%)
22	Add a written coursebook covering the whole material as a refresher	1 (0.6%)
23	Subject course duration is too short considering its requirements, no options for good utilization of all course materials	1 (0.6%)
24	Add more physiology materials	1 (0.6%)
25	Double negations in questions, hard to understand	1 (0.6%)
26	Male and not female reader voice	1 (0.6%)
27	Add animations to present the specific issues	1 (0.6%)

28	Standardize presentation backgrounds	1 (0.6%)
29	Add a course synopsis, videos	1 (0.6%)
30	Too many tabs in the portal	1 (0.6%)

*Source: Own elaboration*

Opinions expressed by students after the second edition of the course can be grouped under similar headings as in the first edition. However, there are certain differences pointed out by students.

- A. Learning materials - 72 (42%) opinions (items: 2, 3, 11, 14, 17, 20, 22, 24, 27, 29), indicating materials which the students believe should be additionally included in the course. A decision to include more materials requested by students must be reviewed carefully by the professional team according to the teaching methodology.
- B. Subject-matter content - 13 (8%) opinions (items: 8, 14, 25) concerning the level of materials made available within the course and any errors or omissions occurring during content edition.
- C. Customization of learning materials, testing - 90 (53%) opinions (items: 3, 4, 6, 7, 10, 11, 12, 13, 15, 18, 19, 21, 23, 26, 28).
- D. Communication within the course, method of moderation - no comments.
- E. Adjustments, updates - 9 (5%) opinions (item 8).
- F. Praise - 1 (0.6%) opinion (item: 23).
- G. Applied technologies and tools - 104 (61%) opinions (items: 1, 5, 7, 9, 16, 20, 30).

After summing up the second edition, we can see a major change - new suggestions are present regarding the method of working with the portal and the applied technologies. This is a consequence of adding new components to the course, including multimedia components (Bednarek, J., 2008; Roszak, M., Kołodziejczak, B., Ren-Kurc, A., Kowalewski, W., 2013). The IT team is responsible for implementation, deployment and testing; however, the aspect of IT competences of participants of the learning process must be considered as well (Ren-Kurc, A., Kowalewski, W., Roszak, M., Kołodziejczak, B., 2012; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., 2014). The proposal to use a speech synthesizer was not approved by medical students - 75 negative opinions were given by 44% of respondents to the open-ended question, which is the opinion of 31% of all course participants.

It should be emphasized that the second edition students had no objections as to the communication within the course and class moderation.

Based on the analysis of item A components, we may conclude that medical students are strongly attached to static learning materials and have no extensive experience with multimedia and mobile format of the learning process.

Students' expectations concerning the technical implementation of the learning materials, indicate the importance of traditional learning methods (printing, text). This claim would be difficult to implement because it is not possible to put all professional remarks in writing, due to the time required to complete this task. Moreover, there should be more emphasis on some students' wrong approach to the learning process. With all types of contents available within the online course, namely explanations of test questions, detailed materials covering the local classes, detailed comments on the contents, etc., students are not given any opportunity to actively seek knowledge, which decreases their chances of retaining the knowledge longer (Roszak, M., Kołodziejczak, B., Ren-Kurc, A., Kowalewski, W., Bręborowicz, A., 2013). It is the teachers' task to convince students that this is a wrong path that lowers their chances to memorize the material successfully. This is quite an alarming indication, which is also pointed out by first edition students (Table 1, item 9).

## 2. GOOD PRACTICES

The above list of items A through F (Chapter 2.1) and the list of items A through G (Chapter 2.2), and both after the first and the second edition of the course, supports the interdisciplinary character of the distance education process, and points to the cooperation between the implementing persons (teams).

Thus, a certain model of good practices is being built, defined by the authors within three topical areas: work organization on the LCMS portal, organization and types of learning materials, and implemented technologies.

This can be presented in more detail as follows:

1. Teaching/learning organization and methodology - implementation, use of the portal, technical issues. The IT team will be primarily responsible for this aspect, in cooperation with the professional team.
2. Learning materials organization - format, types of materials, contents and updates - the professional team, in cooperation with IT, will be responsible for this area.
3. Tools and technologies applied - only the IT team is responsible.
4. Customization of tests, self-tests, other learning materials, including their availability, time limits - this is managed by the IT team, in cooperation with the professionals.

Success of distance education largely depends on good planning, organization of classes, and learning materials (Ren-Kurc, A., Roszak, M., 2011; Roszak, M., Kołodziejczak, B., Kowalewski, W., Ren-Kurc, A., 2013). These are



commonly acknowledged standards which are not always properly implemented, or may be disregarded in the education preparation process. As we can see, the responsibility for its successful execution relies on good cooperation between these two teams, namely the IT and the professional team. Therefore, we can claim with a high level of certainty that distance education could not exist without the IT team, but IT experts would not be able to implement distance education in any topical area without the professional team. Any changes to online courses must be justified and consistent with the learning principles so that they support the knowledge acquisition process and enhance its efficiency (Bramley 2011, Mokwa-Tarnowska 2014). Asking questions and actively seeking the answer has always been, and still is, the essential type of mental activity throughout the learning process.

## CONCLUSION

Distance education (Meger 2010) is a verified and necessary teaching/learning method that requires interdisciplinary cooperation between teachers and IT teams (Półjanowicz, Roszak, Kołodziejczak, Kowalewski 2014). A well designed and executed online course can remain useful for years, but must be adjusted, modified and updated, and any such adjustments and updates must be included in the teachers' working times. Financial investments in distance education are not lower than those applicable to traditional education - multimedia require a lot of effort, technologies must be supported and monitored by administrators.

These conclusions should be extended with online classes efficiency analysis (Półjanowicz, Roszak, Kołodziejczak, Bręborowicz, 2014, Półjanowicz, Mrugacz, Szumiński, Latosiewicz, Bakunowicz-Łazarczyk, Bryl, Mrugacz, 2013). At the moment, the authors are working on the efficiency analysis of the first edition standard course and on the findings after implementation of extended multimedia methods occurring in the second edition of the course for the first time (Kołodziejczak, Roszak, Ren-Kurc, Bręborowicz, Kowalewski 2015). Results of such research will supplement good practices in medical education.

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# **TEACHING FRENCH AS A THIRD LANGUAGE: THEORETICAL ASPECTS AND A WEB-BASED COURSE REDUCING THE NEGATIVE TRANSFER OF SELECTED VERBAL CONSTRUCTIONS FROM ENGLISH TO FRENCH**

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***Abstract:** The paper revolves around the problem of cross-linguistic influence in multilingual learners with a particular focus on the issue of teaching French as a third language. The distance learning course described in the article has been created in order to reduce the number of mistakes resulting from negative transfer and committed by learners of French and English, the latter being their dominant foreign language.*

***Keywords:** distance learning course, FLE, language transfer, Moodle, multimedia*

## **INTRODUCTION**

The following article will concentrate on the online teaching material elaborated as part of the MA seminar on the use of multimedia in foreign language teaching at the Institute of Romance Languages and Translation Studies in the Faculty of Philology at the University of Silesia (Poland), under the supervision of Halina Widła. It illustrates the mechanism of cross-linguistic influence in multilingual learners and provides an example of how to use distance learning tools in the process of teaching French as a third language to students whose dominant foreign language is English. The main objective of the course prepared by Aleksandra Serwotka is to prevent the occurrence of grammatical errors resulting from interference, as well as to provide efficient methods of referring to the foreign language already known to students in order to facilitate the acquisition of another language. The emphasis is put on self-studying so as to encourage the learners to perceive certain regularities, but also major differences between the two languages. The course has been created on the

basis of CLMS Moodle (selected as the University of Silesia's e-learning platform) with the aid of the Prezi presentation software and the Hot Potatoes software suite.

## **1. THE MA SEMINAR 'MULTIMEDIA'**

The MA seminar „Multimedia“, conducted since 2008, aims to prepare the participants to write their MA theses, which are supposed to include a theoretical part, discussing selected problems, and a practical part, consisting in the creation of educational materials with the use of various means and techniques of distance learning.

Taking into account the widespread use of web-based textbooks, one may ask whether and to what extent a future foreign language teacher would need the skill of creating multimedia resources. It appears that the numerous educational aids available on data storage devices and online frequently require to be expanded through embedding within the local context, comparison, or adjustment to individual capacities of the learner. Therefore, ensuring the students' ability to apply modern technologies is not sufficient; a lot of time needs to be devoted to the reflection concerning the creation of online teaching materials. This allows for a thorough analysis of the learners' needs, as well as the assessment of their possibilities; moreover, it gives an occasion to perform a comprehensive analysis of the factors which foster language instruction, the evaluation of its effects, and a better assessment of the mechanisms conditioning successful teaching.

The MA theses written as part of the seminar may touch upon a variety of subjects related mainly to Internet communication and described so as to meet the needs of the target user. So far, 33 courses have been created on the Faculty of Philology's distance learning platform. Each of them is aimed to deepen the knowledge and expertise of the specialised language.

Each thesis is based on the author's own online project, related to the use of modern technologies at work, including the specialised language instruction with a particular focus on the possibilities of the so-called e-learning of foreign languages. The seminar classes revolve around the theoretical issues which are raised in the theses, as well as the evaluation of the courses prepared online and described in the theses with regard to their goals, content, utility and the issues discussed during their preparation.

The subjects of the theses are related to specific interests of the participants. They usually address the issue of the students' current or future professional career. For instance, a number of courses refer to such domains as tourism, art, history, medicine and content-based instruction. Many times the skills acquired during the seminar (both theoretical and linguistic skills related to the issues portrayed by the students, as well as strictly technical skills regarding the use of modern technologies) proved to be a valuable asset in the process of getting a job. The

course described in the following part of the paper has been created by Aleksandra Serwotka as part of the seminar.

## **2. WEB-BASED LEARNING AS A COMPONENT OF BLENDED FOREIGN LANGUAGE LEARNING**

Tavangarian et al. (2004) put emphasis on the change in learning methodologies which started to emerge in the nineties in the US and whose effect was the shift of the attention from the teacher towards the individual learner. This resulted in a rapid development of e-learning, defined as “computer and network-enabled transfer of skills and knowledge” (Hejtmánková 2013). Hejtmánková remarks that the present-day foreign language education has also been transformed by the dynamic advancement of new technologies. As distance-learning platforms offer the possibility of creating learner-specific content easily, they may be successfully used to support the process of foreign language teaching within a variety of learning environments.

The syllabus of the module „French practical grammar“ for second year students of applied languages (French and English) at the University of Silesia comprises 20 hours of student’s individual work, and the total number of hours that the student should spend on individual learning as part of the practical French module is as many as 140 (this includes the theoretical preparation, doing homework and preparing for written assignments). The use of web-based learning may constitute a good alternative for the students to meet this requirement. However, taking into consideration the abundance of linguistic material offered by the World Wide Web, it is essential to assist the learners in the process of selecting the right educational aids. Otherwise, the students may find the choice of learning materials difficult (El-Bakry and Mastorakis 2009). One of the numerous solutions may be the preparation of online self-studying content and its distribution among students, which can prevent confusion resulting from being faced with the immense quantity of various educational supporting materials.

The authors of the present article are of the opinion that the use of distance, web-based learning strategies is a proper method to motivate the learners to individual work in the amount of time that is required of them. The type of education including both participation in traditional classes and the use of other learning methods, such as web-based education, is referred to as blended learning (see Garrison and Vaughan 2008). Mazurek and Vrsecka (2011) claim that blended learning, understood as the connection of traditional instruction and distance learning, is the optimal form of learning. Nevertheless, these authors notice the great potential of web-based learning, especially in relation to university education. Thus, the course described in the present paper is designed to support the learning process occurring at the university in the traditional form (i.e. inside the classroom in the presence of both the teacher and the student).

### 3. THE SPECIFICITY OF TEACHING FRENCH AS A THIRD LANGUAGE

Over the years, many language teaching methodologies have emerged. Some of them, such as the Grammar Translation approach, emphasise the use of the learner's native language during the teaching process (see Mackey 2006). Nevertheless, before selecting a teaching method, the teacher should take into consideration a number of factors, including the learner's linguistic background, especially when it comes to multilingual learners (who dispose of more than one language system). There are numerous components which can possibly determine the influence that specific languages exert on one another in an individual speaker. There is also a wide variety of hypotheses concerning the nature of factors that condition the influence of several languages upon one another in a speaker's mind. For instance, Paradis (2004) claims that cross-linguistic influences result from neurobiological mechanisms.

As for the factors which can possibly determine the non-native language influence, de Angelis (2007) mentions, among others, such elements as proficiency, recency of use and language distance. According to Widła (2007), during the process of acquiring their third language, learners base upon language resources which they believe to be the closest to the target language. This factor is referred to by de Angelis (*ibidem*) as psychotypology (a term borrowed from Kellerman; Chłopek 2011) – the manner in which a person learning a language perceives the similarities, as well as the differences between given languages. Hence, in case of a Polish native speaker who had mastered English at advanced level and began to learn French, it is possible to observe the influence of both Polish and English on the speaker's performance in French. This hypothesis was confirmed by the research, conducted by Aleksandra Serwotka on 27 students of the second year of Applied Languages – a course offered by the University of Silesia, as part of which English is taught from the advanced level, whereas French from the basic level. The students were asked to translate 20 sentences from Polish into French. The sentences contained verbs whose complementation (for example, the presence or lack of a preposition, the use of direct object or indirect objects) differs between English and French. When it comes to Polish structures, in case of the chosen verbs they were either corresponding to French structures or entirely different from both languages mentioned before. A number of mistakes whose source may possibly be observed in English has occurred. Several examples are depicted in the table below.

It can be observed that the interferences occur between all the languages known or taught to the learner. This is why Widła (2007: 199-204) suggests that the didactic material aimed to teach French to Polish speakers whose primary foreign language is English does not necessarily have to be the same as that proposed to the Polish speaker for whom French is the first foreign language. In this case, English is far from being only the source of mistakes occurring during the use of French. As there is a number of structures which are common between these two languages, it can be

used as a point of reference in the cases when certain constructions in this language are closer to French constructions than their Polish equivalents.

**Table 1.**

**Examples of errors committed by the students of the second year of applied languages (English and French) and possibly resulting from the influence of English upon their French.**

<b>Mistake</b>	<b>Correct form</b>	<b>English translation</b>	<b>Possible source of the interference</b>
Je suis entré la chambre.	Je suis entré dans la chambre	I entered my room.	The lack of preposition in the English construction.
Quelqu'un nous s'approche.	Quelqu'un s'approche de nous.	Somebody approaches us.	The lack of preposition in the English construction; <i>s</i> added to the verb in the third person singular.
Qu'est-ce que tu pense à ?	À quoi penses-tu ?	What are you thinking about?	The possibility of putting the preposition at the end of the sentence in English.
J'ai cherché à cette livre.	J'ai cherché ce livre.	I've been looking for this book.	The use of a preposition in English; the female gender of <i>książka</i> („book”) in Polish.
Jouons le football !	Jouons au football !	Let's play football!	The lack of preposition in the English construction.

*Source: Own work*

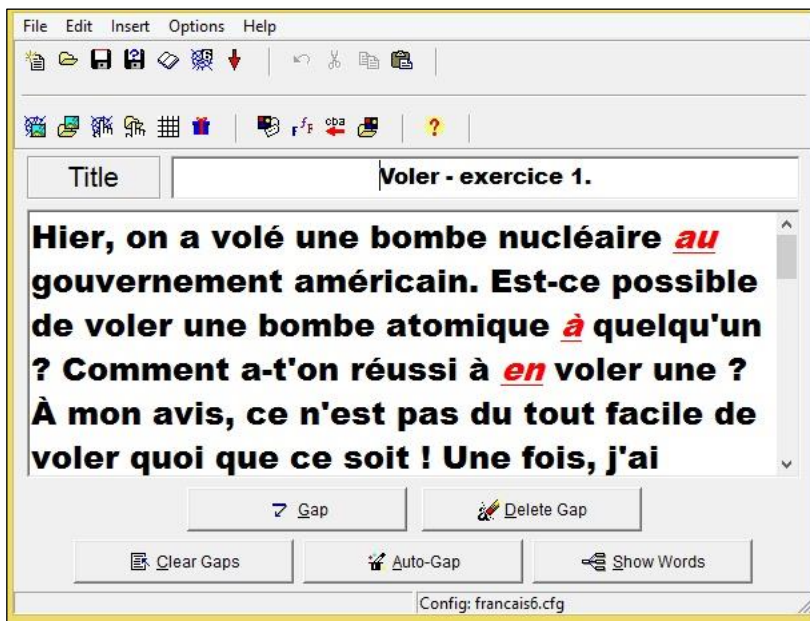
Computer-assisted learning may be considered useful in the process of teaching French as a third language, since it enables the teacher to easily adapt the content to specific needs of the learner. What is important and emphasised *inter alia* by Widła (2007), Mazurek and Vrsecka (2011), the teacher should not be entirely replaced by a computer program. Instead, information technologies should be implemented in order to support the learning process and to assist in the process of individual learning, as it is in the case of the course prepared by Aleksandra Serwotka. Because of their flexibility, courses of this kind can be used in order to enhance or optimise the quality of teaching.



## 4. THE COURSE

### 4.1 Basic information

In order to create the course, the author made use of open-source or freeware software exclusively. Moodle (Modular Object-Oriented Dynamic Learning Environment) is a free learning management system whose principal function is to create personalised web-based learning environments. It was implemented by the University of Silesia as its e-learning platform. Prezi is a cloud-based zooming presentation software, whose basic version is free of charge. Moreover, students and teachers are allowed to receive a Prezi Edu Enjoy license for free. Hot Potatoes is a suite of six applications (JCloze, JCross, JMatch, JMix, JQuiz and the Masher), used for creating various types of exercises which can later be embedded into a website or an e-learning platform. The license is free of charge provided that the exercises created by means of the applications are freely available (Widła 2007). When creating the course, the author used the applications JCloze, JMatch and JQuiz, as well as the Masher in order to prepare a single web page out of several exercises.



**Figure 1. The process of creating a JCloze exercise by means of the Hot Potatoes software**

*Source: Own work*

### 4.2 Goals of the course

The course that is the subject of the present article is a supplementary multimedia course, designed in order to support the process of teaching French to the students of the second year of applied languages (English and French) who have already

mastered English at the advanced level. The educational material prepared by the author may be used as a tool for individual learning, both among students and other persons aiming to improve their language skills in French through practice. The basic objectives of the course involve:

1. the consolidation of practical knowledge of the French grammar;
2. the improvement of the learners' qualifications concerning the use of French structures selected by the author;
3. the elimination of possible mistakes resulting from negative cross-linguistic transfer between English and French;
4. creation of good linguistic habits by increasing the metalinguistic knowledge of the learners in order to facilitate the process of learning the third language;
5. encouraging the students to take advantage of their linguistic knowledge concerning one language in the process of learning another.;
6. supporting the process of individual learning as required from the students by the curriculum by making it more attractive and hence more approachable.

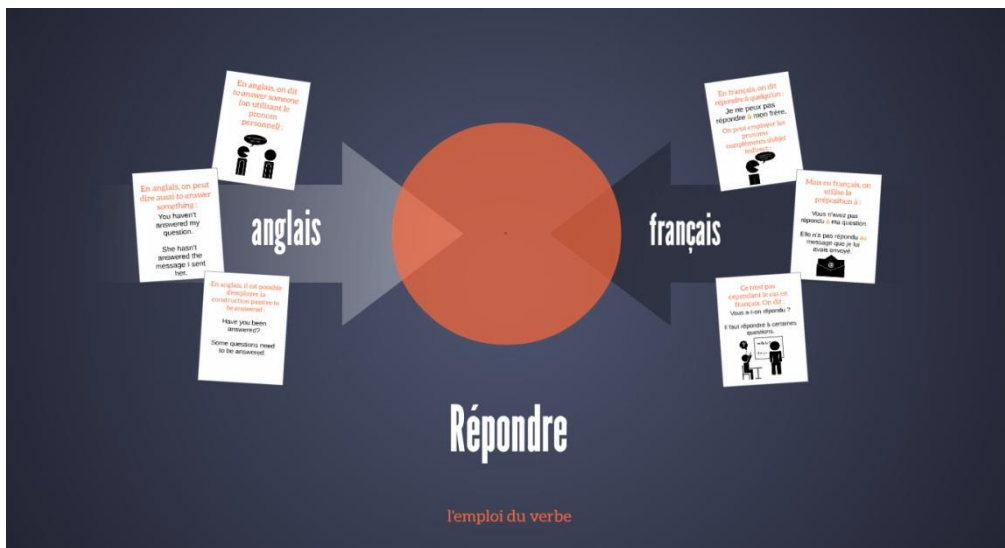
#### **4.3 Structure of the course**

The course, prepared almost entirely in French (although without surpassing the intermediate level, so that it is comprehensible to the learners), has a modular structure and comprises a short introductory part, 11 units (modules) and a final revision part. Each module is dedicated to a specific French verb (or verbs) whose complementation is different than in English. The verbs have been selected by the author in reference to her own experience related to learning French as the third language, as well as on the basis of the research mentioned in the previous chapter. The units are as follow:

1. Voler (to steal);
2. Appeler/téléphoner (to call/to phone);
3. Penser (to think);
4. Jouer (to play);
5. Demander (to ask);
6. Écouter/regarder (to listen/to look, to watch);
7. Entrer (to enter);
8. Dépendre (to depend);
9. Répondre (to answer);
10. Approcher/s'approcher (to approach, to come closer);

11. Ressembler (to resemble), chercher (to search), oser (to dare), attendre (to wait).

Each section begins with a multimedia presentation, embedded into the course so that the learners are free to zoom and switch the content by themselves. As a result, the students are able to skip the material with which they are already familiar, as well as to concentrate for a longer amount of time on the issues that they consider particularly problematic. The presentations are created by means of the Prezi software and their main goal is to compare specific English and French verbal structures in order to enable the student to spot the similarities between them, as well as the differences to avoid further errors. The main focus is on the differences in the use of specific prepositions in English and in French, together with the constructions with a direct or indirect object. Each use of a particular verb is followed by a description in French, indicating the similarities and the differences in grammar between English and French, as well as in meaning when necessary. There are also examples of use in both languages, derived from authentic texts in French and translated into English by the author. Specific parts of each sentence are marked by different colours in order to facilitate their identification and to indicate the differences in word order between the two languages. The content is accompanied by various illustrations, appropriate for the theme and selected so as not to distract the learner's attention from the lesson. The presentations are relatively short and concise.



**Figure 2.** One of the presentations embedded into the course

*Source: Own work*

The subsequent part of each lesson consists of tasks related to the content of the presentations. A large variety of exercise types proposed by CLMS Moodle is used. In relation to constructions in which differences in the word order appear, the word-

ordering exercises are proposed. After having completed each task, the students are able to verify whether their answers are correct or not, as well as to view the right answers. The majority of sections contain at least one exercise introducing an authentic French text and consisting in either writing or choosing the appropriate preposition. The tasks in which the user is asked to fill in the gaps with the right verb forms or prepositions (as opposed to the exercises in which the student simply chooses the form which is correct) are prepared by means of the Hot Potatoes JCloze application, which allows the teacher to include a keypad enabling the learner to easily type French characters.

As it has already been mentioned, the focus of the author was on the process of individual learning. Therefore, the students do not receive grades after having completed the tasks. Moreover, they are free to choose the order of learning depending on their preference. They are not obliged to accomplish every single task. The amount of time corresponding to each exercise is not limited, hence the learners can concentrate on specific examples as long as it is convenient. In the introduction to the course, it is suggested that the users do not tackle more than one verb a day in order to facilitate the acquisition of knowledge. Although dealing with more than one section in one day is possible, it is not recommended, since such an amount of information may discourage the students. Nevertheless, the author of the course is aware of the differences in individual preferences of the learners; this is why all the sections are constantly available to users who are allowed to browse them freely.

**Figure 3. One of the revision exercises**

*Source: Own work*

Although the modules are independent of one another, it is advised to maintain the order imposed by the course structure, since the presentations dealing with the theoretical part of the lesson contain general grammatical information. Its part

should be already familiar to the students (taking into account the fact that the course is designed to be a component of the blended learning process), but the grammar tips might prove useful in order to complete the tasks that follow. Nevertheless, the users are allowed to determine the order of learning independently, as they may already be familiar with certain structures because of their different learning backgrounds not necessarily related to the university education.

The last module is different in its form from the previous sections. It contains a number of revision exercises, prepared with the use of the Hot Potatoes software. It includes several cloze activities (created by means of the JCloze application), in which the learner is asked to complete the translations of given French sentences into English. The translation usually consists in writing the right form of the verb given in brackets and the use of a correct preposition. The last exercise is a quiz (prepared via JQuiz), in which the user chooses the most accurate French translations of English sentences.

#### 4.4 Example of a course unit



**Figure 4. The process of creating a multimedia presentation using the Prezi software**

*Source: Own work*

Unit 4 – *Jouer* (to play) starts with a presentation in which the author compares various uses of the verb *to play* in French. Each example is followed by its English translation, and the differences between the two languages are clearly marked, as it is visible in the Figure 4. After having watched the presentation, the learner is invited to complete 6 exercises, out of which 3 were created with the use the Moodle tools (two *drag-and-drop* exercises, one of which is shown in the Figure 6.; and a *select missing word* exercise) and the other 3 by means of the Hot Potatoes software (a cloze exercise, a quiz and a jumbled sentence exercise).

**Jouer - questionnaire à choix multiples.**

Cliquez sur la bonne réponse.

[Afficher toutes les questions](#)

<=> 3 / 10 =>

Il dit qu'il n'a jamais joué...

A. ? les boules

B. ? aux boules


C. ? des boules


<=> Index =>


**Figure 5. One of the multiple choice questions**


*Source: Own work*


Choisissez et faites glisser la préposition correcte et le nom qui correspond le mieux à l'image; « - » signifie qu'il n'y a pas de préposition.


1.  jouer

2.  jouer

3.  jouer

4.  jouer

5.  jouer

6.  jouer

des de au du à la de la avec aux à -

batterie des jouets échecs jazz tennis cache-cache

Vérifier

**Figure 6. A *drag-and-drop* exercise in which the learner has to choose the right preposition and the noun corresponding to each image. The images illustrate different uses of the verb *jouer* (to play)**

*Source: Own work*

## 4.5 Requirements

From the technical point of view, in order to start using the course the students should be able to use the computer smoothly. They must be familiar with the basic principles of Moodle courses, although any advanced knowledge is not required. When it comes to the level of language proficiency, the knowledge of French at A2 level is required. However, in case of any problems concerning the vocabulary used in the course, the learner is free to check the meaning in any web-based or traditional dictionary, as the time to be spent on the course completion is by no means limited. Although the vast majority of the course is in French, at least the intermediate level of proficiency in English may be necessary in order to make specific comparisons between the two languages.

## CONCLUSION

It is evident that the role of web-based learning methods has significantly increased simultaneously with the development of new technologies. Therefore, the use of such methods in language teaching is fully justified as, due to their flexibility, they can be easily and successfully adapted to learners with specific language backgrounds. Although the e-learning course prepared by Aleksandra Serwotka constitutes an educational aid being merely an addition to the inestimable learning process taking place at the university and including personal contact with a teacher, it may prove to be an effective teaching tool.

The course constitutes an attempt to support the traditional, in-class process of teaching French as a third language to second year students of applied languages at the University of Silesia. It takes into account the specificity of teaching and learning French as a third language by Polish native speakers who have already mastered English; therefore, it makes use of the knowledge of English that the students have already acquired in order to further the process of learning French. It has been created to facilitate the selection of materials used by the students in the course of individual, independent learning. Therefore, the course should not be used as a substitute for face-to-face learning forms taking place at the university.

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# **BASIC ASPECTS OF FORMING ICT-COMPETENCES OF SOCIOLOGISTS**

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**Abstract:** *For the high quality transition of professionally meaningful knowledge and abilities, which are necessary for effective professional activity of future sociologists it is necessary to work out a complex of events, from the determination of professional competences and their constituents to the development of educational and methodical support of particular disciplines. The aim of this investigation is the determination of the ICT competences of students and the forming of basic approaches for their provision. Modern packages of software products are analyzed, specially worked out both for sociological information processing (WASP, SPSS) and for general-purpose tasks (Microsoft EXCEL, ACCESS, Power Point). The questionnaire of students of Sociology was conducted*

*with the aim to determine the degree of evolution of abilities of using ICT facilities. On the basis of analysis of qualifying requirements to the sociologists, the information-communication competences were determined. The basic approaches to the organization of educational process in higher educational establishment were formed. All of this in totality provides to the future sociologists the ability to apply modern facilities of information and computer technologies to the solution of typical professional tasks comprehensively.*

**Keywords:** ICTs, ICT-competence, higher educational establishment, students of Sociology, e-environment of the university

## INTRODUCTION

The modern stage of the development of society is characterized with a help of scale and depth of the penetration of ICTs in all spheres of vital functions of humankind (Okinava Charter).

As a result the problem of training of specialists appears sharper. Modern specialists must have the new type of thinking, skills and abilities that answer the requirements of information society. In particular, it touches future sociologists, as their activity is intimately connected to different work on various kinds of information.

The questions of content and organization of training of specialists in the sphere of sociology were studied in scientific investigations of many domestic and foreign scientists. They examined general principles and approaches to the problem (Toschenko 2008, Abramov 2008); analyzed the features of sociological education in the context of Bologna process (Narbut 2008, Vakulenko 2010) and the methodical and technological providing of educational activity in this field (Tsymbaliuk 2008).

At the same time the methodological problems of training of future sociologists to the systematic use of ICT in professional activity need further development of research, in particular, aiming at working out in detail different approaches and procedure of forming of the information and communication related competences of future specialists.

## 1. PROBLEM STATEMENT

Training of specialists for any industry in higher educational establishments of Ukraine is conducted in accordance with the Standards of Higher Education. The basic approach of these Standards is an integrated approach that envisages such organization of educational process, at that we have secured providing of professionally-meaningful knowledge and abilities that are necessary for future effective professional activity (Ovcharuk 2004).

For practical realization of such approach in relation to "Sociology" it is necessary to complete a complex of events, from the determination of professional competences and their constituents to the development of the educational and methodical provision of separate disciplines.

The aim of this research is to determine information and communication competences of future sociologists and forming of the basic approaches for their providing.

### Results of research

Base discipline at the study of ICT-competences of future sociologists are formed - is the discipline "Basics of Informatics". Description of this discipline in the light of the investigated problem is given in the table 1.

**Table 1**

**The Description of discipline "Basics of Informatics"**

Name of the module (themes)	Content of knowledge that is provided	Content of ability that is provided	Competence, that is formed
1	2	3	4
Object and content of discipline. An introduction to informatics.	A terminological base of informatics, place and role of informatics in sociology.	Use of terminology of informatics	
Composition, architectonics and functioning of computer systems	Architecture and principles of functioning of PC. Classification of software.	Determination of necessary and sufficient configuration of PC	Ability of effective work with modern computer facilities (computer-technological competence)
Operating system Windows	Possibilities of OS and technology of work in the environment of the graphic operating system Windows	Implementation of basic operations with objects in the environment of Windows	
Basics of computer networks construction	Principles of construction and technology of work in local and global computer networks	Information processing in computer networks, remote communication	Ability of effective work with modern computer facilities (computer-technological competence)
Organization of computer security and defence of information	Principles and technological approaches to defence of information	Realization of anti-virus prophylaxis, defence of information from an unauthorized access	

Systems of the text processing	Technology of text documents processing	Usage of MS Word for preparation of various documents	
Databases and control system by the bases of data	Principles of databases planning; technology of creation, editing and control of database of MS Access objects	Creation of databases and information processing in them by means of DBMS of MS Access	Ability of effective work with information in all forms of presentation (informative competence)
Systems of the tabular data processing of Excel	Technology of creation, editing and formatting of spreadsheets and diagrams in the environment of MS Excel; basic possibilities of MS Excel on processing and analysis of data	Creation, editing and formatting of spreadsheets and diagrams in the environment of MS Excel	

*Continuation of the Table 1*

1	2	3	4
Using of DBMS for information processing of sociological aspiration	Technology of application of DBMS in sociological researches	Processing of sociological information by means of DBMS of MS Access	Ability to apply modern facilities
Processing of sociological information by facilities of tabular processors	Technology of application of spreadsheets in sociological researches	Processing of sociological information by means of tabular processor of MS Excel	informative and computer technologies with information work
Informative resources of computer networks and their applications in sociology	Technology of the usage of the network informative resources in sociological researches	The use of global informative space for satisfaction of professional requirements in informative products and services	and solve various tasks (procedural and operational competences)

Modern methods of organization of presentations by facilities of Microsoft PowerPoint	Technology of creation, editing and show of presentations	Application of modern technology of presentation of ideas and results of researches
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*Source: own work*

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ICT competences, indicated in Table 1 are formed on the basis of standard programmatic facilities, in particular: Microsoft Word (text information processing, including documentation, preparation of reports on the results of sociological researches, analytical review etc.); Microsoft Excel (processing of the information presented as tables, including various calculations, working of questionnaires and others like that); Microsoft Access (creation and conduct of databases); Microsoft PowerPoint (creation and revision of sliding seats, presentations, different video information); programs-browsers as Internet Explorer or Mozilla Firefox (providing access to the resources of global information network of Internet).

Fixing and deepening of the formed competences is conducted during all periods of studies. Taking into account the specifics of future professional activity of specialists in a variety of forms and facilities it follows to distinguish two basic directions:

- 1) use of resources of global information network and means of remote intercourse;
- 2) processing of sociological information by means of the modern information—communication technologies.

Clarification and fixing of competences from the first direction take place in the process of study practically for all disciplines of curriculum. It is assisted by the predefined logic of educational process, permanent necessity of certificate information retrieval, active use of educational resources (for example, the DSTU web-portal (Information Portal of DSTU)), and it also offers for many tutors a possibility of remote communication by means of e-mail and Skype.

No mean role is played by students' aspiration supported by tutors to use modern information communication technologies for the purpose of satisfying their personal requirements in information and communication, as a result a computer and other communication facilities having become an inalienable part of youth's life.

There is clarification and fixing such procedural and operational competence as an ability to apply in complexity the modern facilities of information and communication technologies to the decision of typical professional tasks, it takes place during the study of disciplines of corresponding aspiration, in particular, "Mathematical methods in sociology", —Analysis of category data", "Quality of empiric research".

Thus next to the popular tabular processor of Microsoft Excel students study the professional packages of PSQ software (Processing of Sociological Questionnaires) and SPSS (IBM SPSS Statistics Base ) (Karimov 2013). A package of PSQ (as it appears from the name) purposefully intended for organization of introduction and statistical analysis of results of the sociological questioning, providing a user with a tool for implementation of all standard stages of the sociological information processing.

The package of SPSS Statistics has a wider setting. This product is oriented to the analysts and scientists, helps them to decide business problems and research tasks, embracing all analytical process. The powerful analytical instruments of SPSS Statistics help to design different situations and accept more reasonable decisions.

The key element of the SPSS Statistics package is SPSS Statistics Base, which provides access to data, control of data and of creation of reports like PSQ.

At the same time, it is possible with the help of SPSS Statistics Base to integrate additional modules with an aim to provide activity on the planning of data collection, introduction and distribution of the results. Thus, mastering of the indicated instruments can be considered as a guarantee of readiness of future sociologists for the complex use of information and communication technologies in professional activity.

The Dniprodzerzhynsk State Technical University takes part in the international project «International Research Network for study and development of new tools and methods for advanced pedagogical science in the field of ICT instruments, e-learning and intercultural competences». The project is financed by the European Commission under the 7th Framework Programme, within the Marie Curie Actions International Research Staff Exchange Scheme.

Within the framework of implementation of tasks to the project the sociological questioning was carried out among the students of DSTU, which gives an opportunity to estimate quality of the use of information and communication technologies, and also to estimate the attitude of students to the website of University and to the Systems of e-learning in general. The students of the Department of Sociology took part in this questionnaire directly.

Research results prove that most respondents (58%) quite rarely call to information that is on the website of the University and find important information in other electronic sources. Thus it should be also noted the sufficiently high percentage of people who have learned a lot of new interesting and important things from the information placed on a website of the University (42%). Undoubtedly, these data remind us about the necessity of the permanent updating of information on a website and search of interesting materials that are necessary for the students for their studies and finding a future job.

About 30% of the students would like to see methodical materials and literature on the website of the University, 15% - information about events that will be conducted

at the University, 12% - the curriculum of classes, sessions and consultations. In this context it would be desirable to mark that DSTU has its own information portal. It functions successfully, and tutors of the University have the opportunity to expound the electronic versions of the methodical materials from courses, and the students - to use them in their independent work and in preparation for classes.

A very interesting piece of information was obtained as a result of students' answers to a question about what divisions of information are major for them (Table 2). It was set that the biggest number of the DSTU students marked necessity and utility of exposition on the website of the University of resources for the distance learning and different additional educational resources (37%), and also information about additional work (29%) (Korobochka 2014):

**Table 2**

**Distribution of the students' answers in relation to importance of information for students on the website of the University (in %)**

№ n/n	Variant of answer	%
1	Resources of the distance learning and additional educational resources	37,23
2	Suggestions of additional work	28,80
3	Invitation to participating in events (conferences, actions)	22,83
4	Photo galleries and reports about events that took place	11,14
	Total	100,00

*Source: own work*

About the high level of students' awareness of the activity of the University indicates the fact that almost 92% of the polled students browse the pages of the University in social networks, 6% - comment these pages and 2% - add content (photo, video etc).

Research results showed that 93% of the polled students had an access to the Internet; here 78% use it every day, 16% - constantly (twenty-four hours), 4% - every week and 2% - every month. The obtained data allow us to assert that 48% of the students have the opportunity to use a computer class, software and Internet at the University after lessons, 36% - do not have such necessities and only 16% of the polled persons marked that they did not have such possibility.

An important factor that directly influences the efficiency of forming the information and communication competences of the students is a degree of readiness



of the tutors of disciplines (that is unrelated strictly with computer technologies) to the active use of ICT in the pedagogical practice.

Unfortunately, today most tutors apply information and communication technologies in teaching disciplines in a fragmentary way, giving advantage to computer diagnostics of knowledge, exchange information by means of e-mail, to the use of presentations and electronic demonstration materials.

Thematic websites, teaching programs, other multimedia facilities are used quite rarely. Practically, different authorial electronic textbooks and the personal open educational resources are not used in the educational process. Additional problems are related to the especially organizational questions. What must lead to such questions is the extent of the created electronic environment of an educational establishment and a level of regulation of the use for electronic instruments in an educational process.

It is necessary for the correction of the indicated situation, first of all, to unite all local networks of separate subdivisions in the only network of educational establishment with accessible for all electronic resources, including an e-library, various databases, information portal and others like that.

Further, it follows to enter a systematic study and advising of the tutors both on application of certain software products in pedagogical activity and for the newest pedagogical technologies on the basis of ICT.

Very important is an everyday support in the form of guidance provided by a higher educational establishment of tutors' activity aimed at mastering and making use of ICTs, input of the effective system of stimulation of information technologies introduction. Perhaps it is even possible to talk about the creation of "a cult of ICT in educational process".

In general the realization of the offered events ensures forming of the ICT competences of future sociologists, prepares them for professional activity in accordance with the requirements of modern information society.

## CONCLUSION

In the article we defined ICT competences and formed the basic approaches to the organization of the educational process in a higher educational establishment, which on the whole provide the future sociologists the ability to apply modern facilities of information and computer technologies to the solution of typical professional tasks comprehensively.

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# MODELS OF SELF-PRESENTATION AS SUPPLIED BY UNIVERSITY STUDENTS IN REMOTE LECTURES

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**Abstract:** *Social interactions are an important aspect of online courses. Yet the models of self-presentation in online courses are still unexplored. This study reports on how university students presented themselves during two remote university-wide lectures, when the participants did not know one another. Two factors were examined: 1. User's profiles. Automatically an email address was given, and the courses, in which the participant was logged. The user provided his/her own photograph and possibly a text. 2. The familiarization forum. Each student placed: the title of post, a text and photographs showing his/her everyday practices. It turned out that the texts, especially the photographs showed the students as consumers. They did not present scientific interests or research.*

**Keywords:** *user's profile, familiarization forum, self-presentation, photograph, consumption.*

## INTRODUCTION

Learning by doing is a characteristic of the Generation of students who constantly remain in the communications – also when learning. The Social interactions among participants in a remote course are its very important aspect. They learn mutually from one another and carry out tasks together. On the basis of connectivism (Siemens) this means they jointly produce knowledge.

Self-presentation is a good chance to establish a personal relationship. In distance learning expression is restricted to written texts, lacking their anthropological context in the form of physical appearance, body, clothes, hairstyles, makeup, jewellery, tattoos, the vocal qualities, gestures, facial expressions, proxemic and chronemic, which in direct contact transmit more information than spoken words. This limits the communication and can cause confusion, difficulties and discouragement. Both the tutor and the student should be identifiable and distinctive – it prevents the anonymity.

In consequence of the pictorial turn (Boehm 1994) images express the deepest cultural content and they have dominated verbal messages (Sturken, Catright 2001). The theory of visual culture assumes a key role of images in the construction of social reality. Imaging articulates the perception of the world. Sometimes it is subjected to viewing regimes that have entered images, advertising, exhibitions, movies, graffiti, posters, signboards, MMS-es, comics, videoclips, TV programs, tabloids, shows and fashion shows, performances, etc. People use photography to communicate, that is, to: define, shape meanings and understand reality. They follow and imitate popular culture and massmedia. Visual media are in fact the same system of representation, as language (Sturken, Catwright 2001:12).

It is assumed that a contemporary student lives in the environment of images and the society of spectacle, in which *Everything that appears is good; whatever is good will appear* (Debord 1995:15). Pictures break away from designates, replace the reality and become the simulacra, divorced from reality (Baudrillard 2005). So photographs do not convey the truth about the reality. Photos in user's profiles, for example in the portal of "Our Class" are a virtual stage, on which *thanks to facade technics (personal decoration) the actor wants to communicate his social standing, status, their I, in accordance with the current socially, controlled definition of situation* (Nowakowska 2008:164). User's profiles in "Facebook" and other social networking sites operate in a similar manner. Users know that *there is an opportunity to manipulate the impressions that the observer takes for a glimpse of reality, because of the lack of direct access to the stuff it is possible to use the sign of the existence of things* (Goffman 2008:275). Avatars of online forums serve as the sign of identity in cyberspace (Ulmer 2012), indicate affiliation with the subject of the site and not always with the personality of the user who often wants to remain anonymous (Popińska 2008:169). On the other hand *the online environment encourages narcissistic behavior* (Buffardi, Campbell 2008).

Also, in the tested self-presentations a photographed student became an actor, the user's profile and forum were the stage, and the participants turned into the audience. Users presented themselves as in "Facebook" profiles: attractive, romantic, happy, active, smiling, with friends or family, playing sports, in unique locations that was not their hometown (Strano 2008). Referring to the concept of the looking-glass self (*the self reflected*) formulated by Charles Horton Cooley (1992:151) it was hypothesised that in self-presentations students replicate the visual patterns of consumption.

## 1. PURPOSE AND METHOD OF INVESTIGATION

This study examines the way in which students present themselves in user's profiles and familiarization forums in two remote university-wide lectures launched in summer semester of the academic year 2014/2015. In the period between: 14-30 July 2015 two of those lectures were investigated in order to pay attention to students' autopresentations. Their type was specified:

1. Supplement to the user's profile.
2. Presentation of one's daily routine at the familiarization forum.

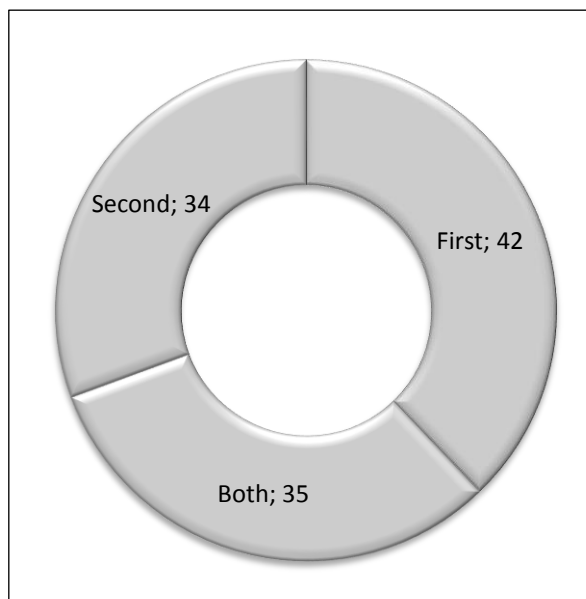
Both of these activities were mandatory. In order to avoid subjectivity quantitative research methods were used. However, they were supplemented with quality methods in order to interpret details and the data.

## 2. RESEARCH MATERIAL

Two university-wide lectures were taken into account:

1. *Media in Poland as the Context of Didactic of Literature.*
2. *Thematic Modules with Multimedia in Native Language Teaching.*

The lectures were addressed to students of the third year of the first-cycle degree, mostly extramural. But also the second year students of the first and second-cycle degree signed up, as well as regular students. For the first lecture 77 students registered, for the second one – 69 (35 students participated in both lectures). Together, therefore, 111 students logged in, and they formed a group of 146 participants.

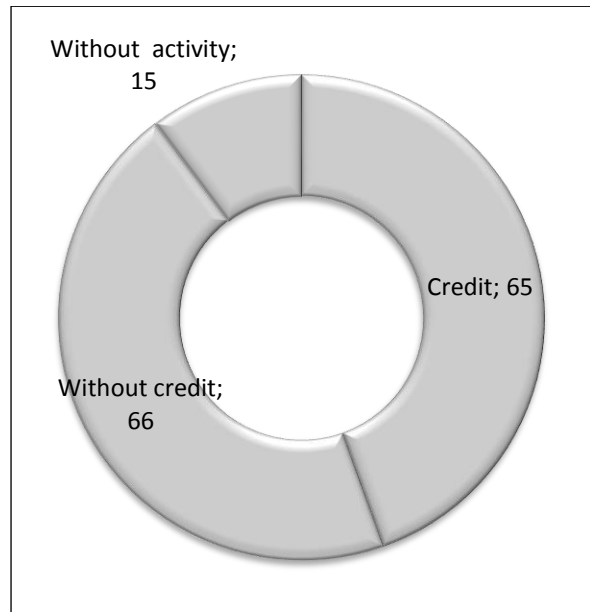


**Figure 1. Number of students in first, second and both lectures.**

*Source: own elaboration*

Students received the password from the tutor and they were allowed to show it to the whole group. Both lectures were attended by students of various faculties: Philological, Pedagogical, Geo-Biological, Physical-Mathematical and Technical.

The analysis of self-presentations was carried out during the holidays. 65 students received credits, 81 failed to meet the conditions and probably they were going to perform tasks and get credit in September. 15 of them did not complete any tasks, so it can be assumed that in the meantime they signed up to another lecture or just gave up their studies.



**Figure 2. Activity and credits of users of both lectures.**

*Source: own elaboration*

### 3. MODELS OF AUTOPRESENTATIONS

#### 3.1 User's profile

An automatically generated profile was to be supplemented with a photo and a note about the student. Some users attended both lectures, so once completed it was a double profile.

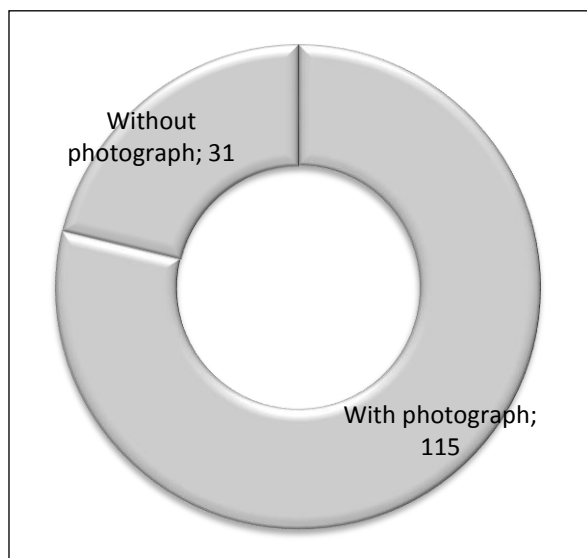
Performing the tasks was affected by the profile of the teacher. Like as post in the familiarization forum the profile was launched before lectures, to set an example for students. It contained professional identity: an academic degree, a portrait photograph, books titles and scans of their covers, the characteristics of academic interests, a list of selected publications, conducted courses and personal interests.



**Figure 3. Photograph of teacher in user's profile.**

*Source: photo by Andrzej Ślósarz*

In the welcome email, right after logging in, every student was instructed to complete the user's profile. It was also required as the first in terms of obtaining credit. 115 of 146 users inserted their own photographs. The task was not completed by 31 students.

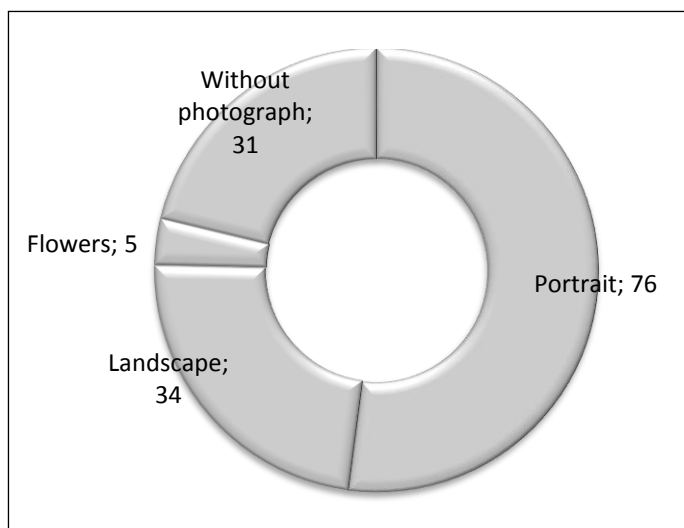


**Figure 4. Types of user's profiles: with and without photograph.**

*Source: own elaboration*

According to the customs prevailing in online forums, 76 students inserted portrait images like in a passport or credit card. A fan of motorcycling photographed a road. On 34 photographs in the background there were Polish and exotic landscapes, and the student could be seen in dark glasses or only as a silhouette. Standing position was significant in the case of a student who a few weeks earlier regained the ability to walk after years of treatment and moving in a wheelchair (the information about it was not in the e-course, but the student's friends were aware of the fact).

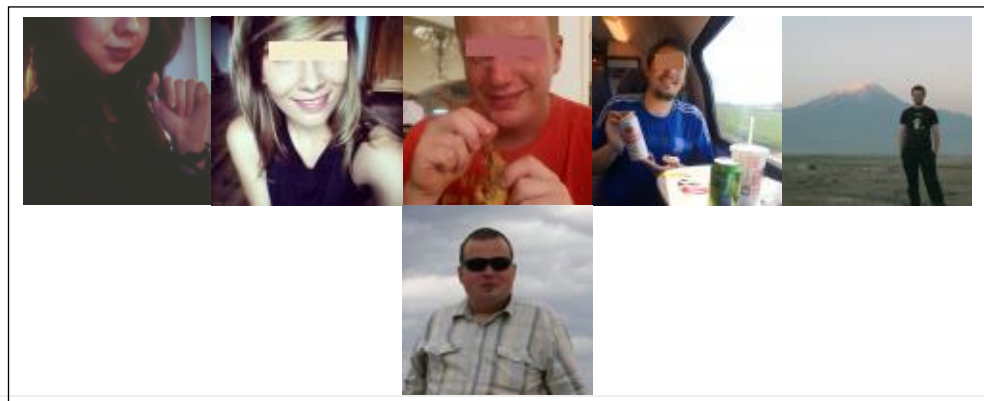




**Figure 5. Themes of photographs in user's profiles.**

*Source: own elaboration*

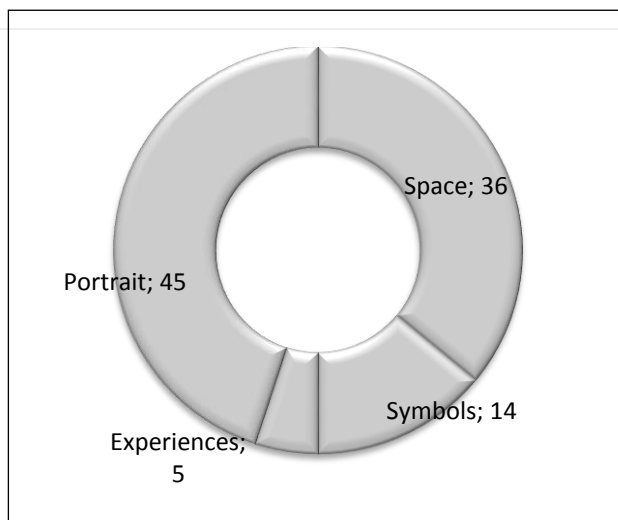
A student from Greece showed up himself at a restaurant table on the train, five female students surrounded by flowers. The type of photographs sometimes resembled selfies. Students took photos only if necessary. When the photos were inserted, they were automatically missing their edges, so sometimes the student's faces were visible only partially.



**Figure 6. Examples of photographs in user's profiles.**

*Source: courses i and 2*

Photographed subjects were often symbolic: Thai shrimp, decoratively trimmed hedges, antique cars and buildings, branded drinks, logos of American companies, a throne, paintings on the walls, a maiden wreath. Their choice was not motivated by any physical needs. They simply defined the presented person.



**Figure 7. Models of consumption in photographs from user's profiles.**

*Source: own elaboration*

The students, who were young mothers, appeared with their children. A mother of a 14-year-old son, probably in front of the house.

Filling out the user's profile was often treated as an additional duty. It was completed sometimes after the completion of the remaining activities, or even just before getting credit, so it was done in order to meet the requirements, and not to present oneself to fellow students. The most users' profiles did not allow for a closer look at the student. Such a situation was predicted on the basis of the past experience with other courses, in which students reluctantly presented themselves and they found this unnecessary to their own group forum. So in the university-wide lecture a better opportunity was given to students for self-presentation: a familiarization forum was offered to them.

### **3.2. Familiarization forum**

The range of topics discussed in the familiarization forum was more extensive than in personal users' profiles. The post allowed to put the photographs in high resolution, large size and add a commentary. The forum was better than the students' self-presentation in users' profiles and supplemented it.

Students' task was to place a post and insert a photograph taken by themselves which would show their daily practices and contain a verbal comment. The first post was placed by the tutor.

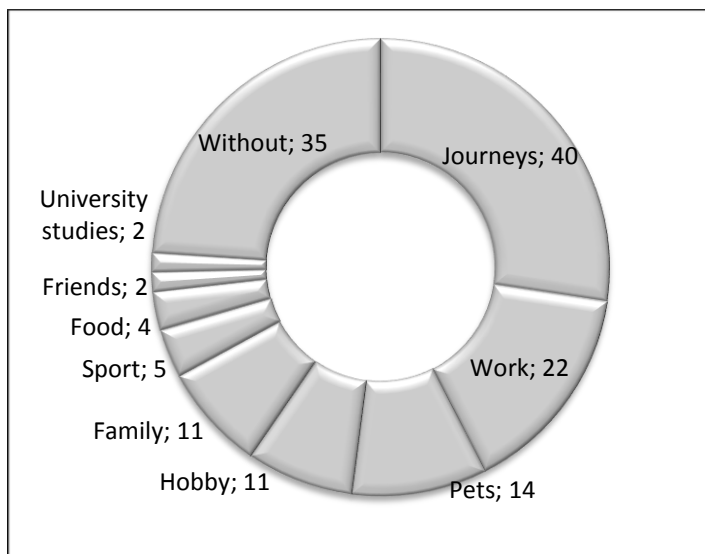


**Figure 8. A photograph of everyday practices placed by tutorin familiarization forum.**

*Source: own photograph*

It was possible to present one's private matters, far from learning or work. Students, however, stylized photos in the mode of advertising, according to economic logic of capitalism focused on consumption. Photographs and comments were connected with:

1. Journeys.
2. Work.
3. Pets (cats, dogs, rats, lizards, pony).
4. Hobby (e.g. videogames, films).
5. Family.
6. Sports (street workout, skiing, skating, gliding).
7. Food.
8. Friends.
9. University studies.



**Figure 9. Topics in familiarization forum.**

*Source: own elaboration*

The most important was, as can be seen above, travel, especially abroad (eg. Norway, London, Crimea, Thailand). Self-portraits were placed against the background of Polish and foreign landscapes. Such photographs were displayed mostly by students of *Tourism and Recreation*.

Occupations performed by students presented the dominance of the sphere of leisure, service and consumption over the production area. It was characteristic of consumer society. They belonged to the service area, never production, eg. a model, a trainer at a gym, a visual merchant, a tour guide, a cameraman, a makeup artist, a company owner. None of students' occupations was related to agriculture or horticulture. The work was, therefore, not so much the source of maintenance, as a way to express oneself in a consumer society, where the production pole is missing. Some students used previously published photos, hyperlinks, or allusions to their materials placed earlier on the Internet. One of the participants referred to his own profile in the "Facebook". A few people published their selfie with a carefully composed background, characterising their work. Some of the photographs were stylized in the commercial mode, and they even had watermarks.

The photos – like profile pictures – not always showed the student, whose portrait was featured on the profile picture. Students mainly showed their family, friends, pets, the workplace.



**Figure 10. The shopwindow designed by student.**

*Source: course 1*

The students were involved in spectacular sports: gliding, street workout, skiing, skating. There was no team sport discipline among them, such as: football, volleyball or basketball. Street workout was a sign of sport globalisation.

Favorite animals were: dogs cats, rats, lizards, pony back from one's childhood. One of the students, along with his parents, breed Bernen Shepherds. Although he did not provide the farm's name or any hyperlinks, the image search led to the website of the farm, so the self-presentation wore the feature of surreptitious advertising. He was asked to use some other photographs and he immediately did this by inserting the photographs of dogs, which he looked after in a shelter for homeless animals. The photos' parameters indicated that they had been taken over the past few days, which asserted the student's reliability.

Another student posted a photograph of a car part, because he worked at automobile flocking. It was located on the website at the point of service that the student ran. When asked to prove that the photo had been taken by him, he posted a few others from the same series. They were taken with a smartphone.

A lot of symbols evoked pleasure and desire. For instance Marilyn Monroe as an icon of glamour, beauty and sex-appeal. One of the students of the Wellness posted a photo of a model after completing her make-up.

#### 4. MODELS OF CONSUMPTION

The popularity of such topics as travel, food, relaxation and thrill-seeking, as well as following and imitating advert images corroborate the prevailing tendency in many student's self-presentations to take on and follow consumer patterns. Referring to the study by Mateusz Marciniak (2011), it can be stated that the photographs showed different consumer orientations: consuming stuff, space, time, thrill, symbols. Even an incentive to read an unspecified book was preceded by mentioning of coffee.



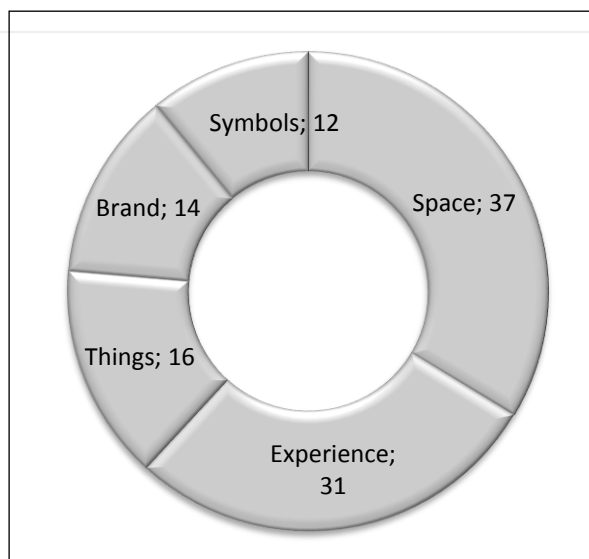
**Figure 14. The book and the coffee.**

*Source: course*

It was common practice to display a brand (e.g. *Nikon*) or a company logo. Consumer syndrome was visible in presenting a child surrounded by his belongings. Food was photographed in abundance and with an attractive decoration (18 muffins, decorative sandwiches, a table laid with abundant food). Objects were multiplied (e.g. a dozen mannequins in a shop window, plenty of scattered clothes, dozens of dancers or several gliders at an airport, two monitors for work, two dogs in a kennel, a cluttered office, etc.). Students willingly photographed themselves when they were resting passively.

In this way the students showed a wide range of consumption goods and their symbolic meaning. They realized that the presented characteristics of their friends were incomplete. It was expressed with a comment for a student's photograph at a carousel: *Magda ... great interests!:-D*

The proportions of consumption patterns encoded in photographs are presented in the chart below.



**Figure 15. Types of consumption patterns encoded in photographs**

*Source: own elaboration*

Consumption of space was the most frequent in connection with the travels. Almost as often students were looking for thrill (gliders, motorcycling, games, thrillers etc.), used the branded products (Nikon camera, Asus computer, Google search, Lightroom program, sophisticated models of motorcycles and cars, computer chair, pilates and massage), media messages and new technologies: home cinema and the new products as *the Witcher Wild Hunt*, shot their own films, edited the profile in the "Facebook", participated in rock concerts etc. Life in a world saturated with high technology has designated standards of new human relationships, because *From the automobile to television, all the goods selected by the spectacular system are also its weapons for a constant reinforcement of the conditions of isolation of "lonely crowds"* (Debord 1995:22). Only 12 photographs showed students with another person or group.

## CONCLUSION

The self-presentations missed students' academic interests, achievements, the academic community, books, information about current research, scientific results of distant travels and topics for cooperation, active citizenship (presidential election was held in May in Poland). The place of birth was rarely shown, students preferred photos from trips, especially from abroad ones. Consumer syndrome dominated basic dimensions of life. Students often introduced themselves as consumers, and consumer culture dominated the local culture and even the one created by students. It confirmed the hypothesis that in self-presentations students replicate visual

models of consumption and the dominant cultural patterns. Knowing the economic logic of late capitalism centered on the consumption, students often succumbed to it and ran the game of employing their own meanings and the definitions of reality.

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# IV. DISTANCE LEARNING AND LIFELONG LEARNING

## BUSINESS PROCESS MANAGEMENT SOFTWARE APPLICATION FOR ENHANCING COMPANIES' KEY PERFORMANCE INDICATORS: EDUCATION APPROACH

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**Abstract:** *This paper presents business process management software application which is intended to be used to simulate trading company behaviour with the aim to improve its key performance indicators. The application is able to be set up according to various simulation models and decision functions. We provide an example of simulation model implementation and introduce the graphical interface and simulation possibilities of the application. The paper firstly introduces some of the main ideas of business process management discipline. Secondly, it describes an implementation of simulation model and finally, it depicts the graphical user interface of the application.*

**Keywords:** business, process, management, simulation, trading.

### INTRODUCTION

In these times of significant uncertainty about future revenues, companies are naturally renewing their focus on reducing costs. Businesses are examining ways to improve operational efficiency by paying more attention to process management and improvement. BPMInstitute.org (2015) has observed an increased interest in introducing the concepts and principles of business process management (BPM) to the company's office workforce. Sponsored by the CEO and CFO, process awareness and process thinking is getting renewed attention, resulting in initiatives to understand how current operational activities are executed. Businesses are looking to identify company weaknesses in an effort to remove them. Executives are looking for ways to reduce defects, waste, cycle time, and bottlenecks – and their related costs.

The companies have to ensure the flexibility of their behaviour, speed of decisions, and customer satisfaction leading to the optimal market share, profits and other key performance indicators (KPIs) in order to survive in a global and turbulent market environment. Simulations can improve not only existing decision support systems, but they can also contribute to the teaching of essential managerial skills already during the education process on universities. If simulation models could be placed into the corresponding IT infrastructure of the educational institution, they could be used also in the distance learning environment. The aim of this paper is to introduce the usage of business process management (BPM) software application.

Simulations supporting decision support systems are typically based on business process modeling treated by many researchers (Axenath et al. 2007, Davenport 1992, Eriksson and Penker 2006, Van der Alst 2004, Suchánek and Bucki 2012, Šperka et al. 2013, Šperka and Spišák 2013). Alternative enterprise modeling methods - value chain oriented models have garnered much attention both among researchers in the accounting and later, from enterprise modeling. Value chain modeling concentrates on the value flows both inside the enterprise and on the value exchange with the environment. Currently, the most popular value chain enterprise methodologies are e3-value (Gordijn and Akkermans 2003), and the REA (Resources, Events, Agents) ontology (McCarthy 1982, Hruby et al. 2006, Dunn et al. 2004). Both process and value chain modeling methods often meet difficulties in modeling complex environments, when some social behavior like negotiation, management specific methods, market disturbances and others come into consideration. In this case, some local intelligence is needed within a business process model. This is probably the main reason, why a new software modeling paradigm came into existence – namely the multi-agent modeling approach. Modeling and simulation using multi-agent systems (Agent-based modeling and simulation) can be seen as a new approach to system modeling, especially for decision-making support systems (Macal and North 2006, Wooldridge 2009). In (Vymětal and Scheller 2012) was presented a general agent-oriented simulation framework MAREA (Multi-agent REA framework).

Using this framework, further research focusing on a possibility to define models to be used in education went on in last time. The result of this research is a business process management application based on the REA value chain and multi-agent modeling approach. The application can be used both in standalone PC environment and in distance learning. The aim of this paper is to present the developed application, its general structure and the graphical user interface. The paper is structured as follows. First, business process management approach and example model structure is presented. Next, graphical user interface is introduced. The conclusion sums up the results obtained.

## 1. BUSINESS PROCESS MANAGEMENT

This section is following the AIIM article published online (2015). The term business process management covers how we study, identify, change, and monitor business processes to ensure they run smoothly and can be improved over time. The term —workflow” generally does fit under the process improvement umbrella. It is an important piece of the access and use puzzle since no or poor process really degrades your ability to get at and leverage information.

BPM is best thought of as a business practice, encompassing techniques and structured methods. It is not a technology, though there are technologies on the market that carry the descriptor because of what they enable: namely, identifying and modifying existing processes so they align with a desired, presumably improved, future state of affairs. It is about formalizing and institutionalizing better ways for work to get done.

Successfully employing BPM usually involves the following:

- Organizing around outcomes not tasks to ensure the proper focus is maintained.
- Correcting and improving processes before (potentially) automating them.
- Establishing processes and assigning ownership lest the work and improvements simply drift away.
- Standardizing processes across the enterprise so they can be more readily understood and managed, errors reduced, and risks mitigated.
- Enabling continuous change so the improvements can be extended and propagated over time.
- Improving existing processes, rather than building radically new or —perfect” ones, because that can take so long as to erode or negate any gains achieved.

BPM should not be a one-time exercise. It should involve a continuous evaluation of the processes and include taking actions to improve the total flow of processes. This all leads to a continuous cycle of evaluating and improving the organization. Applying the BPM discipline strategically requires the practice of the following nine areas in a cohesive program (BPMInstitute.org 2015):

- Aligning processes with business strategy.
- Discovering and modeling processes.
- Measuring processes.
- Analysing and benchmarking processes.
- Harvesting policies and rules.
- Improving processes.

- Managing the changing of a culture.
- Governance — decision making, and,
- Deploying technology.

It allows business and technology to better understand implications of how work is performed. It visually identifies problems with processes. It allows the business to define improved business processes and test them prior to implementation. BPM provides value throughout an organization by (BPMInstitute.org 2015):

- Using process-enabled achievement of strategic objectives.
- Accelerating time to market.
- Delivering improvements in cost, productivity, timeliness and quality.
- Improving customer service levels and increasing customer satisfaction.
- Transferring knowledge to ensure that customer teams achieve the necessary competence and autonomy to maintain and develop future capabilities.
- Simplifying business processes to drive effectiveness, efficiencies and agility.
- Managing risks and meeting compliance regulations.
- Providing greater visibility into your organizational performance.
- Introducing new process designs faster.
- Reducing costs and improving revenue streams.

In the next section we will describe an example model structure principles of a business process management application.

## **2. EXAMPLE MODEL STRUCTURE**

The model implemented in business process management application simulates a virtual business company using the REA value chain and multi-agent approach. The general model structure is presented in Figure 1. The model is based on the control loop paradigm. The internal parts of the company are represented by sales representative, purchase representatives and marketing agents. The outputs of the company are measured by the REA ERP system, which also records all activities of the agents. The market environment is represented by customer and vendor agents. Note that all the agents mentioned exist in a large number of instances. The difference between measured outputs and targets is sent as a feedback to the management agent, who takes necessary actions in order to keep the system in the proximity of the targets.

The interaction between the customers and sales representatives and also between the vendors and purchase representatives is a typical negotiation. This is modeled by the classical contract net protocol. The customer decides if he should accept the quotation based on the decision function presented earlier in an example (Šperka and Spišák 2015). If the proposal is not accepted, the sales representative changes the price accordingly (this is one of the parameters that can be changed by the students.).

The decision function for m-th sales representative negotiating with i-th customer is represented by formula

$$c_n^m = \frac{\tau_n T_n \gamma \rho_m}{O v_n} \quad (1)$$

$c_n^m$  - price of n-th product offered by m-th sales representative,

$\tau_n$  - market share of the company for n-th product  $0 < \tau_n < 1$ ,

$T_n$  - market volume for n-th product in local currency,

$\gamma$  - competition coefficient, lowering the success of the sale  $0 < \gamma \leq 1$ ,

$\rho_m$  - m-th sales representative ability to sell,  $0.5 \leq \rho_m \leq 2$ ,

$O$  – number of sales orders for the simulated time,

$v_n$  - average quantity of the n-th product, ordered by i-th customer from m-th sales representative.

Similar decision function is used in the vendor – purchase representatives negotiation. The aforementioned parameters represent global simulation parameters set for each simulation experiment. Other global simulation parameters are: lower limit sales price, number of customers, number of sales representatives, number of iterations, and mean sales request probability. The more exact parameters can be delivered by the real company, the more realistic simulation results can be obtained. In case we would not be able to use the expected number of sales orders  $O$  following formula can be used

$$O = ZIp \quad (2)$$

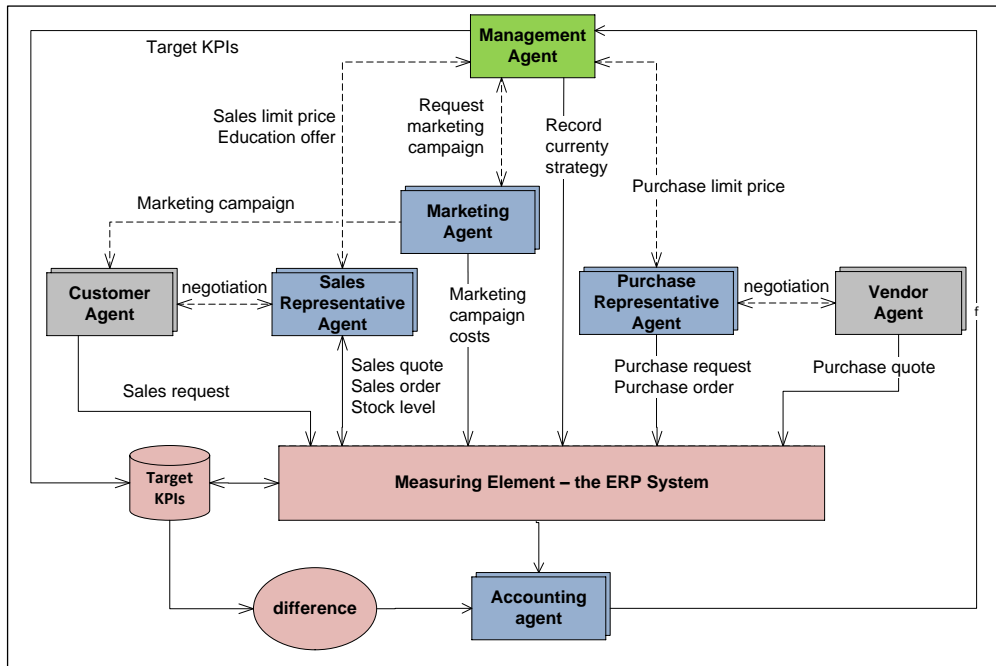
$Z$  – number of customers,

$I$  – number of iterations,

$P$  – mean sales request probability in one iteration.

The presented decision function is generally based on the overall market balance for each product. However, quite another approach can be used for the customers decision whether to buy or not. This approach is based on the utility theory and needs data for the preferences and budget constraints.

The management agent can change the purchase limit price, to decide upon a sales representative education, marketing campaign, etc. These interventions lead to higher profitability of sales representatives. The parameters of such action can be set by the students. With such general structure, the students are able to configure the agent types, the management action etc. and to observe the behavior of the system reacting to the management actions.

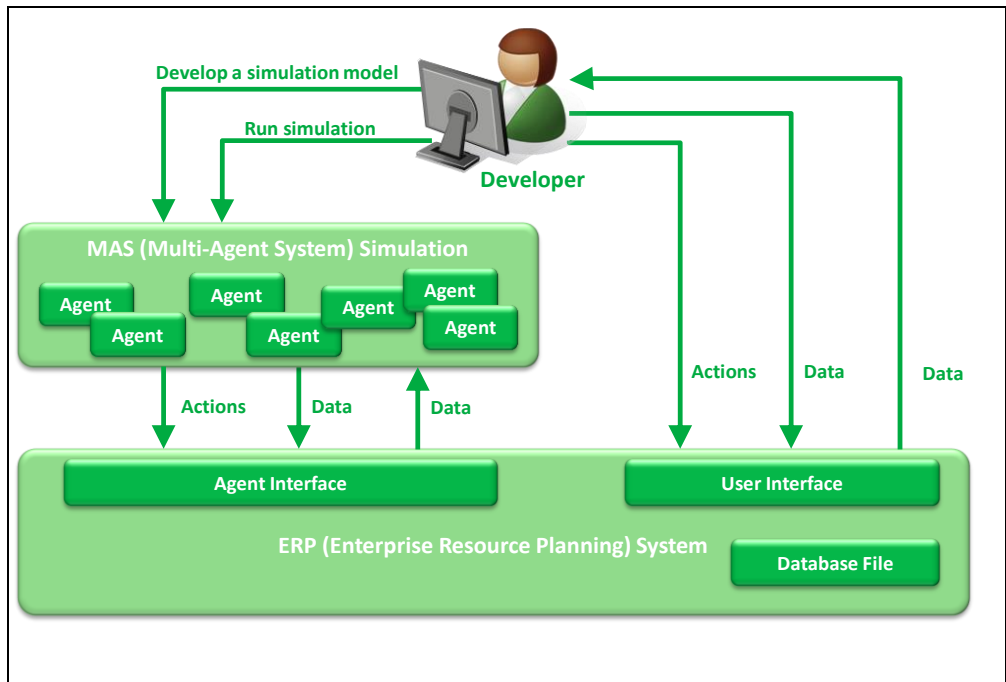


**Figure 1. General simulation model structure.**

*Source: Šperka and Vymětal, 2013*

### 3. BUSINESS PROCESS MANAGEMENT APPLICATION

The application consists of two main components, the Simulation of a multi-agent system (MAS) and the REA based Enterprise Resource Planning system (ERP). The simulation designer can interact with the system by means of a Graphical user interface. The general overview is presented in Figure 2. Next important elements of the application, hidden within the ERP system are the Message viewer and the log file. A simulation designer can either use the ERP system directly, or can program intelligent agents to perform the same activities that a human user can perform. For example, a simulation designer can use the ERP system directly to create initial data for a simulation, then start the agent platform to run a simulation, then using the ERP system to inspect the simulation results, and even adjust the data (within the rules implemented in the ERP system) and then start the agent platform to continue



**Figure 2. Application overview.**

*Source: REA Technology official documentation*

MAREA application enables users to set up trading company parameters (see the example in Table 1) and run trading simulation for a specific time to interpret the development of KPIs of this company.

**Table 1.**

**Basic simulation parameters**

Parameter	Example	Remark
Number of iterations	365	52 weeks also possible
Number of customers	100	Up to several thousand
Number of vendors	5	typically



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Mean quantity in one sales order	5 units	
Probability of sales order request	0,01	
Number of sales representatives	2-3	One for e-business modeling
Sales representative ability	0,7	For start

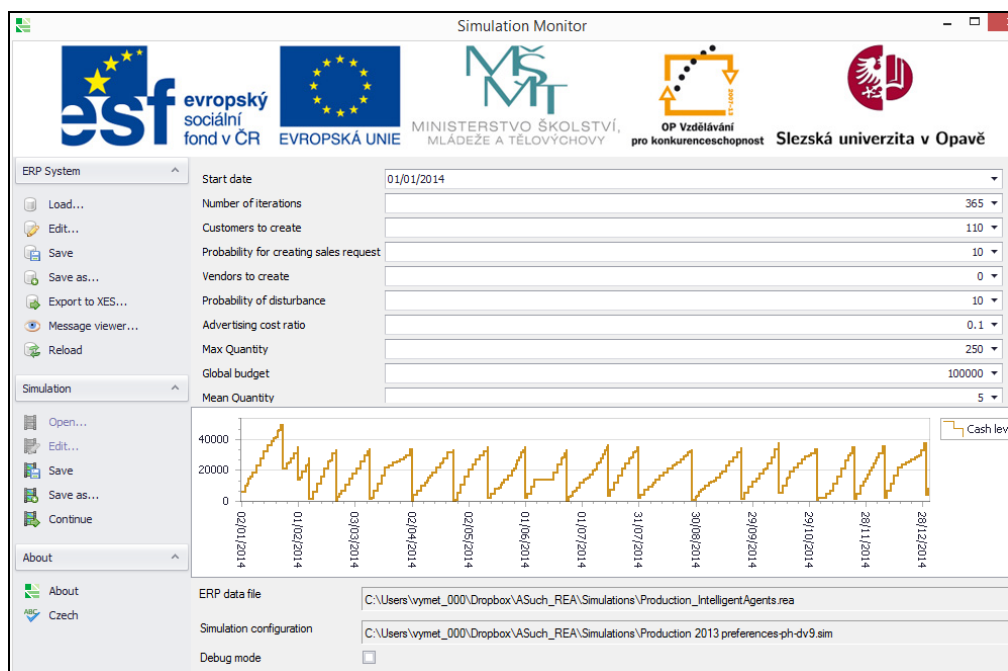
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*Source: Šperka and Vymětal, 2013*

The main screen called Simulation monitor (Figure 3) consists of five panes:

- Logo pane with sponsors of the project. You can hide the logo by clicking it. Clicking the upper area of the window shows the sponsor's logo again.
- Simulation properties. These properties are determined by the agent simulation model, and different simulation models might contain different simulation properties.
- ERP system menu. Within the ERP system menu, two very important buttons can be seen: the Export to XES button and the Message viewer button. The functions and usage of these two buttons will be described in the next section.
- Simulation menu.
- A graph of the cash level of the company, indicating the progress of the simulation. Please note that this graph is updated by ERP transactions that influence cash level. That is, if the simulation runs but none of these transactions occur, the cash level graph in the Simulation monitor will not be updated.

The ERP system has been configured to calculate several key performance indicators (KPIs) by summing up other values. For example, Cash level is calculated as a total of all transactions that change Cash level – payments for purchases, income from sales, payment of bonus, initial cash, etc. Turnover and Gross profit is calculated as a total of gross profits and turnovers of specific product types.



**Figure 3. Description of the simulation monitor.**

*Source: Šperka and Vymětal, 2014*

Name	Id	Correlation Id	Response To	Sender
[-] Sales quote		14636	14611	14611 Peter Hanson
Fields Children				
Values				
[-] Item: Kitchen set; Quantity: 7; Price: 564.062500; Amount: 3948.44				
[+] Sales quote	14708	14611	14679	Peter Hanson
[+] Sales quote	14777	14611	14740	Peter Hanson
[+] Sales quote	14840	14611	14811	Peter Hanson
[+] Sales quote	14911	14611	14870	Peter Hanson
[+] Sales quote	14959	14611	14932	Peter Hanson
[+] Sales quote	15019	14611	14994	Peter Hanson
[+] Sales quote	15079	14611	15045	Peter Hanson
Fields Children				
Values				
[-] Item: Kitchen set; Quantity: 7; Price: 450.89111328125; Amount: 3156.24				

**Figure 4. The example negotiation.**

*Source: Šperka and Vymětal, 2014*

All messages sent among the agents including the messages the agents send to each other during negotiation are recorded in a message log file. They can be seen by

means of the Message viewer and can be also filtered on the message type. The example negotiation between sales representative agent and the customer agent is presented in Fig. 4. Here we can see a result of a multi-round negotiation. The originally proposed price of the kitchen set (564) was negotiated down to 450.9. Here again: the parameters of a price reduction within a negotiation are a part of global system parameters that can be changed by the students.

## CONCLUSION

We presented basic parts of MAREA business process management application in this paper. MAREA is a prototype of a simulation based software framework. In the first part of the paper we described basics of business process management and a general structure of the simulation model, basic participants and simulation steps. The remaining scope is dedicated to MAREA graphical user interface introduction and the means of structure validation. The MAREA application serves for the decision support of company's management as well as for educational purposes. It enables users to get familiar with the principles of trading using business company virtual model. The setup of the application provides possibilities to edit the company parameters and to run trading simulations. This allows users to analyse trading behavior back-to-back according to the parameters setup. The prototype was tested using real data gathered from the ERP system of high-tech Slovakian company and using randomly generated data as well. The validation shows reasonable results with the necessity to integrate some kind of mechanism dealing with seasonal differences in KPIs. Future research will concentrate on the log files analysis to give us feedback about processes in the running simulation experiment.

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# **PEDAGOGICAL SOLUTIONS IN E-TEACHER TRAINING – TOWARDS EFFECTIVE TECHNOLOGY ADOPTION BY TEACHERS**

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**Abstract:** *The question of how to design and implement teacher training in the use of educational technologies is a hot topic which still needs thorough research. The authors describe a case study in which teachers of English from rural areas were recruited, had their needs diagnosed and were trained in the use of technology in language teaching. Afterwards, a sample of the course participants was investigated through observations and interviews in their teaching contexts, in order to see the effect of training on subsequent technology adoption.*

**Keywords:** middle and secondary school education, interactive whiteboards, language teacher training

*You always hope for positive results, but you never know what to expect. I'm happy to show you these results, because they clearly show that technology ... makes a positive impact on learning.*

Robert Marzano <sup>1</sup>

## **INTRODUCTION**

Great efforts have been undertaken all over the world to design and deliver effective training in the use of technology to language teachers. While much has been written

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<sup>1</sup> CEO of Marzano Research Laboratory, presenting his organization's newest research report, titled "Evaluation Study of the Effects of Promethean ActivClassroom on Student Achievement," which details how interactive whiteboards can affect student learning.

on the way training should be designed and implemented, there is still a need for research into actual technology adoption. In other words, studies in which investigators actually attempt to see the effect of trainings on the daily practice of trainees are rather scarce.

The purpose of the present paper is to reflect upon the effect of pedagogical solutions adopted throughout e-teacher training on the actual technology adoption of language teachers. For that purpose, lesson observations and teacher interviews were undertaken with a sample of training participants. The paper reviews previous literature on technology adoption, reports upon the characteristics of the training and gives qualitative data gathered at schools.

## **1. BACKGROUND TO THE STUDY**

### **1.1. Teachers' positive and negative attitudes to learning technologies**

There is a universal belief about the perceived beneficial role of computer technology for the foreign language learning process, as well as the advantages of CALL contexts over traditional, „unplugged“, teaching procedures. In general, the educational computer technology is encountered with much less anxiety than it used to be (see Shi and Bichelmeyer 2007), and the computer had already overcome some of the uncertainties identified previously.

One particularly prominent theme permeating through the investigations into teachers' perceptions of educational technology has been the promotion of constructivist approaches to learning and the development of learner autonomy in computer-mediated contexts. Parker, Bianchi and Cheah (2008) highlight the view of technology as providing enhanced opportunities for student interaction, thus enriching the possibilities for knowledge construction, as one of the fundamental concepts in educational theory. Also Judson (2006) notes that, as indicated by research into teachers' perceptions and practices, those instructors who readily integrate technology into their instruction are more likely to display constructivist teaching styles. Constructivist-minded educators, according to Judson (2006), employ technology to make their classrooms dynamic and student-oriented.

Effective use of computerised language programs provides individualised instruction and immediate feedback as well as facilitates self-instruction (Velazquez-Torres 2006). Teachers believe that the use of computers could be beneficial to language learning, increasing learners' motivation by allowing their own choice of learning materials, adjusting the pace of work and devising individual study paths (Kim 2008). Teachers perceive technology as a factor enabling more effective development of students' language skills, through integrating multimedia and skilfully interweaving a variety of learning technologies in teaching scenarios (Velazquez-Torres 2006). Using computers in the classroom opens up three possible spheres of implementation of computer technology to augment the language teaching process: as a tool (to enable authoring and delivery of resources, individual

tutoring as well as synchronous or asynchronous communication), as a motivator (to provide multimedia, increase interaction and facilitate collaboration) and as an optional tool (Kim 2008).

The prerequisites for technology implementation are ample provision of learning technologies in schools, especially in terms of software and access, and teacher confidence in technology use (Hegelheimer 2006). Those teachers who are more confident about technology and its use are more likely to employ it in innovative ways, while the very technology used does not have to be highly innovative in itself. Experienced teachers who use computers effectively with their students view technology as a means rather than an end to learning (Garner & Gillingham 1996; after Meskill *et al.* 2002), seeing themselves in a largely advisory role (Meskill, Mossop & Bates 1999). Experienced teachers confident in the use of technology welcome newness and variety, seeking constantly to expand their repertoires (Berg *et al.* 1998).

On the other hand, teachers' apprehension of the consequences of incorporating ICT in the language lesson is perceived to be caused by intrinsic factors, such as teacher's computer and media literacy, teaching style, and personality (Gajek 2002), resulting in self-perception as „technopeasants“, „technophobes“, „resident Luddites“, or „stupid about computers“ (Jacobsen, Clifford and Friesen 2002). Teachers tend to exaggerate their lack of technical expertise (Krajka 2012), and even though instructors may be fairly competent computer users in their personal, social or professional spheres, they can still be apprehensive about using computers in the classroom, feeling that students might know more about technology than they do, causing them to „lose face“ (Chambers and Bax 2006). Thus, according to Marcinkiewicz (1994), teachers' use of computers for teaching is related to their belief in their ability to do so and self-efficacy plays an important part in technology adoption. As Norum, Grabinger and Duffield (1999) report, teachers feel the strong assertion that they need to change personally and take on new roles if technology is to be integrated effectively into their classrooms, seeing themselves as the place where change efforts need to begin.

Another reason for the negative perception of technology-assisted language learning may be the ill-conceived idea of a „CALL“ lesson (Chambers and Bax 2006). The common misconception here might be that such a lesson involves placing students in front of computers for an entire classroom period, relying solely on human-computer interaction with no role for the teacher, as well as that using computers in an EFL classroom is not about „learning English“ but rather „learning about computers“ (Chambers and Bax 2006). Jacobsen *et al.* (2002) observed that teachers, especially those less confident in their ability to use technology for professional purposes, are uncertain about how to augment teaching with technology. Clarification of models of technology use, followed by examples of good practice, might help to prevent such ill-formed visions (see Krajka 2007, 2012, for a detailed overview of curriculum development of Internet-based language teaching). Also poor quality of early CALL programs might have created a negative view of



technology-enhanced teaching for many teachers, who could have experienced such „drill-and-kill“ instruction themselves as learners (Rusiecki 1991, 1993). An unwillingness to prepare digital materials instead of relying on ready-made published resources may be, according to Leffa (2005), a fairly important motivation against teaching with technology.

It is not only the acquired level of computer literacy but also general classroom experience that shapes teachers' attitudes towards technological innovation adoption. Meskill *et al.* (2002) showed that even though the technological training novice teachers received was more state-of-the-art, they were much less comfortable in their technological implementations than more experienced educators who had a lot more classroom experience with no formal CALL training.

## 1.2. Technology adoption by teachers

Even though the new skills might be effectively acquired as a result of instruction, teachers do not have to become ardent innovation adopters (Langone *et al.* 1998). According to McMeniman and Evans (1998), the reason for this may be lack of perception there is sufficient evidence of positive effects of technology-enhanced teaching in „real life“, and the very real belief of teachers that although technology has an empowering potential it is not enough for them to apply the tool in their classrooms. Thus, instruction that presents “evidence that shows positive effects of the new teaching method on the quality of learning outcomes” and helps “develop expertise in the new method” (McMeniman and Evans 1998: 1) is a necessary step towards effective technology adoption.

The ways that teachers perceive innovation can be multifold, and the three most frequent attitudes are withdrawal conditioned by apprehension of novelty, losing authority or personal safety; reception of innovation only when convinced of low risk and personal benefit; and, finally, ardent adoption and trend-setting, characteristic of creative individuals ready to take risk (Zawadzka 2004). The technology adoption process is to a large extent individualised, conditioned by the teachers' personal characteristics, teaching experiences, administrative considerations, learners' expectations and needs, logistical allowances, etc. The adoption (more commonly referred to as „diffusion“) process is a complex, dynamic continuum, with many factors influencing the change (Dooley, Metcalf and Martinez 1999).

In describing technology adoption by individual teachers, Rogers (1995) suggests that the process consists of five major sequential steps:

1. Gaining awareness of the innovation.
2. Forming either a positive or a negative opinion about the innovation.
3. Choosing to adopt or reject the innovation.
4. Using the innovation.

5. Seeking evidence that supports the decision to adopt or reject the innovation.

The second stage, that of forming a personal opinion about innovation, should lead to „ownership“ or a situation in which those teachers who are more expected to resist innovation will be found more willing to implement it when the innovation becomes „theirs“ (Palmer 1993: 170). This can take place through first experiencing the effects of innovation themselves, then reflecting upon it and subsequently adapting to one's own particular circumstances and teaching style, finally, evaluating its effect.

### **1.3. Enablers and barriers to innovation adoption**

Even though a great amount of money, effort and time can be expended, instructors may still seem reluctant to integrate technology into their teaching, i.e. being able to use an array of tools to gather information and communicate with others (Abdelraheem 2004). Ertmer (1999) indicates that teachers would not automatically integrate technology into teaching and learning even if barriers such as access, time, and technical support were removed, as the change needs to be implanted in their intrinsic beliefs about teaching as well.

Ertmer (1999) provides a useful distinction into first-order barriers, which include access to hardware, access to software, time to plan instruction, technical support, and administrative support, and second-order barriers, namely the underlying beliefs of teachers about teaching, learning technology, organizational context and unwillingness to change. The former are extrinsic to teachers, environmental (incremental, institutional), and easier to manage and solve, while the latter are intrinsic, personal and fundamental, more difficult to deal with (Abdelraheem 2004).

Other most common barriers to technology integration are as follows:

- poor administrative support, problems with time, access, space, supervision, and operations, poor software, curriculum integration difficulties, teacher's attitudes towards and knowledge of computers, computer limitations and inadequate numbers of computers and lack of technical support (Hadley and Sheingold 1993);
- access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national policies, commitment to professional learning and backgrounds in formal computer training (Mumtaz 2000);
- the instructor's discipline, lack of time, inadequate equipment and insufficient training (Beggs 2000; Brill and Galloway 2007; Schoepp 2005).

It is interesting to note that the major barriers, according to principal faculties (deans and teacher educators) investigated by Goktas, Yildirim and Yildirim (2009), are

lack of in-service training, lack of appropriate software and materials, and lack of hardware, but not really lack of appropriate course content and instructional programs, lack of time, or lack of appropriate administrative support. Most probably, the perception of high-profile educators would be different from that of teachers, who stress questions of curriculum integration and pedagogical support rather than just technical assistance as key issues to be resolved.

In terms of enablers, Goktas *et al.* (2009) reveal the following factors:

- having at least one computer in every classroom,
- having at least one free laboratory in every school,
- supporting courses with an appropriate webpage,
- offering more ICT-related courses,
- enhancing the motivation of the teacher educators and prospective teachers in regard to using ICTs in their classes,
- designing ICT-related courses based on applicable activities,
- teacher educators being role models for prospective teachers and demonstrating how to use ICTs effectively in teaching.

The preferred teaching style seems to be interconnected with technology adoption. Honey and Moeller (1990) found that teachers with student-centred pedagogical beliefs were successful at integrating technology except in cases when anxiety about computers prevented them from using the technology. In contrast, teachers with more traditional beliefs faced much greater change in their practices in order to integrate technology. For Zapata (2004) the conceptualization of innovation-driven teaching as opposed to „standard“ L2 instruction, as well as general L2 acquisition knowledge, occupy an important role in technology adoption.

## 2. THE STUDY

### 2.1. Aims and assumptions of the instructional module

Striving towards effective ICT teacher development means the consideration of enabling factors in the two contexts, at university and at school. On the one hand, effective ICT teacher training needs to be grounded in the practical reality of the learning environment student teachers are educated at. At the same time, at least rough consideration of what possible enablers might be encountered at school needs to be implanted by the instructors for teachers to properly design and implement computer-based methodology.

Therefore, during 2014 SWPS (University of Social Sciences and Humanities) EU sponsored language teacher training, the total of 64 hours were devoted to the theory and practice of technology usage in the foreign language classroom. The aims of the

workshops were to acquaint participants with the methods and techniques of joining the traditional and IT-supported styles of language teaching in the primary, middle and high schools, in particular:

- to present and train the usage of various digital technologies in order to develop digital competence and communication in foreign languages;
- to gain a better understanding of a variety of aspects involved in the process of teaching languages with technology;
- to collect a wide repertoire of technology-assisted tools, techniques and activities;
- to prepare participants to be able to select, adapt and create ICT-based ELT materials to suit learners' needs and abilities;
- to provide students with critical and analytical skills that will help them conduct a comparative evaluation of different teaching methods and language teaching materials. ("Program szkolenia," 2013)

A lot of effort and time was devoted to practical activities, peer teaching, group discussion and evaluation. In effect, the training has successfully motivated teachers to use technology-based teaching in their work. In fact, three participants from one of the best schools in the Mazovian district invited the trainer to observe in practice the effects of the training, which resulted in a very valuable and rewarding follow-up experience.

## **2.2. Participants**

### **2.2.1. Participants of the e-teacher trainings**

The 2013-14 SWPS EU-funded training courses were addressed at primary and junior secondary foreign language teachers from the rural areas of the Mazovian district. The participants ranged greatly in age and teaching experience, as well as their familiarity with ICT tools. Each of the six groups was highly heterogeneous in terms of languages taught, age and teaching experience, as well as willingness to teach with technology.

Before the beginning of the classes, they were asked to complete a diagnostic test ("Test Diagnostyczny," SWPS 2015). The tests' close analysis reveals that although 43 respondents out of 73 training participants used mail services, social networks, MS Office tools on daily basis, the usage was limited to the basic and social functions. In fact, about 50% of the respondents answered that they did not know how to use editing, review tools to adjust the text or the image. Moreover,

- 41.86 % did not use Google tools and 76.74 % did not use them for teaching purposes
- 95.35 % did not use Internet blogs for teaching
- Yet, 79.07 % used online dictionaries

- Only 9.30 %) used podcasts and screencasts

All in all, 73 participants were trained in six editions of the EU sponsored SWPS e-teacher training. Among them, three teachers from the Sikórz complex of non-public Catholic schools.

### 2.2.2. Selected sample of trainees for post-training study

Sikórz based (a small town near Płock) complex of middle and high school is a highly modern and successful educational institution in the Mazovian district. It is a beautifully located boarding private school. However, neither location (countryside) nor costs make this institution an isolated island on the Polish educational market. Its long and prestigious history, outstanding middle and high school exams results (Table 1), renown and standards, friendly and motivating atmosphere, modern approach to teaching make it attractive for pupils not only from the neighboring villages, towns, cities (the school transportation is very efficient) but also from the two-hour-drive Warsaw.

**Table 1.**

**Sikórz 2014 Middle School exams**

	Mazovian average %	Poland average %	Sikórz average %
English- basic	70.1	67.0	83.2
English- advanced	49.5	46.0	67.8

*Source: [online] at <http://www.liceumkostka.pl/index.php/wyniki-egzaminu-gimnazjalnego>, (accessed on 8 August 2015)*

The school and its teachers are open to new challenges and opportunities; thus, they participate in a variety of projects (e-Twinning, student exchange, etc.), field trips and trainings. The school is equipped with seven interactive boards, a computer room and even a radio studio. The biggest asset are the teachers who want to learn and are open to the world, including technological challenges. It was a privilege and a very rewarding experience to be invited by all three language teachers working there to observe their real-life teaching and to be asked to provide them with the feedback and further support.

### 2.3. Instructional procedures

The major assumptions of the e-teacher training used to prevent negative perceptions of participants and maximise their technology adoption were as follows:

- technology integration needs to involve teachers in observing models of integrated technology use, viewing examples of good practice, reflecting upon and discussing ideas with mentors and peers (Ertmer 1999);

- less independent teachers need more technical support on the basic level as well, while a more sophisticated technology integrator will need both more advanced technology support (due to the exploitation of more sophisticated solutions) and more advanced professional development (Rogers 2000);
- guidance from more advanced technology integrators on how to create the technology-assisted curricula ought to be provided (Schoepp 2005);
- conceptual support should be given in the form of templates or checklists (similarly to WebQuest's matrix, <http://webquest.org>, or the TalenQuest model, <http://webquestmaker.nl/zoeken/talenquest> - Krajka 2012);
- effective collaboration among teachers helps to try out ideas and receive peer feedback on pedagogical value of innovative activities (Ertmer 1999);
- greater instructional impact is achieved if the ways of analyzing, evaluating, and grading English language arts technology projects are provided (Pope and Golub 2000).

These assumptions were implemented throughout the 64-hour on-site training, divided into the following modules:

- introduction to teaching with technology
- text-based tools in language teaching
- audio-based tools in language teaching
- video-based tools in language teaching
- designing and implementing interactive quizzes
- individualising technology-based instruction to fit different age groups
- managing a Moodle platform
- psychological, ethical and legal aspects of technology-based teaching.

## **2.4. Results and findings**

### **2.4.1. Lesson observations**

The lesson observation took place in both the middle and secondary of the Sikórz non-public Catholic schools complex. It can be concluded that middle school learners work more effectively with the IWB than high school learners: everyone is active and eager to work with the board. Teachers design extra materials to introduce the elements of culture, to be able to use authentic material, to individualize and personalize tasks. They do not refrain from departing from the coursebook, to insert humour in order to boost learners' motivation. During some other classes, the teachers skillfully use the pdf or digital version of the coursebook (Figure 2). It has to be noted that although the teachers in question had had experience with IT in the classroom, the SWPS training (as they admitted

themselves and can be clearly observed) gave them more confidence and skills in the IT usage for teaching purposes. They admit using Google drive, more IWB tools than before, designing Hot Potatoes quizzes, uploading and editing films on YouTube. The training also contributed to the school cooperation with the foreign partners in the e-Twinning program. In addition, one of the respondents claims that the training changed her attitude towards looking for new opportunities and challenges.



**Figure 1. Sikórz post-training lesson observation (2015)**

It has to be noted that in Poland, although more and more schools are equipped with IWBs, their availability is still conditioned by school's lack of financial resources or teachers' lack of training. In some schools there are a few boards, but in some there are none. Moreover, in some schools IWBs are still supervised by IT teachers or rarely used because of the principals' worries as to the proper usage of this expensive equipment. Therefore, it is very important that both teachers and school principals understand the need to be engaged in the process of looking for new opportunities, training, projects, competitions that will result not only in financing the equipment but also in proper teacher training.

#### **2.4.2. Follow-up interviews**

The feedback gathered from the interviews with teachers participating in the SWPS training suggests that Polish language teachers feel the need to learn how to use technology in the classroom because their schools participate in e-projects; they

want to respond to their students' needs and expectations; they are creative; they have an option of using the digital version of the coursebook or they want to design their own digital materials, for example as there are "gaps" in the paper-based coursebooks (Gadomska 2015). "[When looking] at the ways of using the Web for entertainment and study, it is clearly visible that Poland, together with other new EU countries, is situated above the EU-27 average as regards all purposes of Internet use. A significant number of Polish Internet users (around 40%) report online learning. When combined with high percentages of users of social networking portals sharing multimedia online, this creates appropriate conditions for multimedia-based online learning..." (Gadomska, Krajka 2015: 148).

The SWPS training participants (Sikórz teachers) were asked the following questions (a follow-up questionnaire):

1. How does the training help you in your everyday work?
2. Do you design your own teaching materials? Do you use student feedback to adjust your materials?
3. Do you use your own materials because of class needs, course book gaps/ lack of high-culture material, intercultural elements?
4. What are your pupils' attitudes towards IT usage?
5. How often do you use IT in the classroom?
6. For what activities do you and your learners use IT?
7. Do you use social websites to communicate with your learners ?
8. How do you rate ready-made/ publishers' IT based materials?
9. What are the main interests of your learners (group characteristics)?
10. Is IT a guarantee for a successful activity/lesson?
11. Student behaviour / class management / special cases and the effectiveness of IT-based materials- do you see any correspondence?
12. How do you assess IT competence of your learners?
13. Do you observe learner autonomy or/and self-study skills development because of IT training?
14. How does IT in the classroom or outside the classroom change the relationship teacher vs. learner?

Sikórz teachers answered that they have become more self-confident as a result of training. However, the training should be repeated from time to time (updating information, refreshing memory). They report using more IWB tools than before; the training has enabled project work and cooperation with foreign schools. Moreover, they are able to design their own materials and use authentic materials (which stimulates discussion, is highly motivating, involves the intercultural



context). IT usage helps them improve class management, keep learners focused. It also helps learning about learners' needs, interests, hobbies, etc. (Figure 2).



**Figure 2. Sikórz post-training lesson observation. Individualizing the learning process by the use of personally relevant material. IWB tool: the curtain- used to boost student alertness**

Teachers claim that they have observed that learners memorize vocabulary better in general or memorize words they select ("the ones I would have never suspected"). Many teachers refrain from using technology in the classroom because they are afraid of losing their credibility as learners' IT skills are higher than their own. However, proper training and readiness to engage the learners and to treat them as IT authorities, results in boosting learners' self-confidence and in effect their motivation. One of the respondents said: "I rely on learners' competence although I try to manage on my own and master new skills." The ability to design teacher's own digital materials enables introducing cross-cultural context, especially to use online material addressed at the Polish audience for English learning activities (elements of the Polish culture introduced), a "gap," characteristic of many materials offered by renowned publishers (Gadomska 2014).

At this point, it must be stressed that the post-training visit was both the trainer's and teachers' initiative. All three teachers from Sikórz are extremely professional, engaged and enthusiastic about the schools modern and student-friendly approach to teaching. It is invaluable that trainees understand and appreciate the post training visit, a visit that not only verifies the training's results but also gives them follow-up back-up, which they make use of in their work. The activities planned for the lesson observation demanded from teachers skillful usage of a variety of IT skills, in particular IWB technology and creativity.

## CONCLUSION

Many teachers who use technology in the classroom complain about technical problems or lack of IT specialist support. It is essential that teachers know the limitations of the medium and the methods and tools used to adapt a given activity in case of technical problems. It is also crucial that teachers should choose between the traditional and IT-supported methods and set proper pedagogical priorities. Technology creates a “wow” factor and can be a highly attractive teaching tool; yet, it may also ruin the lesson if something goes wrong. The respondents concluded that although IT in the classroom is not the only guarantee of teaching/learning success, it can be a decisive factor.

As the present study indicates, the awareness of technology adoption process together with enablers and barriers is essential in the process of designing e-teacher training courses. Making participants able to adapt particular technology-based activities or techniques to suit their contexts is an important part of the flexible training philosophy. While first-order barriers (Ertmer 1999) such as provision of hardware and software are becoming less and less prevalent, much greater pedagogical effort is needed to remove second-order barriers such as teachers’ unwillingness to change their practices. Most importantly, underlying beliefs of teachers about teaching, learning technology and organizational context need to be shaped throughout the training and afterwards, so that participants develop their personal philosophy of how to teach with or without technology.

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# TAILORED COURSES FOR PROFESSIONAL LIFE

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**Abstract:** *The article designs a method of eLearning courses which are customized with regard to the future professional lives of students. The method is based on the disaggregation of the branch of study to single semantic learning objects. Semantic learning objects are interconnected by prerequisites and they contain metadata about the importance of learning objects for mastering specific professions. At the beginning of his/her study each student takes a test to determine which profession could be potentially suitable for him/her and the individual's graduate profile is developed. According to the individual's graduate profile the Learning Management System (LMS) automatically generates a proposal for the optimal study path. For each student the semantic learning objects which are the most important regarding to his/her future profession are selected.*

**Keywords:** learning management system (LMS), professional life, semantic learning object, tailored eLearning course

## INTRODUCTION

A common problem for young people is that they have only a vague idea about their future profession, not only in the choice of field of study at university, but also at the end of their university studies. Many of them then start working in a different field than the one studied, so money, time and effort is largely wasted.

This article describes a solution that could partially alleviate this problem. From the beginning, a customized graduate profile would be developed for each individual student with respect to the profession which would be the most appropriate for him/her. On the basis of this profile, Learning Management System (LMS) will generate an individual study plan for the student with regard to the requirements of the possible future profession. From the beginning of his/her studies the student will have both a clearer goal and path towards this goal. This proposal may be one of the forms of a future LMS.



Disaggregation of the subject matter of a field of study into a set of further indivisible semantic learning objects brings out another characteristic of the potential future LMS. This system will not only be an authoring tool for the creation of individual courses, but it will be a strategic tool for creating entire fields of study. In the author's opinion, it is sufficient to disaggregate the subject matter of a field of study into semantic learning objects and the individual subjects of the field of study will sort of “emerge as if by themselves” in the form of clusters of learning objects.

Semantic learning objects have to carry such information which will determine whether a certain learning object is a prerequisite of another one. In other words, a learning object has to be embedded with metadata that describes the content of the learning object. As seen in Figure 1, learning objects interconnected by prerequisites create semantic (associative) networks (Lukasová et al., 2010), where each node represents a learning object and each edge represents the predicate “is a prerequisite”. The nonlinear language of semantic networks can be converted into a linear language, the so-called framework. The metadata format of the semantic learning objects can therefore be based on the syntax of the frameworks. A general registry of semantic learning object metadata with prerequisites is shown in Figure 2.

```
A framework of semantic learning objectives
Framework identifier: learning_object
Slots
Type: definition
Time: hours:minutes
Prerequisite 1: learning_object_prerequisite_1
Prerequisite 2: learning_object_prerequisite_2
...
Prerequisite n: learning_object_prerequisite_n
```

**Figure 2: A general framework of semantic learning object with prerequisites**

*Source: Own work*

It is possible to illustrate this with a specific example of a semantic learning object “convex lens”. This object has the form of a real lens which the teacher can demonstrate to his/her students and the instruction takes about nine minutes. The objects have only one prerequisite, and that is the semantic learning object “refraction”. The entry of the semantic learning object “convex lens” is shown in Figure 3.

Interconnection of a semantic learning object with its prerequisites is only the first step towards LMS, which automatically generates the optimal path through his/her studies for each individual student. As described in the next chapter, in order to



create a personalized LMS, the metadata of semantic learning objects need to be expanded.

```
The framework of the semantic learning object "convex lens"
Framework identifier: convex_lens
Slots
Type: real_object
Time: 00:09
Prerequisite: refraction
```

**Figure 3: The framework of the semantic learning object “convex lens”**

*Source: Own work*

## 2. CUSTOMIZED GRADUATE PROFILE

As already indicated, the possible future LMS for each student generates a customized path through his/her studies in such a way as to saturate the student's educational, professional and personal needs to the maximum. At the beginning of his/her studies, a student, with a help of a teacher, psychologist and career consultant, creates his/her own customized graduate profile. From the student's perspective, this profile will express the rate of suitability of professions that the student might pursue after graduation. “Suitability” refers to how attractive a particular profession seems to a student as well as the extent of the student's study and personal skills regarding this profession which will be diagnosed by specialists (teacher, psychologist and career consultant).

```
Framework of a customized graduate profile
Framework identifier: field_of_study&student
Slots
Suitability of profession 1: profession_1=suitability_rate_1
Suitability of profession 2: profession_2=suitability_rate_2
...
Suitability of profession n: profession_n=suitability_rate_n
```

**Figure 4: General framework of a customized graduate profile**

*Source: Own work*

The general format of a customized graduate profile is shown in Figure 4. The entry “profile” refers to a general profile of a graduate and entries “professions\_n” refer to professions which the graduate, given his/her specialization, can perform after graduation if he/she stays in the field. The rate of suitability of a profession for a

graduate continuously takes values from 0 (totally unsuitable profession) to 1 (completely suitable profession).

For a better idea, Figure 5 shows a customized graduate profile for a student named Radim Bendr who is studying the field of Optics. As an example, three possible professions are named that the student of this field could hold and also the suitability rates of these professions for the specific future graduate are given.

```
Framework of the graduate profile for Radim Bendr studying
the field of Optics
Framework identifier: optics&radim_bendr
Slots
Suitability of profession 1: measurement_technician=0,65
Suitability of profession 2: optometrist=0,87
Suitability of profession 3: reseacher=0,25
```

**Figure 5: Framework of the customized graduate profile for Radim Bendr studying the field of Optics**

*Source: Own work*

```
Framework of semantic learning object
Framework identifier: learning_object
Slots
Type: definition
Time: hours:minutes
Prerequisite 1: learning_object_prerequisite_1
Prerequisite 2: learning_object_prerequisite_2
...
Prerequisite n: name_of_the_object_prerequisite_n
Importance 1: profession_1=rate_of_importance_1
Importance 2: profession_2=rate_of_importance_2
...
Importance n: profession_n=rate_of_importance_n
```

**Figure 6: General framework of semantic learning object with prerequisites and rates of importance for different professions**

*Source: Own work*

As shown in Figure 6, for further progress, it is necessary that the semantic metadata for learning objects in Figure 2 (general framework of semantic learning object with

prerequisites) are extended with information as to what extent the completion of this training module is important for the performance in different professions. The degree of importance ranges from 0 (the learning object can be entirely disregarded) to 1 (this learning object is absolutely necessary).

To have a better idea, Figure 7 shows the framework of semantic learning object “convex lens”, which is given in Figure 3 (the framework of semantic learning object “convex lens”). In this Figure the frame is extended with rates of importance of completing this learning object for carrying out the future professions which are given in the Figure 5 (the framework of graduate's customized profile for Radim Bendr studying the field of Optics).

```
The framework of semantic learning objects "convex lens"
Framework identifier: convex_lens
Slots
Type: real_object
Time: 00:09
Prerequisite: refraction
Importance 1: measurement_technician=0,71
Importance 2: optometrist=0,95
Importance 3: researcher=0,83
```

**Figure 7: The framework of semantic learning object “convex lens” with prerequisites and rates of importance for carrying out different professions**

*Source: Own work*

Now we have a customized profile of a graduate that contains a list of professions with rates of suitability for this student. Furthermore, there is a set of all learning objects for a field of study which contains metadata about the rate of importance for completing specific learning objects to carry out specific professions.

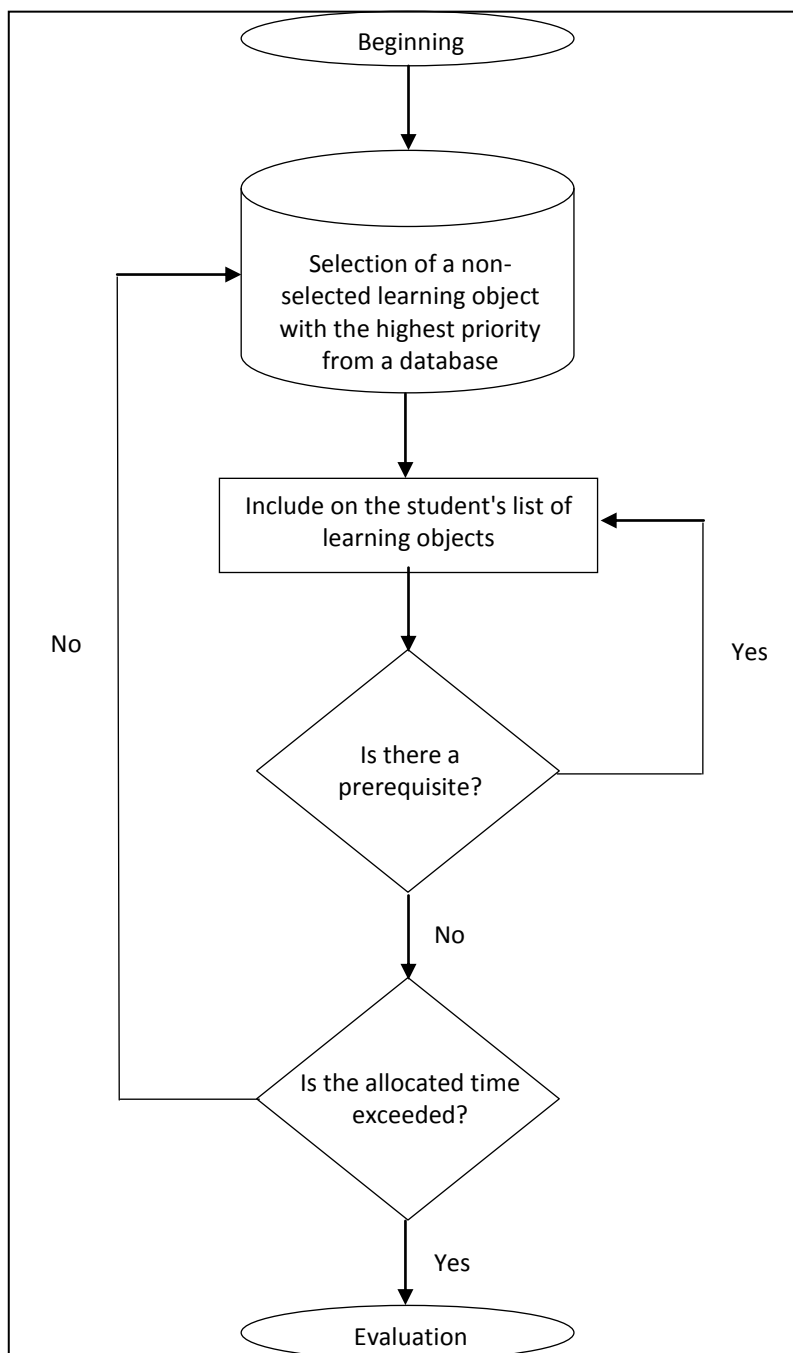
Using the above examples, the rate of suitability of the profession of measurement technician for the student Radim Bendr assumes a value of 0.65. The rate of importance of completing the module “convex lens” for carrying out the profession measurement technician is 0.71. When assembling an individual study plan for the student Radim Bendr in terms of carrying out the profession of measurement technician, the inclusion of the learning object “convex lens” will have a rate of priority  $0.65 \times 0.71 = 0.4615$ . In the same way we can calculate the rate of priority of the learning object “convex lens” for the student Radim Bendr in terms of carrying out the optometrist profession. The rate of priority in this case will be  $0.87 \times 0.95 = 0.8265$ . The rate of priority of the learning object “convex lens” for the student Radim Bendr in terms of carrying out the profession of a researcher then will be  $0.25 \times 0.83 = 0.2075$ . The overall rate of priority of the learning object “convex

lens” for the student Radim Bendr is given by the average of the individual priorities  $(0.4615+0.8265+0.2075)/3=0.4985$ . In this way the overall rates of priorities of all the learning objects for all the students of the given field of study will be calculated and these values will be entered into a database.

### 3. OPTIMAL STUDY PATH

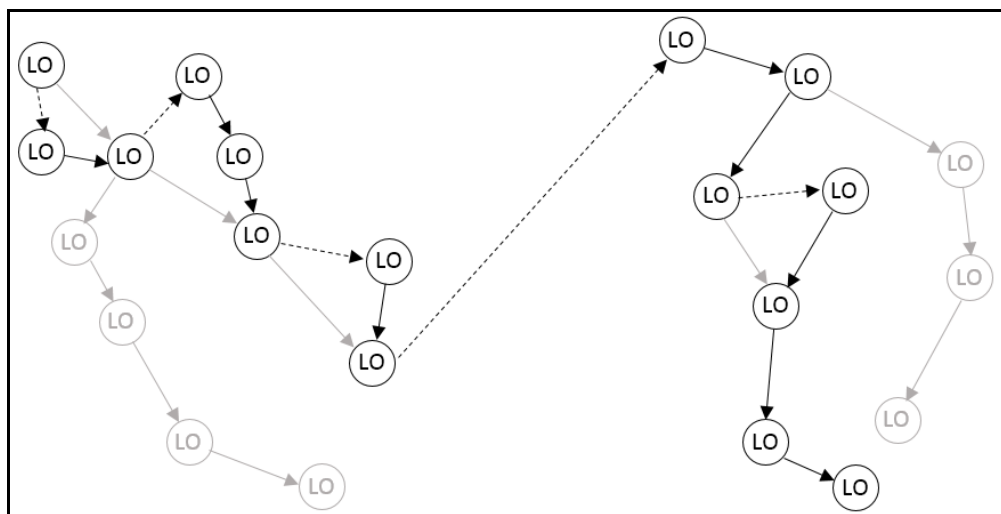
The framework algorithm in Figure 8 shows the process of creating a list of learning objects that should be completed by the student. In the first step the LMS selects a learning object from a database that has the highest overall priority for the student and that the student did not yet enroll in and includes it in the list. Then the LMS will continue to work in cycles putting other learning objects on the list that are a prerequisite of the learning object put on the list in the previous step. When the last included learning object does not have a prerequisite, the LMS will check whether the time required to complete all learning objects on the list does not exceed the time allocated for the study (overall, in one year, in one semester or one subject). If the allocated time is not exceeded, the LMS will again select a learning object with the highest priority which has not been enrolled in and repeat the whole process again. If the allocated time is exceeded, the LMS will direct the student towards an evaluation of his/her knowledge of subject matter presented at the completed learning modules. If the student evaluation is satisfactory, another cluster of semantic learning objects interconnected by prerequisites will follow for him/her to study.

After the compilation of a list of learning objects to be completed by the student within the allocated time, the LMS will suggest the optimum study path through the field of study with respect to the future profession. The set of interconnected semantic learning objects can be viewed as a directed graph, where the vertices represent semantic learning objects and oriented edges represent prerequisites. In such a case, tasks from graph theory can be applied (Milková 2013). The LMS will try to find a path that would connect the start and the end point of the study and that would pass through each vertex (learning object from the student's list) just once. In the event that some vertices of the graph will not be connected by an edge (prerequisite), the LMS will add an auxiliary edge to the graph. The final optimal study path is shown in Figure 9. The black circles (LO) represent learning objects from the student's list, the other circles (LO) which are grey, are not included on his/her list. The solid arrows represent prerequisites and the black colour (not grey) signifies the stages of student's study path. The black dashed arrows indicate the auxiliary edges which were added to the graph in order to create a seamless path without recurrence.



**Figure 8: The creation of a list of learning objects to be completed by the student**

*Source: Own work*



**Figure 9: The student's optimal study trajectory through the field of study**

*Source: Own work*

These proposals can be summarized by saying that our goal is to align a customized graduate profile with the available semantic learning objects. The LMS tries to find the greatest harmony between the suitability of the possible professions for the given student and the importance of the completion of the learning objects for carrying out these professions. In the end the LMS will offer the student an optimal study path through his field of study.

## CONCLUSION

The author is aware that a disaggregation of a whole field of study into learning objects and their description using metadata in frameworks is very demanding. The first step could be to describe only required and required elective subjects with metadata containing information about prerequisites and rates of importance for the given profession. Based on his/her customized graduate profile, the student would receive a list of suitable subjects for him/her, which should be completed with regard to his/her professional goals.

Although better decision making by young people regarding their future and a more goal-oriented preparation of students for their professional life is an arduous and long-term problem, it needs to be solved by all appropriate means. This is evidenced by various studies on employability of university graduates (Gottvald et al., 2008). There are professions where suitable graduates are scarce, while there are other fields of study that have practically zero market application. This problem affects not only society but also the individual because it leads to suboptimal use of individual skills, lack of self-fulfilment and a low sense of professional and personal satisfaction.

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# PROFESSIONAL TRAINING TEACHERS UNIVERSITY IN E-LEARNING

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**Abstract:** *This article shows models of e-learning implementation in higher education. This article describes experiences and approaches in deploying the e-learning course „Technology of remote online training” using the LMS Module platform, Google Apps for the professional training of teachers in the Ternopil National Pedagogical University, named after Volodymyr Hnatiuk.*

**Keywords:** e-learning, distance learning, teaching models, professional training of teachers, LMS Moodle.

## INTRODUCTION

E-learning allows society to prepare the right amount of essential personnel in minimum time and at minimum cost. This is recognized as a priority in the reform of educational systems in many leading countries of the world, such as the U.S., Great Britain, Canada, Germany, France and others. UNESCO experts agree the requirements of today's information-driven society can be met using e-learning as a technology that focuses on the modern style of education. (Dendev 2013).

Electronic studies (e-learning) are studies with applications of information and communication technologies and electronic educational resources. UNESCO specialists define e-learning as the process of acquiring knowledge and skills through the use of information and communication technologies (ICT) (*Summary Report – UNESCO, 2006*)

The main factors to introduce e-learning in universities are:

- The necessity to increase the efficiency of work in university;
- The necessity for improving the quality of studies;
- The need to attract more competitive students.



Another important argument for the active use of electronic studies in universities is to meet the conditions of a new Ukrainian Law „On higher education” (*A law of Ukraine „On higher education”, 2014*). This law outlines reduced lecture time, thereby, increasing and widening different forms of independent studies.

It should be noted that:

- e-learning allows for education among different age groups; it is an instrument for those who aim to further increase their level of knowledge despite their age, previous level of education or experience
- with e-learning it is possible to contact people in different time zones and collaborate with them to exchange and master each other’s knowledge;
- e-learning is an enormous informational field with flexible access to a wide variety of educational materials;
- e-learning is independent and mobile;
- e-learning is an orientation on expanding innovative methods and technologies. (*E-Learning: myths, possibilities, prospects, 2014*)

The scale of applications of electronic studies grows due to such possibilities. Modern educational systems are oriented on e-learning. The main aspects of introducing e-learning in higher educational establishments are:

- expanding the role of teachers;
- a change to competitive studies;
- attention to open educational resources;
- more deployment of mixed (hybrid) studies;
- use of collaborative technologies.

## **1. PROBLEMS OF IMPLEMENTATION OF E-LEARNING AT THE UNIVERSITY**

At the same time, the process of introducing e-learning in Ukrainian universities is accompanied by many different problems. Professors distinguish such problems related to introducing electronic studies as:

- arbitrary terminology in the industry of e-learning;
- absence of connections and collaboration between school and university sectors;
- an increase of data volumes in networks, thereby complicating the professor’s work;

- absence of normative base;
- increased attention to technology, but not to educational process;
- appearance of cloudy technologies lead to the use of new pedagogical approaches that have not yet spread among teachers;
- low quality of electronic studies is not equal to its potential possibilities (*About distance course „Blended Learning”, 2015*)

Considerable attention of researchers is drawn to the quality of e-learning. Some researchers state that the specifics of electronic studies improves quality. (Vlasova 2014) It all depends on their opinion on the student's planned time and prioritization of their work.

Other scientists, disturbed by the absence of progress in quality of electronic studies, offered the Manifest of „serious electronic studies”, an aim of which is a more exact formulation of goals for providing a high quality electronic studies. (Allen, Dirksen, Quinn, Thalheimer 2014)

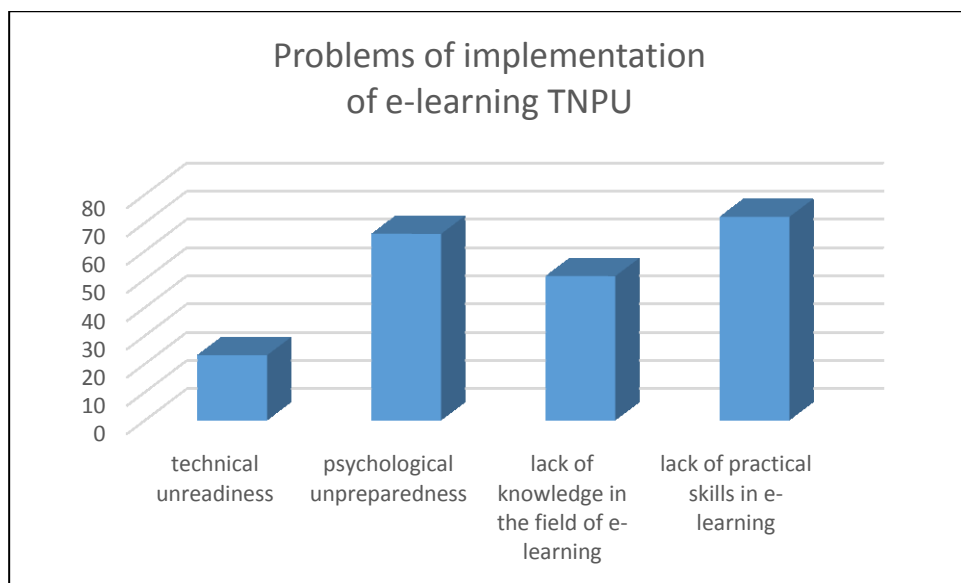
Formulating goals of e-learning:

- values of traditional e-learning: an accent on content; efficiency for authors; focus on attendance; „delivery” of knowledge; testing facts; occasional events; constructive feedback
- values of serious e-learning: concentration on productivity; meaningfulness for students; fascination; authenticity of context; reality of solutions; space of practice; reality of consequences.

In the Ternopil National Pedagogical University, we conducted a study in relation to the slowing of the introduction of e-learning in the educational process of the university. This study led to the development of an adapted distant course training of teachers in the field of e-learning.

450 teachers belonging to all faculties of the university took part in the research study. The main methods undertaken in the study were: comprehension of literature and normative documents in the field of e-learning, supervision, monitoring, study and generalization of pedagogical experience, verbal and writing questioning of teachers, testing. Google Apps and LMS Module were mainly used for organizing scientific research.

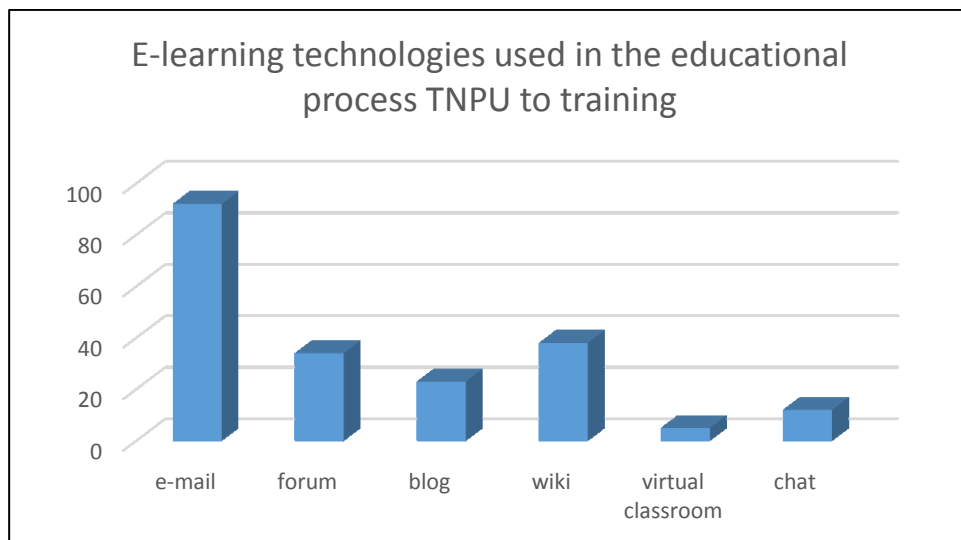
The first stage of research consisted of the establishment of principal reasons of slowing the implementation of e-learning in the educational process of Pedagogical University.



**Figure 1. Reasons of slow implementation of e-learning in an educational process**

*Source: Own work*

Recognition of mentioned problems provide an opportunity to define further work of Pedagogical University as the center of preparation of modern specialists (both teachers and students) in the implementation of e-learning in an educational process.



**Figure. 2. Technologies that was used by professors to increase of their qualification in domain e-learning**

*Source: Own work*

In our study, questioning was conducted concerning determination of technologies and usefulness of e-learning in practice. 51% of professors mentioned an absence of necessary knowledge in implementing e-learning into their courses.

From the results of research it was evident that professors use both asynchronous and synchronous forms of communication technologies. Asynchronous technologies are most used: e-mail, blogs, Wiki, forums. Synchronous technologies are used less in an educational process, such as virtual classes and chats.

At the second stage of research the task was finding and developing a model of implementation of e-learning specifically adapted to the educational process of Pedagogical University.

## **2. MODELS OF IMPLEMENTATION OF E- LEARNING**

Today there are different models of implementation of e-learning in higher educational establishments. The most successful model in the organizational strategy of electronic studies and infrastructure in a higher educational establishment, in our opinion, is the Hexagonal Model of B. Khan. (Khan, Badii 2012) The E-Learning Frame Work includes: institutional, pedagogical, technological, interface design, evaluation, management, resource support, ethical dimensions.

It should be mentioned that in the process of implementation of electronic studies in a higher education establishment it is important to define the models of its development. As it is known, the traditional model of education is based on mastering a considerable volume of knowledge, transmission of this knowledge from the teacher to the student. According to this model, the students are suggested to mastering a large quantity of already received knowledge. However, searching for educational material independently and developing projects which demand joint educational collaboration with other students of the university is practically absent.

The modern model of studies is provisionally named „American” and it is based on a constructivism theory. This model is pragmatic, personality-orientated, flexibly reacts to the real requests of a society. A teacher performs the functions of a trainer, a leader of a group of students, but not of a basic transmitter of information. Students develop skills of research, independent activity, skills of the critical thinking, and skills of communication and collaboration.

Thus, it is possible to make a conclusion, that the formation of students’ skills of independent and collective work, the realization of a principle „education through the whole life” – these are only a few tasks that the system of education faces nowadays, and for the fulfillment of which the information and communications technology can be used, in particular the distance education technologies.

In e-learning the following models of studies are distinguished (Polat, Buharkina, Moiseeva 2004):

- a teacher oriented model;
- a student oriented model;
- a model oriented on the creation of educational groups.

**A teacher oriented model.** A traditional model of studies by means of lectures, that is named **a teacher oriented model**, is used mostly, when the aim of studies is a simple knowledge transmission. In the terms of learning, the goal means the data receiving and memorizing, but not their interpretation and change. In the terms of teaching, the teacher oriented approach envisages a control above the process of presentation of educational material together with the simultaneous transmission of knowledge to the student.

**A student oriented model.** The gist of the student oriented model implies that every student must not just get a certain educational material, but interpret it for creation of new knowledge. Thus, thinking is regarded to be not only an instrument for the recreation of actual knowledge, but also a mechanism for the internal mastering of knowledge through a supervision and experience. According to such approach students study by the method of attempts and errors and can simultaneously control their own learning process.

**A model oriented on the creation of educational groups.** A model that is based on application of educational groups, creates an environment in which new knowledge appears and is spread as a result of the collective work of students in educational groups. A teaching approach, based on application of educational groups, is the most effective while solving the practically-oriented tasks and in conducting research. The process of learning is aimed at creating new knowledge on the basis of already existing and at creative application of this knowledge for the accomplishment of new tasks.

### 3. INCREASED TEACHER SUPPORT SYSTEMS TO STRENGTHEN THE E-LEARNING FOUNDATION

While planning a course „Technology of distance on-line education” for the teachers of university in co-authorship with the associate professor of the Department of Informatics and its teaching methodology, a head of the Center of distance education and the newest educational technologies of the V. Hnatiuk TNPU, Habrusiev Y., the integrated model of electronic education, oriented on the student and on teaching with application of educational groups, was selected. It should be noted that using such a model of electronic education gives the following opportunities to the students:

- to operatively get necessary and systematized educational material for the effective study of a discipline;
- to participate personally in creation of the open educational content;

- to operatively estimate the gained knowledge, both independently and under the teacher's control;
- to see the analytical teacher's work with the electronic magazine of estimations;
- to organize virtual associations with the aim of exchange of knowledge and experience, discussion of courses, receiving of advice and consultations;
- to create cloud electronic portfolio;
- to operatively intermingle with teachers on the basis of modern communications.

With the aim of the use of the distance education course as the mean of forming the teacher's competences in electronic education the department of informatics and methodology of its teaching jointly with the Center of distance education and the newest educational technologies of the Ternopil national pedagogical university conducted the distance courses of in-house training for 450 teachers.

The aims of the created course "Technology of distance on-line education" – to form the knowledge about:

- the conception of the distance learning, role of information and communication technologies (ICT) in this form of studies;
- achievement of the primary objectives of the process of electronic education and the corresponding organizational, technological and didactics contexts;
- general principles of development of educational courses with the use of technology of distance education;
- didactic principles of studies with taking into account the influence of ICT;
- politics in industry of electronic and distance education on the institutional and national levels.

A course is intended for:

- specialists engaged in preparation of teaching staff within the framework of the system of retraining or in-plant training; also managers and consultants in industry of distance and electronic education;
- specialists of different educational establishments, such as institutes of in-plant training;
- specialists from a number of the faculty advisors of higher education establishments, teachers of education institutions that study without leaving their work individually or as a member of virtual groups.

The creation of the course „Technology of distance on-line education” according to the theory of pedagogical design took a few phases:

- analysis (requirements in studies are analyzed) and formulation of desirable results;
- design (the plans aimed at the achievement of the pre-arranged results are developed);
- development (plans are turned into educational materials);
- realization (educational materials are used by listeners);
- evaluation of efficiency (educational materials are approved and corrected).

It should be noted that planning of the pedagogical design of a particular course was aimed at making its listeners the center of the whole educational process. For example, it was necessary to think not just of the context of the material, but also about what a listener must do in order to master an educational course.

In the process of development of the „Technology of distance on-line education” course the following principles of pedagogical design were used:

- adaptation of learning methods „face to face” to the terms of on-line education;
- development of a modular construction that gives an opportunity to the listeners easily to move from one educational module to another;
- methods and techniques of presenting the content and types of activity that provide maximal interactiveness of the learning process.

On the basis of the conducted analysis of the competencies of modern specialist, e-learning course was divided into seven modules:

1. Organization of distance education in educational establishment. The work with the educational course „Technology of distance on-line education”.
2. The system of management of educational resources MOODLE (independent work).
3. Organization of educational activity in the process of electronic (distance) learning.
4. Cloud services by Google Apps For Education for providing the educational process.
5. The use of information and communications services of GOOGLE APPS in the educational process.
6. Introduction of distance learning in the educational process.
7. Project work. The presentation of a professional portfolio of a distance learning course developer.

From our own experience of conducting distance courses, we believe that an electronic course must contain the following components:

1. The content of a course – that is, lectures, presentations, instructions for listeners, information sources, glossaries on the theme of a course.
2. The estimating component – different types of tasks both for current (a map of knowledge, infographics, essay, article, test, etc.) and final control (project work and presentation of a professional portfolio of a distance learning course developer).
3. The organizational component – educational process documentation, current announcements concerning a course.
4. Means of communication – facilities for both individual and group studies (forum, e-mail, chat, videoconferences, on-line consultations, social networks, etc).
5. Summing up – questionnaire at the beginning and upon completion of a course, reflection/feedback after the study of its modules.

The first and the second components – the pre-course methodical work, the third and the fourth – the pedagogical activity during the course, the fifth – fixing the results. When preparing the course the methodical content of the distance course modules was developed for every stage; also the peculiarities of the use of pedagogical technologies of distance education were taken into account. Every module contains both the compulsory and additional materials. The structure of the module includes aims and tasks, a video-lecture (both on-line translations and in a record), a presentation, tasks, text and video-instructions to tasks implementation, a list of basic and additional sources, a glossary of terms and definitions.

In the process of studies it was emphasized that the activity of a teacher of distance education organizationally can be divided into two stages:

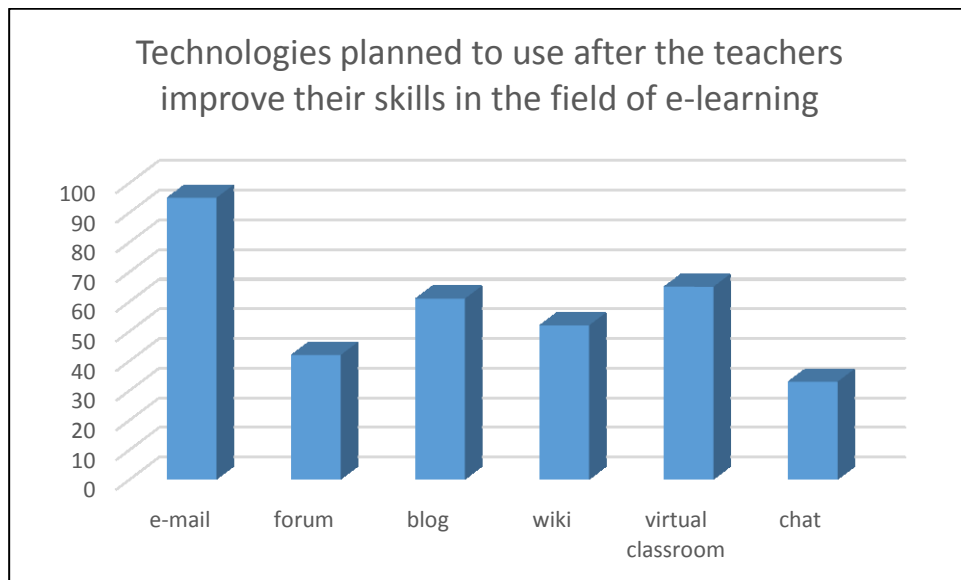
- development of the distance course;
- realization and conduct of the distance course.

To support the modern forms of studies with the use of LMS Moodle the special tasks were created; doing them the listeners had the opportunity to acquire a competence of a specialist in industry of electronic education. With such an approach a teacher acquires a new status. The main task – to organize an independent cognitive activity of a course listener; teach him or her independently to obtain the knowledge and to apply the gained knowledge in practice.

To accomplish the above-mentioned task such methods and technologies of studies were selected, that not only and not so much allow to master the ready made knowledge, but also to obtain the knowledge independently of different sources, to form their own point of view, to be able to prove it, to use the already gained knowledge as a method for receiving new knowledge. Upon completion of the distance course „Technology of distance on-line education”, a survey was conducted



concerning the most appropriate technologies of e-learning, which the teachers plan to use in their electronic educational courses.



**Figure. 3. Technologies that are planned to be used by teachers after the improvement of their skills in a field of e-learning.**

*Source: Own work*

## CONCLUSION

It is expedient to mark that after completing the distance course a majority of teachers of pedagogical university overcame psychological and technical barriers towards introduction of electronic education in their professional activity, increased their level of knowledge in the a field of e-learning. In particular, all teachers completed the distance education course well, improved the earlier created electronic courses on the LMS Moodle platform. Especially they marked such advantages of e-learning as the operative access to the educational resources and their exchange; the productive joint work of participants of educational process on the basis of cloud technologies of Google Apps (Google Documents, Google+, Google Hangouts) and Web 2.0 technologies. Our experience showed that electronic education is a prospective type of education in a pedagogical university that orients teachers towards the implementation of innovative methods and technologies, such as on-line lectures, on-line consultations, video- conferences, webinars, etc.

The prospects of further research include the improvement of introduction model of electronic education by means of integration of project technologies and competence approach.

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# REMOTE LEARNING SYSTEM IN PREPARING STUDENTS TO BECOME TEACHERS

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**Abstract:** *The educational training preparing students for teaching natural sciences should be placed in the school environment. In this article, the authors describe the usage of a blended learning method, utilizing an e-learning platform for students' educational training. The authors also studied how the usage of this method influences the frequency of the communication between students and tutors and the efficiency of their cooperation and social interactions. The authors also described the attitude of these groups towards the implemented new technologies, which should assist educational training.*

**Keywords:** teachers' training, blended learning, science experiment, teaching practices.

## INTRODUCTION

Students preparing to work as teachers of science subjects must conduct lessons in natural conditions at school. For this reason, they must work closely with experienced teachers, playing the role of school tutors. The course of this cooperation, however, is sometimes different. This is connected inter alia with a different perception of how to implement the practices by teachers and the different ones by students, especially in terms of using modern styles and methods of communication.

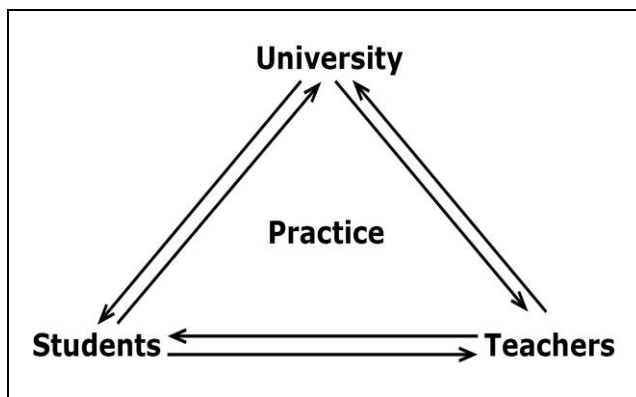
Teachers and school tutors in elementary schools, secondary schools and high schools, accepting students for the practical teaching of science subjects, assume that they already possess the necessary skills that allow them to conduct lessons in the classroom under natural conditions. However, students in theoretical and laboratory exercises at a university acquire certain detailed messages about teaching, in our case, teaching science subjects. They practice well and take on appropriate skills related to the learning process. They achieve these skills, however, when conducting

parts of or whole class lessons during classes at the university, during which other students, their colleagues, act as students. Therefore, their knowledge and special skills are not complete. Why? Because they are achieved in unnatural conditions and, as a consequence, the further abilities of trainees should be developed when conducting a lesson in natural conditions during school practice (Darling-Hammond 1998).

This problem is perceived differently by students. They expect, both from a teacher and a school tutor, the pedagogical guidance of a teacher teaching science subjects. Feeling that the knowledge and skills, especially those related to the implementation of the educational process gained at the university, are insufficient, students require from school tutors a greater commitment in their cooperation.

On the other hand, students that get practice at school bring into the educational process skills associated with a very good understanding of the ways to use modern information technology (IT) to increase the quality of the lessons and to facilitate the conduction of the lessons.

During the students training, a triple system of cooperation is created between university teachers and students. Each participant brings defined benefits to the collaboration: teachers give students the information and teach them specific tasks, and students use both new ideas during the practice for conducting lessons as well as their ability to use modern multimedia teaching aids. The university supervises the proper conduct of a so described cooperation, leading to technical, methodical and formal advice ("Best practices for effective schools", nd.).



**Figure 1. Information flow between teachers, students and university staff during the educational training**

*Source: authors' own resources*

While studying, students and trainees are required to participate in many activities such as lectures, tutorials, and laboratory classes, of which the number is truly large. Also, teachers and school tutors, when performing their daily duties, are involved in the implementation of the educational school process, which also consumes a lot of

time. For these reasons, the cooperation and communication between the students and the teachers was insufficient. For these reasons, both the students engaged in the practices and the teachers taking care of the trainees were not fully satisfied with the final practice results.

We decided that, in order to solve the existing problems, to the process of practices implementation should be introduced a system of remote learning. It should improve the exchange of information between the participants of the practice in these relationships: teacher - student, student - student and teacher - teacher.

## **HOW DO WE IMPLEMENT THE PEDAGOGICAL PRACTICES OF SCIENCE SUBJECTS?**

Professional teaching practice takes place in two stages - interim practices and continuous practices. The aim of the interim practices is auditing and, then, conducting lessons by a trainee on topics indicated by the teacher at different times. These practices are held during the academic year and are an integral part of the curriculum. In contrast, continuous practices are held at the end of the academic year, while in the first month, September, of each new school year. The aim of continuous practices is auditing and conducting lessons while learning about the functioning of the school by every trainee in educational and administrative terms, which is possible thanks to the continuous cycle course of these practices.

After the start of the third year (bachelor) of every profile teachers course, students participate in lectures and exercises about teaching science subjects. After completing six weeks of classes at the university, they take part in a three-week interim practice, the aim of which is only auditing each lesson. Students are divided into small groups. Each group has a designated guardian of school practices and observes the course of a few lessons that he has conducted, analysing by observation during the lessons: applied teaching methods, teaching aids, the most important goals of the lesson. In the further course, students return to the university for a two-week series of classes, during which they plan lessons scenario, which they then carry out in trial lessons. Those speeches are held in a micro mode of teaching (microteaching). The method is based on the video registration of certain parts of the lessons given by students, including their specific teaching skills (Mellon & Dence, 1971; Bush & Allen, 1964). In the next three weeks, students continue to practice in schools, in which they not only observe lessons but also conduct lessons on the subjects designated by the school tutor. The classes are recorded and, then, their video is played and analyzed in terms of its merit and methodological content by all the students in the group. In this way, they can analyze different instances, which is instructive from the didactic point of view. These footages are placed on the remote learning platform. This allows each trainee to observe himself, friends, and colleagues (with their consent) in practical action. During the II semester of the course, students (divided as in semester I) implement again interim practices in schools according to the scheme: 4 auditing lessons and 3 lessons conducted in cycle

2 x for three weeks of the classes. After the completion of the interim practices, in which students gain specific skills, practice is carried out continuously. During this time, students carry out 10 classes on a given subject from science topics that are selected by a teacher, auditing 62 hours of the remaining lessons, which corresponds to the full-time job of a teacher.

## **PLACE OF THE REMOTE LEARNING PLATFORM IN THE IMPLEMENTATION OF PEDAGOGICAL PRACTICES**

During the implementation of practice, *inter alia* to improve the communication between students and teachers, we were supported with a distance learning model using a learning platform. Training on the platform is conducted by a blended learning method during which the following are used in the educational process, e-learning methods of work as well as traditional classroom training methods, and, in our case, this applies to student teaching practice. Under this method, classes are implemented in an alternative way, namely, stationary sessions that take place in groups are interspersed with work on the platform (McGinnis, 2005). This educational model requires appropriate conditions for its implementation, that are strictly associated with the use of information technology tools. In this case, access to educational materials is via the Internet, so it allows people to use them anytime and anywhere. Practical activities, complemented by the work in the web, allows the maximum use of the time that students can allocate to the planned practices (Graham, 2005; McCullough & Aimard, 2006; Jagodziński & Wolski, 2011). Thanks to the platform, trainees can quickly consult with tutors while preparing to conduct a new lesson. Via the platform, trainees practices are also conducted, during which issues are discussed related to the profession of a teacher (Boyle et al., 2003; Christensen, 2003). In the discussed system of remote learning, there are also available presentations, multimedia materials, remote simulations and lectures online. These materials significantly enhance the individualization of the learning process. An important value of such an action is the ease to make changes and update the content of the training materials by the authors of these materials (Catley 2005, Jagodziński & Wolski 2012).

## **OpenOlat PLATFORM DESCRIPTION**

The Faculty of Computer Science at the University of Zurich began in 1999 to create an educational platform of remote learning. It serves to conduct courses on the online system or to support the traditional teaching process, and the OLAT name comes from the first letters of the words Online Learning And Training. In 2011, the designed software of the platform began to be under an open source license, and the project changed its name to OpenOLAT. The OpenOLAT platform is a web application, and most of it is written in the Java programming language. This platform also uses the standard server applications such as Apache - web server,

Tomcat - Web application server, MySQL database and another database can be used, XML - universal formal language, designed to represent different data in a structured way. The platform user interface is intuitive and includes technologies developed for Web 2.0 websites. OpenOLAT is not a CMS (this acronym is derived from the first letters of the words Content Management System), which is a content management system. It is a platform which allows managing materials and teaching students through the creation of courses and the dynamic management of these courses. This system also allows for an efficient flow of information between lecturers and learners while adapting courses to the needs of their customers ("User Manual", nd.; "Olat history", nd.).

It is an application that runs in the window of any web browser on a student's or teacher's computer, supporting e-learning standards such as IMS Content Packaging, IMS Question and Test Interoperability or SCORM, which makes it a management system of learning process category LMS (Learning Management System). The advantage of this software is that the app is free, downloadable from the Internet and can be installed on your own server, and, then, used and modified as needed. Because the system is based on JAVA, it may be used on different operating systems such as Windows, Linux or Solaris. The system can be expanded according to the needs of the users, without having to modify its basic elements. This makes it easy to update the software of the platform and its integration with new possibilities of constantly developing information technology ("User manual", nd.; "Features", nd.).

The basic idea of the platform is the use of different functions and rights assigned to the users. So, we can distinguish four basic functions allocated to the users:

- guest - anonymous, unregistered user with limited access rights that can familiarize himself with shared in public curriculum, but he cannot actively use some elements of the platform, such as discussion forums.
- registered user - has his own "username", can use the learning content and all items related to this teaching, and change the main page of the system, adapting it to his needs, create a group of people in the project and participate in courses.
- author - apart from having the rights of a registered user, he can also create, import, copy, archive or delete educational resources within his course.
- system administrator - the main task is taking care of the efficiency of the entire system.

Platform users can be assigned additional rights, for example, to allow a registered user to supervise the other groups of participants. In addition, you can attach to your course authors of other courses while, at the same time, giving them the right to edit the appearing contents ("Features", nd., "Development", nd.)



## **TOOLS OF THE OpenOLAT PLATFORM USED IN GROUP WORK**

The OpenOLAT platform is software that enables the collaboration of people in different places far from each other, the exchange of opinions or the sharing of tasks. The tools include: discussion forum, wiki portal and file folder.

On the platform there are folders assigned to each user separately. These folders may contain, for example, work sent by people conducting courses or files containing a solution of tasks performed by the participants of the courses and the files returned by the teachers after completing the necessary adjustments.

An important element of the courses is to enable efficient communication between the participants in order to effectively exchange opinions and information. This is served, among others by: contact form, calendar, chat and survey ("Development", nd.).

The above described features of the OpenOLAT platform will be used to assist in the implementation of training future science teachers. For this reason, the platform should meet the requirements of a useful tool in information technology, supporting the execution of practices.

## **THE USE OF THE PLATFORM BY THE TEACHERS - SCHOOL TUTORS**

During the implementation of practices, students are divided into appropriate groups. Each group works with the its assigned teacher – the school tutor. This cooperation takes place mostly through the platform. Students perform tasks that provide them with teachers. Within these tasks, they plan lesson scenarios on the chosen topics, which they will present in person at the school. These teachers supervise the proper conduct of the work, make merits and a methodological analysis of prepared scenarios, provide the necessary consultation and, together with the students, make the final adjustments. All of these activities take place remotely, using the above-described features of the platform OpenOLAT. This means that the school tutors have continuous control over the process of preparing the trainees to conduct the lesson. The teachers have direct contact with the students during class inspections, the conducting of lessons and when analyzing any lesson conducted by the students.

## **PREPARING TEACHERS TO WORK WITH THE PLATFORM**

In contrast to the students for whom work with Web applications is generally known, the majority of teachers involved in the implementation of practices had their first contact with this type of software. Therefore, before the teachers began to work on the platform, it was necessary to carry out proper training. It included the

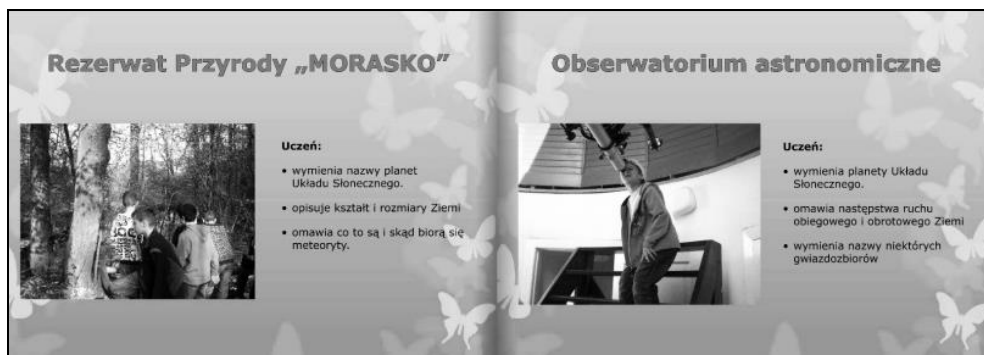
theoretical and practical issues of operating the platform, creating new contents of training and updating it, information and file sharing, and handling mailing lists. Teachers became familiar with the methodology of creating distance learning courses and preparing appropriate materials in the form of ready-made courses on topics of their choice, which then benefited students preparing for their practice. After the training, those teachers without problems used tools available through a platform, which helped them to work remotely with students.

## **OpenOLAT PLATFORM CAPABILITIES IN THE PROVISION OF INSTRUCTIONAL MATERIALS**

Through the platform OpenOLAT used in the implementation of the practices, it is possible to share instructional materials in various formats such as Word, PowerPoint, pdf, mp3, and mp4. It was used for the preparation of materials including issues relating to the implementation of teaching in the natural sciences, developed in the form of courses designed to work independently. These include:

- Preparing teachers for science nature lessons,
- How to use different methods of teaching during science nature classes,
- Activating methods for pupils during science nature classes,
- Problem teaching of science nature,
- Experiment during science nature classes with an emphasis on teaching demonstration,
- Student experiment with an emphasis on students teamwork projects,
- The use of models during science nature classes,
- School science nature classes circles interested in nature in school practice,
- Different methods for conducting field activities in science nature classes,
- Variations for using a whiteboard during science nature classes,
- Scenarios of science nature classes - an outline of a good lesson.

In addition, registered trial lessons taught by students in the school during practice were placed on the platform. Students can, thus, observe the course of lessons conducted by them or lessons conducted by other members of the group to make the necessary comparisons as well as go through platform discussions and polemics concerning their speeches and the presentations of other students, using the above-described functions of the groupware platform.



**Figure 2. Screenshot of course materials about the organization and the importance of fieldwork placed on remote education platform**

*Source: Project materials POKL 03.03.02-00-006/11 \**

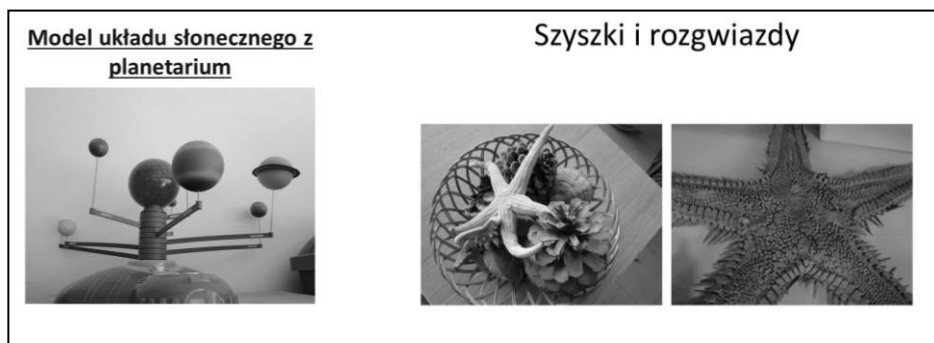


**Figure 3. Screenshot of course materials on extra-curricular activities for students especially interested in science objects placed on remote education platform**

*Source: Project materials POKL 03.03.02-00-006/11 \**

Films are also placed on the platform to show selected teaching situations and the discussing aspects of merits, the methodological and formal preparation of the teacher for the lesson. These materials are useful in the selection of teaching methods, enabling an optimal implementation of a specific lesson topic. In addition to this, there is also a library of instruction films, presenting chosen natural experiments. This makes it easier for students for the appropriate preparation when conducting trial lessons.

Before conducting the lesson, students are obliged to familiarize themselves with the aforementioned materials placed on the platform.



**Figure 4. Screenshot of course materials about how to use the models in the classroom science placed on a platform of remote training.**

*Source: Project materials POKL 03.03.02-00-006/11\**

In the film, the title: "Teacher's demonstration" has showed a suggestion on how to conduct a science nature class, where the previous method of teaching was used. The teacher presents experiments at the demonstration table.

In the film titled "Teacher getting ready for the lesson", we present three stages of teacher's work before the lesson that is merit, methodological and formal preparation.

## SUMMARY

The use of the remote learning platform OpenOLAT in preparing students for teaching natural science subjects in the context of pedagogical practices turned out to be the right choice. Both the user-friendliness of the platform and the ability to put on it various types of educational materials designed to conduct specialized vocational courses helped to improve the course of apprenticeships and support them with modern multilateral strategies to prepare students for the teacher profession. Thanks to the social networking functions of the platform, interpersonal communication between students and school tutors has increased. In our research, we found that in the initial stage of the preparation of students to conduct lessons, during which a large number of consultations is necessary, it is better to interact with a tutor from a distance. This is caused by the fact that students may at a convenient time fully describe which issue or encountered problem is interesting for them, and the guardians, in turn, at a convenient time for them may discuss the matter or help to solve the problem. It makes it easier in further stages of any cooperation while having direct communication between students with teachers, since most of the problems have been previously discussed and resolved. This allows students to look more positively at a tutor, especially when sharing their considerable age difference. It turned out, however, that undergoing courses by teachers - school tutors concerning the functioning and operation of remote learning platform, has led to tangible results. Teachers are able to effectively use the tools

provided on the remote learning platform. They efficiently design courses for the remote learning platform, manage them and communicate with the other users. In this way, teachers have broken their concerns regarding the use of new information technology tools in education. Studies have shown a more systematic work of students as well as teachers. This contributed to a better organization of student's working time while achieving better results in preparing students for teaching natural science subjects.

All of our studies and activities are aimed at the development of new standards for the implementation of pedagogical practices to prepare students to work as teachers of natural sciences and were carried out in the framework of an EU project on improving the quality of learning.

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Figure 1. Piotr Jagodziński, Robert Wolski

Figure 2,3,4. „Nowoczesne strategie wielostronnego przygotowania studentów do zawodu nauczyciela, wspomagane internetowym systemem kształcenia. Przyroda w praktyce szkolnej.” POKL 03.03.02-00-006/11 Project participants: Grażyna Rydlewska, Katarzyna Brzezińska, Jolanta Zakrzewska

*Note: Author declaration that send to publish in the Monograph own original work, that before not printed in other sources in same form.*



# TEACHERS' PROFESSIONAL DEVELOPMENT NETWORKS

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***Abstract:** In the article the possibilities of creation of networks which provide teachers' professional development and instruments for creation of informative educational environment are selected on the basis of scientific works' analysis. Teachers' professional development networks can be provided by special instruments and services. Possibilities of special platforms, instruments and services are generalized for creation of professional networks: e-mails, webinars, sites, blogs, forums, wiki resources, social networks, special platforms.*

**Keywords:** professional development, networks, online communities, informational communicative technologies.

## INTRODUCTION

In January 2012 the Law of Ukraine "About professional development of workers", which determines legal, organizational and financial functioning principles of the system of workers' professional development was accepted, and in November 2011 the National scope of qualifications according to the Act of the Cabinet of Ministers of Ukraine in order to introduce European standards and principles of quality of education, assistance to international acknowledgement of national qualifications, obtained in Ukraine, adjusting effective cooperation sphere of educational services at the labor market. Professional development is carried out in society in the conditions of continuous professional education which covers professional education at school, colleges, universities and post-graduate establishments, and in the conditions of production. At the same time professional development takes place in the process of professional studies and self-education, professional development of a personality.

Specialists determine several directions to modeling professional development and personality formation (O. Anisimov, L. Antsiferova, O. Bolotova, A. Derkach, N. Kuzmina, E. Zeer, S. Maksimenko, A. Markova,



L. Mitina, N. Povyakel, V. Semichenko and others). Among them: adaptive approach, where a tendency of the submission of professional labour to the external circumstances as implementation of algorithms of case studies, rules and norms prevails; professional development approach, which is characterized by the ability to leave the practice of conversion of activities and as a result to overcome restrictions of professional abilities.

Nowadays scientific searches are oriented to the pedagogical approach of studies of professional networks, virtual communities which is represented in works of the following authors: V. Bikova, M. Zhaldaka, N. Zadorozhnaya, S. Litvinova, V. Kukhareno, N. Morse, S. Sisoeva (Ukraine), O. Andreev, E. Patarakin, E. Polat, A. Hutorskiy (Russia), N. Virkus (Great Britain), D. Bouden (USA) and others.

But the use of professional networks and virtual communities for teachers' professional development hasn't been studied enough, so we'll expose possibilities of introduction of professional development approach by means of professional networks' creation on the basis of the ICT usage with the help of generalization of existing instruments for creation of teachers' professional networks and determination of perspectives of professional networks' introduction for teachers' professional development.

S. Litvinova in her research (Litvinova 2012: 40) emphasizes possibilities of the usage of virtual subject communities (associations of teachers which have general interests, aspirations and aims, actively communicate with each other on both professional and on nonprofessional topics). S. Litvinova determines distinctive features of virtual subject communities: absence of both psychological and geographical barriers of communication; interactive character of members, which can effectively exchange useful and interesting information; possibility of self-presentation and self-realization of teachers; an informal structure of online communication; structured bank of methodological materials.

Realization of professional community online is provided by creation of the proper informative infrastructure, organization of collaboration among teachers, materials' exchange, common creation of new knowledge. Communication as a type of activity in a network community can be provided by special instruments and services.

Let us generalize possibilities of creation of professional networks of teachers on the basis of their usage.

### ***E-mails and mailing lists***

An e-mail is the first Internet service which is widespread and effective and provides the possibility of exchanging messages from one persons to another or from one person to others. Sometimes mailing lists are also included here – some e-mail addresses which are common for a lot of people, subscribers of this mailing list, add this service.

### ***Webinars***

Teachers actively participate in webinars (associations are „Partnership in studies”, Intel and the others) and organization of webinars by free facility services (onwebinar.ru, seemedia.pro). The main opportunities of webinars are use of video or audio broadcasting; simultaneous demonstration of presentation or actions on a desktop; switching on an electronic board for simultaneous work of listeners; parallel socializing with audience in a chat; surveys; function of „raising of hand”; operational management of listeners' rights, additional chat-room including private; transmission of files; by translation of movies and the like (for example, <http://webinar.ru>);

Free services often have a limit on the amount of participants, management of listeners' rights. For example, teachers actively use Skype as a service for audio/video conferences with possibilities of previous registration of participants, showing desktop to the participants of seminars. But connecting of several participants of video of conferences requires payment. The usage of Google account also gives a possibility to conduct video conferences for 9 participants which have the earlier mention account. Microsoft for Education offers free of charge Office 365 with the Lync product which gives the possibility to exchange, discuss and give a general access to the desktop.

### ***Sites, blogs, forums***

In order to create free sites, web pages educational establishments and teachers use all free resources more frequently: Edukit or School Champion (<http://schoolchampion.in.ua>), Ukoz ([www.ucoz.ru](http://www.ucoz.ru)) and sites of Google ([www.sites.google.com](http://www.sites.google.com)). Each of these environments is free of charge and it can be computer-integrated with other resources. Possibilities of the portal “Class estimation” ([www.klassnaocinka.com.ua](http://www.klassnaocinka.com.ua)) allow to create distant courses and teach students from any place of Ukraine. Personal blogs of teachers of different subjects, methodical associations ([gennitv.blogspot.com](http://gennitv.blogspot.com), [karchevska.blogspot.com](http://karchevska.blogspot.com), [krasnyiluch-moinf.edukit.lg.ua](http://krasnyiluch-moinf.edukit.lg.ua)) and use of forums (<http://forum.rgo.msk.ru/>) allow to organize an exchange of experience and professional communication among teachers from different countries. There are plenty of educational sites and blogs, which contribute to creation of various resources by teachers. In accordance with the level of professional development a teacher can read or discuss colleagues' articles or upload their own developments on methodical portals and educational internet editions ([metodportal.net](http://metodportal.net), [www.teacherjournal.com.ua](http://www.teacherjournal.com.ua), <http://goo.gl/pLtFw>).

### ***Wiki***

Teachers create electronic documents individually or collectively, information in which is given in the form of electronic data and for the use of which hardware is needed. Word and tabular processors (e.g. cloudy services of Google and Microsoft) can become such instruments for this purpose, (WikiWiki) is a social service which allows any user to edit text of a site (write, make alteration, delete, create reference

to the new articles). For example, except for the most widely spread resource of Wikipediya the service WikiWiki is used in Ukraine to place educational, research projects of students ([wiki.iteach.com.ua](http://wiki.iteach.com.ua)) or resources for professional development and professional co-operation of teachers ([eduwiki.urau.net.ua](http://eduwiki.urau.net.ua), Zapowiki, Lugawiki, Mikolawiki). A vivid example is creation of regional resource for the collaboration of teachers in Lugansk region (Lugawiki) and social professional network of teachers in Lisichansk ([wikilic.org.ua](http://wikilic.org.ua)) which are based on the ideas of social constructivism which assists to development of creation and collaboration and realized by 2.0 web technology.

### ***Social networks***

Teachers co-operate in social networks, use Twitter, Linked-In, Facebook, V Kontakte in order to discuss professional questions and examination of creation of educational resources.

### ***On the basis of the special platforms***

There are program platforms for the construction of own professional networks which allow the author-creator of a network to determine a design independently, set the levels of access for different groups of users. Any created network is characterized by the set of services of network communication, joint activity which provide delivery of news, search of partners, placing and discussion of materials and others.

Professional network of Microsoft „Partnership in studies” gives certain knowledge and skills in the use of ICT for teachers’ professional growth. A teacher has a right to change, to copy, to diffuse, to pass, to reproduce, to publish, to create, to pass any information, software, products or services, adhering to the copyrights. But the Microsoft company reserves the right to the network updating, including creation of any additional possibilities and new functions; to look through materials, placed on intercommunication services and to delete any materials at its own discretion and to close access to any or all services of connection at any time without notifications.

For example, one of priority directions in the network „Partnership in studies” set six subject communities of an innately mathematical cycle:

- mathematics ([ua.partnersinlearningnetwork.com/communities/mathematics](http://ua.partnersinlearningnetwork.com/communities/mathematics))
- physics ([ua.partnersinlearningnetwork.com/communities/geography](http://ua.partnersinlearningnetwork.com/communities/geography))
- chemistry ([ua.partnersinlearningnetwork.com/communities/chemistry](http://ua.partnersinlearningnetwork.com/communities/chemistry))
- biology ([ua.partnersinlearningnetwork.com/communities/biology\\_b](http://ua.partnersinlearningnetwork.com/communities/biology_b))
- geography ([ua.partnersinlearningnetwork.com/communities/geography](http://ua.partnersinlearningnetwork.com/communities/geography)).

The easiest way to organize a professional network is with the help of Googleplus, creating your own professional circles or joining in existing. In order to create a professional network it is necessary to have the proper level of ICT competence

(level of deepening of knowledge or creation of knowledge) and be able to use existing resources. For example, teachers of mathematics and chemistry can use intellectual searching system Nigma which is based on clustering of accepted documents (<http://www.nigma.ru/index.php?t=math>, <http://info.nigma.ru/index.php/nigma-himiya.html>) for a search and solving tasks, and <http://learningapps.org/> to create interactive lessons on the Internet.

The presence of teachers' professional networks of different subjects and possibility of creation of new knowledge needs subsequent research in associations and professional networks of the world in order to create unique informational educational environments for studies and professional development.

## Acknowledgments

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# V. METHODS, FORMS AND TECHNIQUES IN DISTANCE LEARNING

## E-LEARNING IN HIGHER EDUCATION IN PRACTICE

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**Abstract:** *The article is a summary of the results the Moodle's use as the educational process support at the Department of Chemistry of the University of Adam Mickiewicz during the Project "UAM: Unique Graduate=Opportunities. Growth of the Adam Mickiewicz University's didactic potential through innovation-oriented education in English, interdisciplinarity, e-learning and investment in human resources" (co-financed by the European Union under the European Social Fund).*

**Keywords:** e-learning, b-learning, Moodle, chemistry

## INTRODUCTION

Recently, a significant increase in research in the field of distance education can be observed. Such phenomenon is the consequence of the development of society and economy based on knowledge as well as the transformations resulting from the widespread presence of modern technology in professional and private life which is reflected in the formal education sector, particularly at the level of academic training. The design and implementation of remote courses is led by professionals from different disciplines, who in the form of e-learning and blended learning conduct their classes. Digital reality puts new challenges in the areas of information literacy. Students expect the teachers to support classes and lectures using ICT (Information and Communication Technology) methods and tools. On the other hand, universities face the new challenge which is a forthcoming demographic decline. It is estimated that in 2020 the number of people aged 18-24 years (in a typical college age) will decrease to 2.7 million (a decrease of 35 percent) (Goc 2011) (Ciżkowicz, Opala, Rybiński, 2009).

E-learning method is associated with cultural development, it is the change in the way of thinking about learning and a big challenge for the university - in terms of financial, organizational and human issues (Adamczewski 2008). Perhaps supporting teaching with remote learning platforms will increase the attractiveness of courses, and provide a more flexible form of classes. Therefore, both the assessment of courses and students' participating in blended learning activities self-assessment, should be analyzed. Gathering these data requires effort and commitment of the students taking part in the courses.

Assumptions of the project (the UAM project : a unique Graduate=options. Improving the teaching potential of the Adam Mickiewicz University through innovative education in English, interdisciplinary approach, e-learning, and investment in human resources" were published in the monograph *E-learning and Intercultural Competences Development in Different Countries* (Bartoszewicz 2014)

Acting as remainder: **BRIEFLY ABOUT THE PROJECT**

"UAM: Unique Graduate = Opportunities" is the largest project funded by the European Social Fund, implemented at the Adam Mickiewicz University. In this project, new specializations and doctoral studies are launched, an e-learning platform is being built and teaching staff of AMU is being educated. Its aim is to make it easier for AMU graduate to find work and become valued employees. Project *"UAM: Unique Graduate=Opportunities. Growth of the Adam Mickiewicz University's didactic potential through innovation-oriented education in English, interdisciplinarity, e-learning and investment in human resources"* started on July 1<sup>st</sup>, 2010 and is going to end on December 31<sup>st</sup>, 2015. It was funded under Priority IV Higher Education and Research, Measure 4.1. *"Strengthening and developing of the didactic potential of university and increasing the number of graduates in fields of key importance for knowledge-based economy"*, the Sub-measure 4.1.1 Strengthening the capacity of university teaching (Contract No.: UDA-POKL.04.01.01-00-019/10-00).

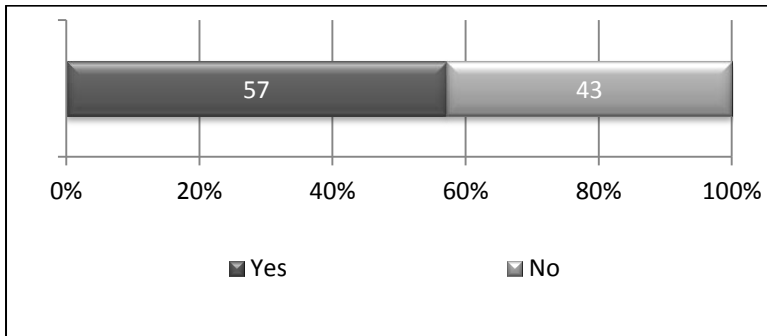
As part of the project *"UAM: Unique Opportunities Graduate = Opportunities"* server was purchased and Moodle platform was installed. Each of the 13 departments are represented by the coordinator (Department coordinators, 2014) and e-learning platform consists of separate instances of Moodle.

## STUDY GROUP

The study regarded lectures and classes conducted in the form e-learning on the university's platform. Using the survey we sought to confront the students' expectations regarding courses with the reality and explore their views on the benefits and difficulties related to e-activities. The study covered students using the platform in the academic year 2013/2014, and the survey was carried out after completion of the course.

**SELECTED QUESTIONS**

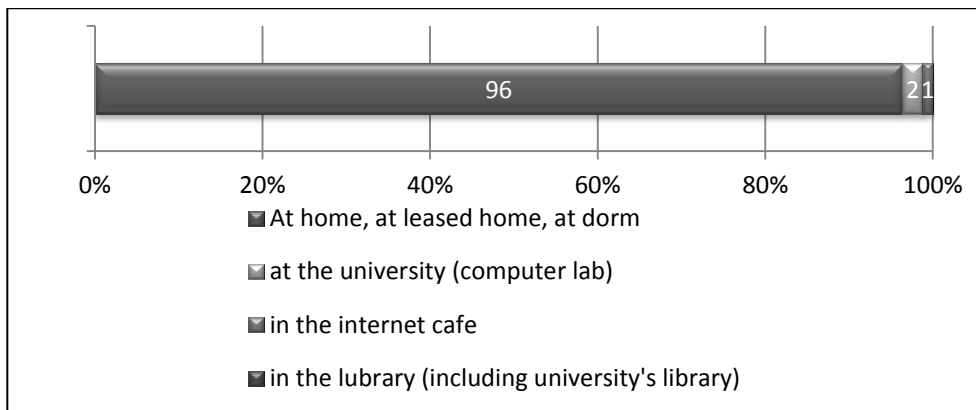
**Question. Have you ever participated in any e-learning course?**



**Figure 1. Student's answer**

*Source: Author's archive*

**Question. Where do you most often used the platform?**

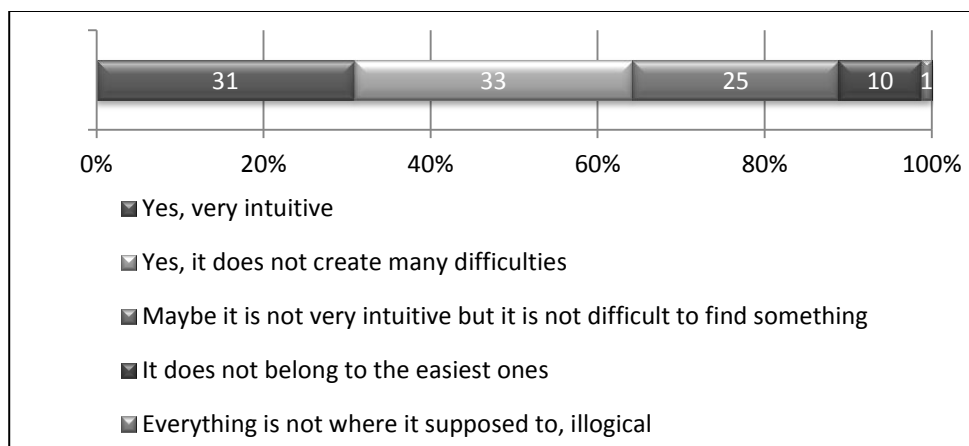


**Figure 2. Student's answer**

*Source: Author's archive*



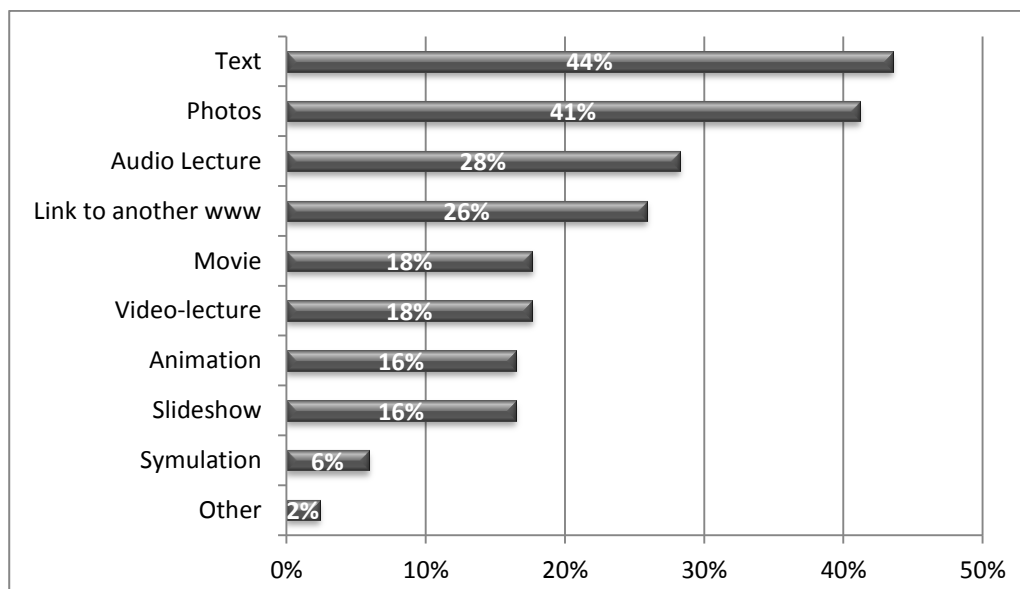
**Question. Do you think that the e-learning platform is easy to navigate?**



**Figure 3. Student's answer**

*Source: Author's archive*

**Question. What forms of communication used during the course you found the most suitable? Please select up to three responses.**

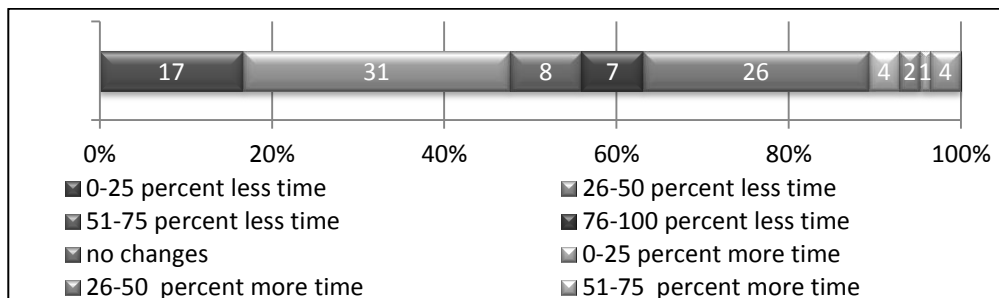


**Figure 4. Student's answer**

*Source: Author's archive*

**Is the participation in e-learning course more time absorbing than the traditional learning?**

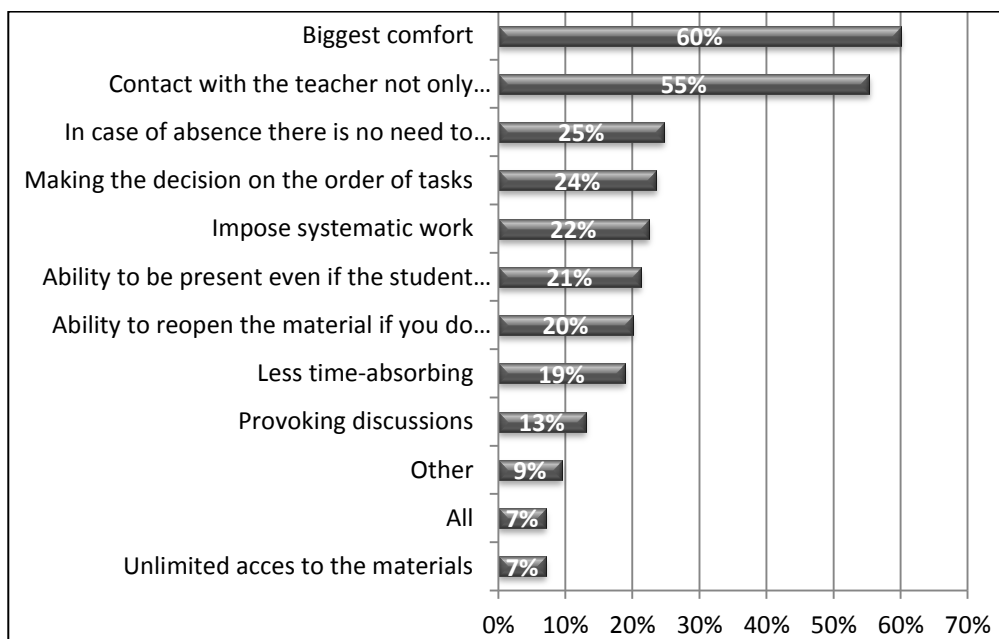
**Please specify a percentage, without taking into account the time spent on the commute.**



**Figure 5. Student's answer**

*Source: Author's archive*

**What are in your opinion the biggest advantages of e-learning courses?  
You can select multiple answers.**



**Figure 6. Student's answer**

*Source: Author's archive*

## CONCLUSION

For many people, the Internet is an integral part of life, used in its various spheres. Apart from the commonly perceived benefits of e-education for students, academics and the higher education institutions, there are also some new challenges, which must be faced by each of those parties. For students e-learning primarily means greater independence and responsibility for the organization of their working time, regularity, punctuality or attentive communication with the teacher. In return, students receive the greater flexibility of the learning process - which is vital at a time when studying different majors at the same time or combining study and work has become common.

*The majority of academic environment accepts forms of distance learning, treating them as a natural consequence of the development of information and communication technologies, and desirable model for education is to educate mixed (blended learning) (Lubina 2005).*

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# ADAPTIVITY OF TESTING IN EDUCATION PROCESS

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***Abstract:** Testing has always been and will be a part of the educational system. Pupils are tested when they start attending a new school, when they graduate and during the course of their studies. The testing results have an impact not only on the pupils, but also on the institution – school: How successful was the school's result compared to other schools? What was the school's position in the evaluation chart? Can the school defend the results when facing the competition of other schools? The paper is aimed at introducing the possibilities of alternative testing – adaptive electronic testing.*

**Keywords:** testing, adaptive electronic testing, repetition with consultation mode, test questions and tasks.

## INTRODUCTION

As far as the Czech pupils are concerned, there are still differences between their knowledge and skills. The pupils, who tend to achieve good results, have a similar level of knowledge and skills. The problematic students, the ones slower in understanding the curriculum, often require a more personal approach, additional materials, demonstrations or a step-by-step explanation of the solving process. Is it in the teacher's powers to do it? In the present state, when it is not unusual that there are as many as thirty pupils in the classroom, it is impossible for the teacher to treat each pupil individually and take their individual needs into account.

The use of an adaptive system (a suitable LMS) containing study materials and a large number of test tasks and questions referring to the current curriculum seems to be an appropriate choice. The test tasks and questions are divided into individual categories according to the level of difficulty. Each task contains the so-called Link (I am not sure about the answer and want to look at the Link which refers to the curriculum related to the test task). Moreover, each task also contains the so-called

Help (I do not know the answer and want to look at the Help, which offers the entire solving process and the correct answer).

What is the principle of adaptive testing? It is a selection of test questions and tasks adapted to the tested pupil's current level of knowledge. While the typical test cannot be adapted to the pupil's individual needs, the adaptive LMS can. Each pupil who participates in adaptive testing begins with a task from the intermediate level of difficulty. If the pupil answers correctly, the following task is from the more difficult category. If the pupil answers incorrectly, the following task is from the less difficult category (in this case the pupil can use the Link and Help).

## 1. BARBORKA LMS AND ITS CONTENT

Which system was used for storing test questions and tasks? The adaptive LMS Barborka 4, which was developed by a group of informatics within the scope of the cooperation of the Faculty of Electrical Engineering and Computer Science of the VŠB-TU and the Department of Information and Communication Technologies at the Pedagogical Faculty of the University of Ostrava (for more detailed information see Takács, 2014).

In order for the LMS to work properly in adaptive testing, it has to contain test questions and tasks that fulfill particular criteria:

- 1) The created tasks should be in accordance with the current Framework Educational Program (FEP) and should be aimed at the development of key competencies,
- 2) As far as the educational content is concerned, the created tasks should fall within thematic areas of Mathematics and its application;
- 3) The created tasks should be automatically evaluable (for the purpose of electronic testing) and divided into groups according to the level of difficulty.

### 1.1 FEP and key competencies

As far as the Czech Republic is concerned, a new system of curricular documents is used for the education of pupils between 3-19 years of age. The system has two levels – state and school. The state level includes **framework educational programs (FEP)** which determine the individual stages of education: preschool, primary and secondary education. The school level includes **school educational programs (SEP)**, which are created by each school individually according to the rules and principles stated in the particular FEP.

Framework educational programs formulate the expected level of education which is determined for the pupils of individual stages of education. Moreover, they specify the level of key competencies, which the pupils should acquire by the end of primary education, and define the educational content.

The main goal of primary education is the formation and continuous development of **key competencies**.

The term key competencies includes knowledge, skills, abilities, approaches and values which are essential for the personal development of an individual and their role in society.

According to the latest FEP (2013), the key competencies of primary education are the following (italicized are the competencies which were emphasized during the creation of test tasks and questions):

➤ Learning competencies

The pupil can *collect, sort and connect information* in a relevant manner; work with various learning strategies and methods; experiment and observe; uses commonly known terms and symbols.

➤ Problem solving competencies

The pupil encounters various problems; *can think critically and find constructive solutions*; uses various points of view to deal with problems; tries to verify the results in practice and use them when solving similar problems.

➤ Communication competencies

The pupil can formulate their ideas and opinions in a logical order; uses information and communication technologies to communicate with the world; *understands image material, various types of texts and records*.

➤ Social and personal competencies

The pupil can work in a group, becomes a team member; cooperates with their fellow pupils; is able to discuss both in a small group and in the classroom.

➤ Civic competencies

The pupil respects other people's opinions; understands basic social norms; can empathize with other people's feelings; understands basic environmental and ecological problems.

➤ Work competencies

The pupils can use the *knowledge and experience acquired in individual courses* in their further development; makes a decision concerning their further professional growth.

## 1.2 Educational area Mathematics and its application

As far as FEP is concerned, the educational content of primary education is divided into nine educational areas. One of the areas is **Mathematics and its application**. In this course the educational content is divided into four thematic areas: *Number and variable; Dependency, relations and working with data; Geometry in plain and space; Non-standard application tasks and problems*.



Primarily, the Barborka LMS contained tasks which should test the knowledge and skills of the 9<sup>th</sup> grade elementary school pupils. Therefore, the abovementioned thematic areas were further divided into six categories: *Number and variable; Terms and equations; Data, graphs and charts; Functions, Geometry in plain, Geometry in space*. 25 theoretical questions and tasks were created for each area. Theoretical questions test definitions while practical tasks require solving. Moreover, for each task two other equivalent tasks were created – different in formulation, numerical values or the provided versions of answers (450 test tasks altogether). The following are assigned to each task: the already mentioned Link – which refers to the curriculum related to the test task and Help – which offers the entire solving process and the correct answer.

### 1.3 Formal and content classification

On the basis of formal classification the tasks were divided into automatically evaluable and automatically non-evaluable (the automatically evaluable tasks are suitable for the purposes of electronic testing). On the basis of Dana Tollingerová's taxonomy of educational tasks (1970) and a detailed analysis the content classification with five categories was created, which represent the five levels of difficulty (in order to achieve adaptivity – adaptation to the tested pupil's individual needs).

## 2. TESTING TASKS

After accepting all the criteria the testing tasks were created. Here are examples of tasks from each thematic area.

Number and variable

**Decide if the following are true:**

$12 * (0,6 - 0,4) = 1,2 * (6 - 4)$	YES	NO
$244,2 : (-11) \neq 2,22 * (-100)$	YES	NO
$0,53 * (-0,5) = 1,2 * 0,24$	YES	NO
$9 + 12 \neq 25 - 4$	YES	NO

Terms and equations

**Write correct answer**

If we increase three times the number  $x$  by one half, we get four times the number  $x$  minus 2. What is number  $x$ ?

The solution is: \_\_\_\_\_

## Data, graphs and charts

**Decide if the following are true.**

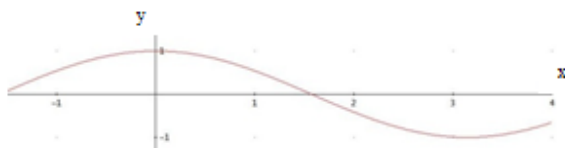
The teacher summarized test grades. The results are in the chart.

Grade	N. of students	Number
1	IIII	4
2	IIII I	5
3	IIII	4
4	III	3
5	II	2

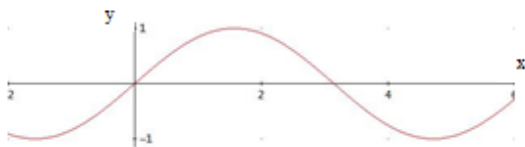
- |  |     |    |
|--|-----|----|
| a) There are 18 pupils in the classroom. | YES | NO |
| b) The average test grade is 2.4.        | YES | NO |
| c) Half of students have an A or B.      | YES | NO |
| d) 1/9 of pupils have an F.              | YES | NO |

## Functions

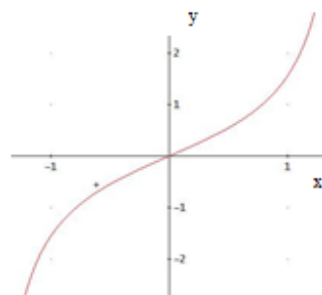
**Assign correct functions to the graphs:**



$\sin x / \cos x / \tan x / \cot x$



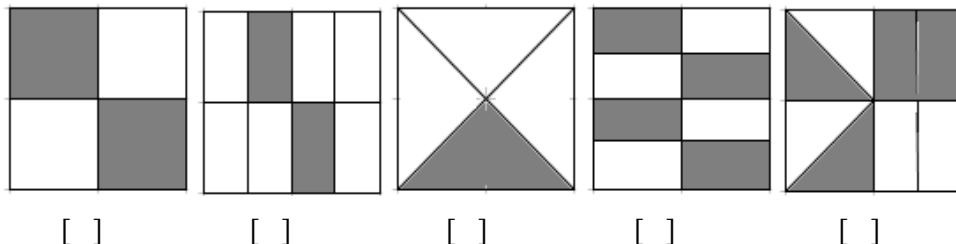
$\sin x / \cos x / \tan x / \cot x$



$\sin x / \cos x / \tan x / \cot x$

## Geometry in plane

*Using a fraction in the basic form, write under each picture what portion of it is colored (example 1/5).*



## Geometry in space

*Make correct pairs (using arrow-heads):*

- |   |                            |
|---|----------------------------|
| a) Surface of a sphere with a radius 10 cm is | 1. 1256 cm <sup>2</sup>    |
| b) Surface of a sphere with a radius 25 cm is | 2. 2122,64 cm <sup>2</sup> |
| c) Surface of a sphere with a radius 15 cm is | 3. 2826 cm <sup>2</sup>    |
| d) Surface of a sphere with a radius 13 cm is | 4. 7850 cm <sup>2</sup>    |

### 3. ADAPTIVE ELECTRONIC TESTING

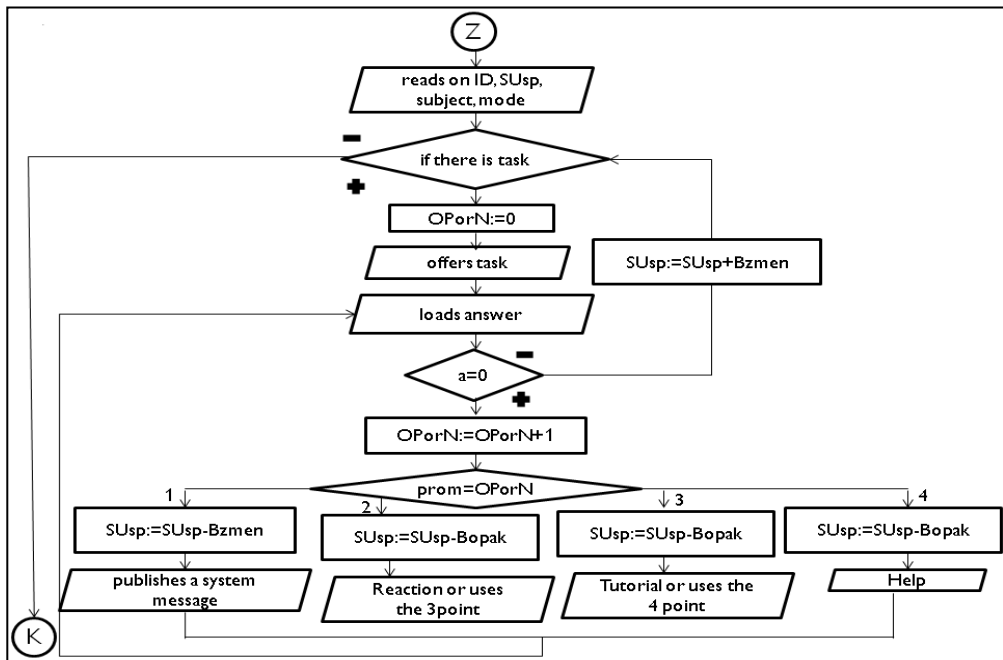
The theory of the adaptive testing method (TATM) is derived from the Theory of adaptive learning (TAL) (Kostolányová, 2013), which contains the proposed process of the Virtual Teacher. According to the TAL, the education process is realized by the already mentioned adaptive Barborka LMS.

Where can adaptive electronic testing be applied? Firstly, we can mention what phases the pupil learning a new curriculum is going through:

- 1) First reading, 2) Instruction, 3) Repetition with consultation concerning the problematic parts, 4) Self-testing

The TAL deals with the first two phases while the TATM deals with last two phases – the Repetition with consultation and Self-testing phases. It is based on the **testing of the level of knowledge** before the pupil takes the exam. It can be expected that in this learning phase the pupil does not yet have the required knowledge. Adaptive electronic testing is based on the division of tasks into **a number of difficulty levels** from the less demanding to the most demanding (as was already suggested by Komenský). By the continuous solving the pupil verifies their knowledge and skills, tests the current knowledge and learns about their gaps, in the context of the failed task the pupil can learn from their mistakes or be re-taught the particular part of the curriculum (they are provided with the Link – which refers to the study material).

What does the way through the adaptive test look like? The following flowchart of the Repetition with consultation mode provides a simplified picture of the way through the adaptive test:



**Figure 1. Repetition with consultation mode flowchart**

*Source: My own paper (Prextová, 2014)*

For clarification, the following is the verbal description of the algorithm (Prextová, 2014):

1. Loads the current pupil's id.
2. Loads the current Susp value (for a new pupil the Susp value is set to the mean value  $Susp = 50$ , for a known pupil the Susp value is set according to the success rate of their previous sessions).
3. On the basis of the pupil's choice of subject, unit or the repetition mode, the algorithm manages the education according to the following procedure of the repetition with consultation:

If there are tasks in the sequence of tasks of the chosen subject (unit), then:

- From the current Susp value the algorithm calculates the pupil's current Obod value,
- CT uses the Choose the Task procedure and offers the pupil one task of an Obod difficulty corresponding to their current Susp,

- Loads the pupil's answer and evaluates it,
  - If the answer is correct, it increases the Susp value by the Bzmen value, otherwise
    - i. If the answer is not correct the first time, it publishes a system report about the incorrectness of the answer and offers the pupil a second attempt; it lowers the Susp value by Bzmen;
    - ii. If the answer is not correct the second time,
      - Lowers sUsp by Bopak,
      - If there is a Reaction (the expected or general incorrect answers) to the answer, it offers the pupil the Reaction, or uses iii,
    - iii. If the answer is incorrect the third time,
      - Lowers sUsp by Bopak,
      - If there is a reference to the particular link to consultation as a context instruction in one of the previous layers, it offers the pupil the layer, or uses iv,
    - iv. If the answer is incorrect the fourth time,
      - Lowers sUsp by Bopak
      - If there is Help, it offers the pupil a similar solving process with a correct result and invites them to copy the result; or simply offers the correct result.
  - Records the pupil's result to the education protocol and to the pupil's task matrix.
  - The end of the cycle for the series of subject (unit) tasks.
4. Notifies the pupil about the overall Susp result (transformed to a grade, if need be).

#### 4. VERIFICATION IN PRACTICE

The algorithm for the Repetition with consultation mode was put into practice and tested on the sample of 53 pupils. At the beginning of the experiment, each pupil was assigned a unique identification code, which they had for the entire time of the experiment (all of its phases). In the first phase the pre-test was realized. In order to verify the efficiency of the six thematic areas, six versions of pre-test were created, each of which consisted of nine tasks. The first five tasks were of intermediate difficulty while the remaining four tasks were of gradually increasing difficulty.

In the second phase the Barborka 4 LMS was put into service. The subject Mathematics – which consists of six thematic areas (units) – was inserted into the system. Each unit has five frames (see Šarmanová, 2011) and each frame has five test tasks of different difficulties. The Link (through which the pupil gains access to the current study material) and Help (which offers the entire solving process and the correct answer) are assigned to each task. All pupils who took the pre-test were logged into the system. Moreover, the pupils were instructed in detail about how to work with the system. The thematic area (unit) on which the pupil focuses in the system is based on which of the six samples of the test they take. During the course of one week the pupils had the opportunity to work with the system, test themselves and improve in the solving of the task which they found to be the most problematic.

In the third phase the post-test was realized. Again, six versions of post-test were created, each of which consisted of nine tasks equivalent to those of the pre-test.

What were the results? The processing of the results into a chart and a graph showed that each of the tested pupils displayed a statistically significant improvement of their level of knowledge in each of the six thematic areas. Moreover, as far as the entire Mathematics course is concerned, the results proved that the pupils improved their knowledge.

## CONCLUSION

It can be stated that the proposed algorithm for adaptive testing (particularly for the Repetition with consultation mode) is a valuable contribution to the field of education. Each pupil is assigned a task the difficulty of which is based on the pupil's answer to the previous task. It maintains individuality by respecting each pupil's level of knowledge. As a result, by providing the pupil with immediate feedback in the form of study material or Help, it eliminates the stress of not being able to answer a question correctly. With every successive repetition the pupil's knowledge is improving, which leads to the improvement of the overall level of knowledge.

As far as the teacher is concerned, it is important to distinguish which thematic area the pupils find the most problematic, which types of tasks they find to be the most problematic, in which manner the tasks and possible answers should be formulated, whether or not the presented solving process is sufficient or if the task needs to be explained differently, etc.

## ACKNOWLEDGEMENT

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*Note: The author declares that the paper which is being sent to be published in the Monograph is her own original work which has not been published before in the same form in other sources.*

# FOSTERING AUTONOMOUS LEARNING WITH THE AID OF ONLINE TECHNOLOGY

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**Abstract:** *This article discusses some of the ways in which learner autonomy can be promoted with the help of online technology, as represented by WebClass (webclass.co). Although the system is rather teacher-oriented, in that its greatest merit lies in facilitating the creation, organization and assignment of materials and assessments, it also allows students to exercise their autonomy by making the best use of the available resources. Among other things, the system allows students to define their learning goals, communicate with the teacher and other learners, access (and edit) learning materials, take tests/quizzes, and monitor their progress.*

**Keywords:** learner autonomy, online technology, LMS, WebClass.

## INTRODUCTION

Perhaps the principal reason why learner autonomy truly deserves the amount of attention being given to it in language learning research is the fact that “autonomy is a fundamental psychological need – an innate yearning that creates disequilibrium if unsatisfied” (May 2010: 100). An observation to a similar effect has been made by Little (2011), who points out that autonomy is essential for “an integrated sense of self” (p. 25). Generally speaking, to be an autonomous person is to “act freely, with a sense of volition and choice” (Deci, in Little 2011: 25).

Emphasis should be placed at the very outset on the interrelatedness of learner autonomy and teacher autonomy: “it is unreasonable to expect teachers to foster the growth of autonomy in their learners if they themselves do not know what it is to be an autonomous learner” (Little, in Lamb 2008: 278). It is also essential that teachers should be free to exercise their autonomy. In other words, learner autonomy can be promoted only by those teachers who know how to develop autonomously as professionals and are actually free to do so.

In distance (and blended) learning environments, teachers need to consider ways in which their students can learn autonomously using the widely available technologies



(Lamb 2008). This article focuses on one specific implementation of web-based technology and shows how using it can contribute to learner autonomy.

## 1. LEARNER AUTONOMY

Volition, motivation, and responsibility are among the defining attributes of learner autonomy, which is traditionally referred to as “the ability to take charge of one’s own learning” (Holec 1981: 3). More specifically, being an autonomous learner involves being (wilfully) responsible for setting one’s learning goals, for selecting the best methods of achieving them, and for evaluating one’s success or failure. In Little’s terms, autonomy is “a matter of the learner’s psychological relation to the process and content of learning. We recognize it in a wide variety of behaviours as a capacity for detachment, critical reflection, decision-making and independent action” (Little 1994: 81).

For Reinders (2010), reflection and motivation, along with interaction, constitute the “the cognitive, affective and social backbone” (p. 50) of autonomous learning, which develops in the following stages (p. 46):

- identifying needs;
- setting goals;
- planning learning;
- selecting resources;
- selecting learning strategies;
- practice;
- monitoring progress;
- assessment and revision.

As noted by Reinders, none of the above stages is absent from teacher-directed environments, the difference being that autonomous learners are actively involved in every aspect of the learning process. Despite being remarkably learner-centred, learner autonomy as an approach to teaching does not mean letting the teacher sink into oblivion. On the contrary, autonomy is not tantamount to (total) independence: “It is sometimes thought that learner autonomy necessarily entails total independence – of the teacher, of other learners and of formally approved curricula. But this is not so: total independence is not autonomy but autism” (Little 1995: 178). Teachers still have important roles to play, “both as pedagogues and as discipline experts” (Little 2007: 20).

The sections below are devoted to using technology in blended learning environments with a view to facilitating the development of the above-mentioned stages of autonomous learning. The focus will be particularly on the following

aspects of learning: setting goals, selecting (and editing) resources, practising and revising, as well as assessment, including self-evaluation.

## 2. ONLINE TECHNOLOGY

Internet technologies are rapidly changing the way we learn. In comparison to traditional approaches, they offer more choice and flexibility: we can easily access an almost endless variety of resources, which we can study anywhere, at any time, at our own pace. The range of available technologies is constantly growing and they can be applied to virtually every area of second-language learning: grammar, vocabulary, reading, writing, pronunciation, listening, speaking, and culture (Levy 2009; Warschauer and Liaw 2011).

Rather than reviewing online applications and platforms currently available to learners and teachers (see, e.g., Elliott 2009), in the remainder of this article I describe one particular implementation of web-based technology as used with students of English philology at the John Paul II Catholic University of Lublin and the State School of Higher Professional Education in Zamość, Poland.

### 2.1 WebClass

WebClass (Malec 2012) is a homegrown learning management system (LMS)<sup>1</sup> with an architecture based on a MySQL database backend and server-side PHP scripts generating HTML code. The system implements such Web technologies as CSS, Javascript, Ajax, and Flash-based video and audio streaming. Among other things, WebClass can be used to manage learners, create and publish learning content, and administer assessments.

WebClass learners can perform a number of typical online activities, such as the following (all taken from Hockly and Clandfield 2010: 19): finding instructions for tasks, posting answers to tasks, reading feedback on individual and group work/assignments, discussing issues with learners and teacher, picking up messages from teacher, leaving messages for teacher or other learners, finding useful links, listening to audio and watching video, attending text chats with teacher and learners, doing quizzes and polls. In addition to these, they can define their own specific learning aims, edit assigned documents and share them with other learners, upload

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<sup>1</sup> While a „pure“ LMS takes care of learner registration and keeps track of the courses completed by each student (William Horton, in Rosenberg 2006: 101), an LCMS (learning content management system) “includes tools for authoring, versioning, and archiving content, features that are less commonly found in a traditional LMS” (Gay *et al.* 2008: 184). A CMS (course management system), on the other hand, is basically a system for developing and delivering individual courses and academic programs. Over time, however, the distinction between these three systems has been blurred and they often share similar features. For example, the Blackboard system is referred to in the literature as an example of LMS, LCMS, or CMS. WebClass is an online platform which integrates selected elements of the systems mentioned above.

files and insert them into edited documents, and self-assess their attainment of each learning objective. They can also view the final results of teacher-administered assessments (with arithmetic and weighted means) and self-assessment, view the (current) final grade at any time throughout the course (monitor their progress) and view the number of unexcused absences. Some of these activities are discussed in greater detail below.

### 3. FOSTERING AUTONOMY ON WEBCLASS

#### 3.1 Learning objectives

At the beginning of each course on WebClass the teacher defines the learning objectives, to which students can add their own specific learning aims, as shown in Figure 1 (for a Phonetics course):

**I. Teacher-defined objectives:**

1. Correctly stress multi-syllable words in English.
2. Shift the stress as a result of affixation, e.g. politics vs. political.
3. Alter the stress depending on the syntactic category of the word, e.g. transport (N) vs. transport (V).
4. Correctly stress compound nouns and compound adjectives.
5. Correctly pronounce longer compounds and phrases.
6. Distinguish between one-stress and two-stress phrasal verbs.
7. Read a passage with a regular rhythm.
8. Apply different intonation patterns to statements and questions.
9. Transcribe a passage using IPA symbols.

**II. My own learning aims:**

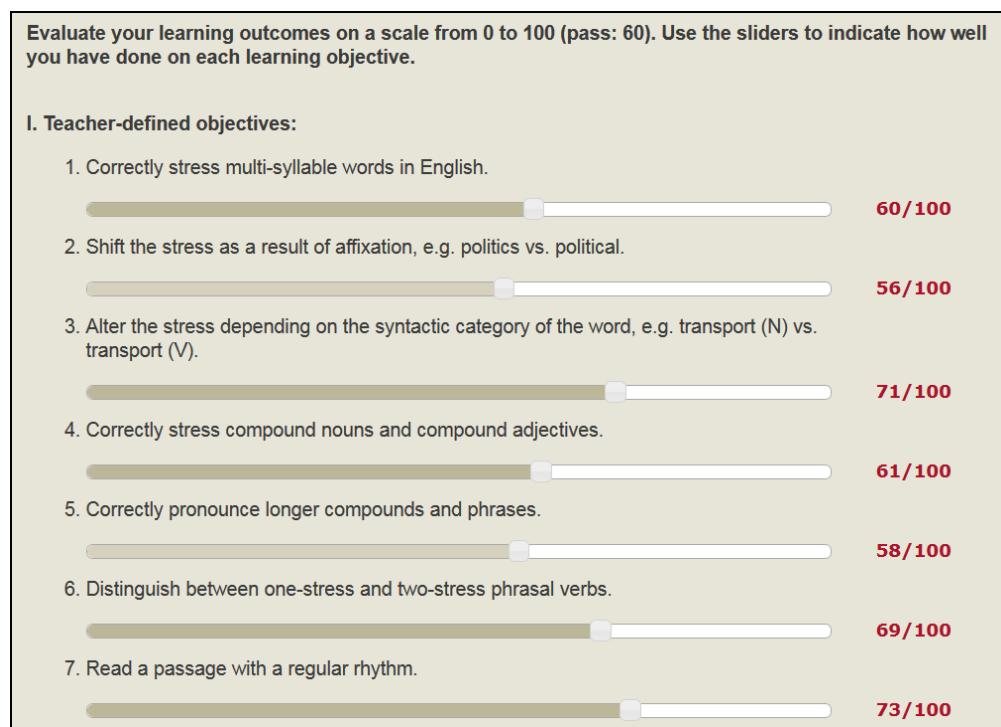
*I wish to be able to... (one line – one objective)*

Pronounce English vowels correctly.  
Learn to pronounce the diphthong /ea/.  
Improve my phonetic transcription.  
Read transcribed texts fluently.

**Figure 1. Learning objectives on WebClass**

*Source: <http://webclass.co/aims.php>*

At the end of the course (or of a shorter unit of instruction), the learners can be asked to self-evaluate their achievement of each objective. They do so on a predefined scale (by moving sliders, as illustrated in Figure 2). Self-assessment is an essential component of learner autonomy. It helps students determine where they stand in relation to the learning goals and reflect on their learning strategies (see, e.g., Gardner 2000). The results of student self-assessment also provide the instructor with useful feedback on the effectiveness of their teaching practices.



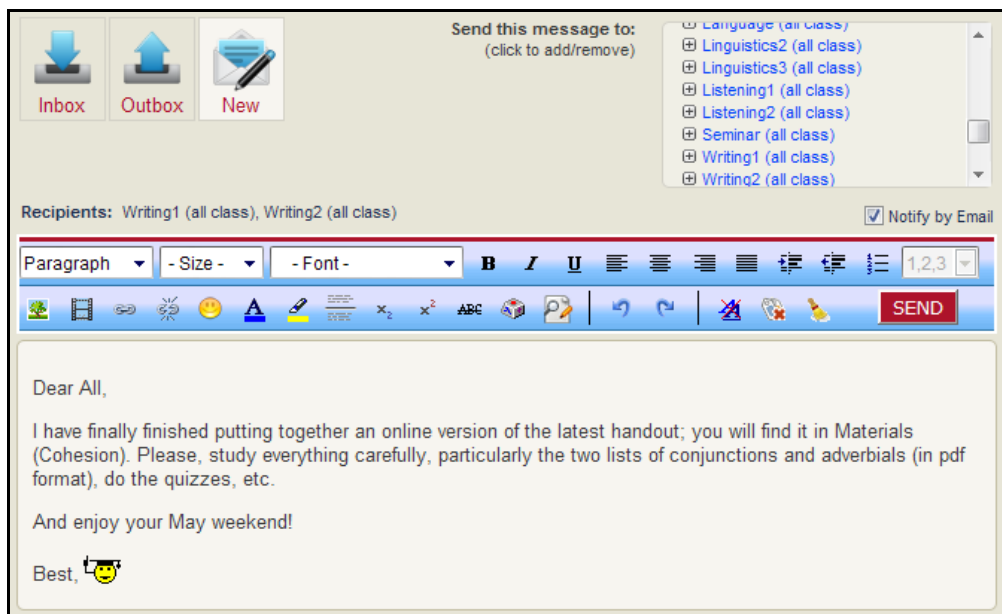
**Figure 2. Self-assessment on WebClass**

*Source: <http://webclass.co/self-assess.php>*

### 3.2 Communication

One-way communication (from teacher to student) includes (automatic) email notifications of new assignments, and teacher feedback on student performance. However, it is rather two-way communication that is vital for autonomous learning (cf. Benson, in Nicolaides 2008: 144). This type of interaction is possible on WebClass thanks to a messaging system, which works in a way that resembles most email clients, with an inbox, outbox, and new message editor (Figure 3). Though not designed to work as a chat room, the system checks for new messages every 5 seconds, which allows for holding conversations in real time.

The functionality of the messaging system can be extended in various ways. For example, students can be asked to send written compositions to one another for peer correction and assessment. They can also create their own quizzes and send the questions to the teacher, who can quickly convert them to test items, using the text-to-items converter (e.g. Malec 2014).



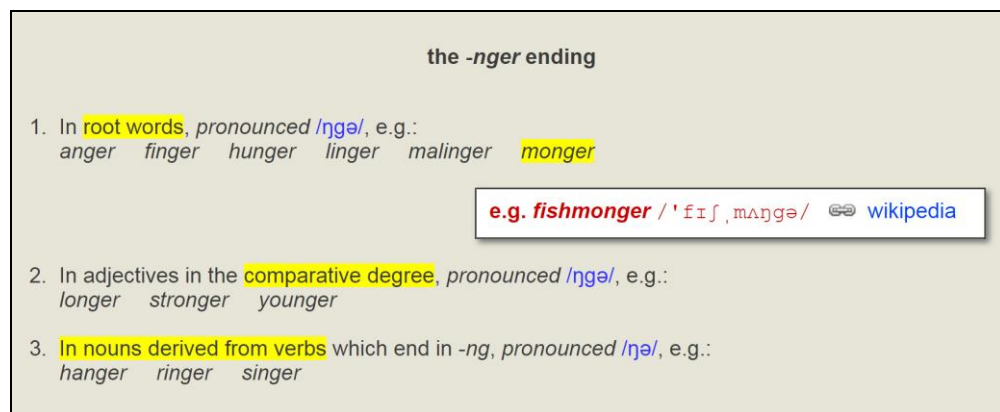
**Figure 3. Message editor on WebClass**

*Source: <http://webclass.co/messages/new.php>*

### 3.3 Materials

As noted by Reinders (2010), “the provision of a self-access centre or on-line self-access materials” is “[o]ften considered the most common way of implementing autonomy” (p. 44). This is because learners themselves decide which materials to study and how much time to devote to them (Reinders and Lewis 2008).

On WebClass, teachers can create and share materials, and then make them available to either all or selected students in a class. Materials are created using a Javascript HTML editor. Besides basic text formatting, the editor allows for the insertion of hyperlinks, images, sound files, and PDF documents. A video can be added either by pasting an embed code, e.g. from YouTube, or by uploading a Flash file and inserting it into the document. Since Flash files can also contain PowerPoint presentations, quizzes, crossword puzzles, and the like, the possibilities of enriching online documents with interactive elements are almost unlimited.



**Figure 4. Part of an online document with learner notes and modifications (highlighting and a box containing an example, followed by a link to Wikipedia)**

*Source:*

*[http://webclass.co/materials/handout.edited.php?handout\\_id=132](http://webclass.co/materials/handout.edited.php?handout_id=132)*

The same possibilities exist for learners, who can modify the documents available to them, for example by highlighting words and phrases, adding text and changing its size, adding links, etc. (see Figure 4).

Learners can also upload their own files (e.g. images) and insert them into the edited documents. In addition, such documents can be shared with other learners.

### 3.4 Practice and assessment

Simple quizzes created using standalone programs (such as the iSpring Quizmaker<sup>2</sup>) can be uploaded to the server (as .swf files) and easily included in a learning document (an example is given in Figure 5). Such quizzes are best suited to practising small portions of material covered in the lesson currently being studied. They can provide learners with immediate feedback, yet no results are saved for future access.

In addition to such quizzes, WebClass allows instructors to develop online tests whose results are stored in the database, available to be retrieved at any time following the test administration. Such tests can contain a number of different item formats, for example multiple choice, multiple correct, true/false, matching, cloze, multiple-choice cloze, gap-filling, transformations, error correction, short answer, extended production. Moreover, test takers can submit audio responses (to either written or audio prompts).

<sup>2</sup> <http://www.ispringsolutions.com/ispring-quizmaker>

Lesson II

Original Edited

Aa Aa Aa

Close

Page 4: A quiz

A quiz

Tadhg and Deaglan

Question 1 of 1 Point Value: 10

Complete the dialogue using the words given.

Déaglán: Dia duit!

Tadhg: Dia's Muire duit. Conas atá tú?

Déaglán: Táim maith. Conas tusa?

Tadhg: Mhuise, olc in aon. Conas Seán agus Máire?

Déaglán: Tá Máire go agus níl Seán olc.

Tadhg: Tá go breá inniu.

Déaglán: Tá, le Dia.

go sé chor breá atá buíochas atá

Muire nílím

Finish

**Figure 5. A quiz included in an Irish lesson (as a Flash object)**

Source: [http://webclass.co/materials/handout.php?handout\\_id=830](http://webclass.co/materials/handout.php?handout_id=830)

Depending on the options selected by the instructor, learners can receive (simple/automated and/or elaborated) feedback on their test performance (see Figure 6). The provision of regular constructive feedback on students' progress towards the learning objectives is one of the touchstones of assessment *for* learning (e.g. Cauley and McMillan 2010; see also Malec 2015). Just like the results of self-assessment, instructor feedback on test performance can give autonomous learners valuable information on the effectiveness of their learning methods.

Test grade: 3  
Date: 2015-05-11 14:47:06  
Completed in: 8 min. 11 s.

Max: 10 | Cut-score: 6.0 | Your score: 6.5 (65.0%) Close

[Switch to old marking style](#)

### Dialogue 14.4

**Transcription**  
Complete the transcription of the following dialogue.

A: maɪ 'fɑ:ðə wəz ə 0.5 'kʌndʒərə ||  
B: ə 'kʌndʒərə ||  
A: hi wəz 1 'kwɑ:t ə 'feɪməs 'kʌndʒərə || hi pə'fɔ:md fo: fə ðə 0.5 'prezɪdnt ||  
B: fo: fə ðə 0.5 'prezɪdnt || ðæt wəz 1 (ALSO: 'ðæt wəz) 'wʌndeɪ ||  
A: ɪt wəz wəz hɪz 0.5 (ALSO: wəz ɪz) 'lɑ:st ən 'best pə'fɔ:məns || hɪz leɪtəst hɪz 'lɑ:st 0 'trɪk wəz ðə 1 'greɪtəst əv əv 'ɔ:l 0.5 ||  
B: 'wɒt 'hæpnd ||  
A: hi dɪse 'prɛd 1 ||

**Figure 6. Automated feedback on a phonetic transcription test**

Source: [http://webclass.co/tests/test.results.php?test\\_id=1318](http://webclass.co/tests/test.results.php?test_id=1318)

At any time throughout the course, learners can view tabulated reports of results with the final semester grade calculated automatically on the basis of the arithmetic or weighted mean of all test scores, including (optionally) results obtained from self-assessment and teacher-marked assignments.

## CONCLUSION

Modern technologies in general and the Internet in particular have an unlimited potential for expanding choice. Given that being an autonomous person is inextricably linked with a sense of choice, the role of Internet technology in fostering autonomy cannot be overestimated. However, apart from choice, autonomy also involves volition and freedom (cf. the quotation from Deci in the Introduction). Thus, to be an autonomous learner means to be willing and free to make decisions about one's own learning. But this, in turn, is only possible when teachers are autonomous themselves, in the sense of being capable of, and free to, make decisions about their professional development. While it is learners who select from a range of resources, it is teachers who decide what the pool of resources actually contains. On WebClass, technology brings learner and teacher autonomy together: the teachers' task is to provide stimulating materials and high-quality assessments, whereas the learners' task is to make the best possible use of them.



In summary, WebClass allows autonomous students to define their learning objectives, contact the teacher and other learners, study and modify the materials, upload their homework, as well as take tests/quizzes and view the marking and feedback. Learners can also self-assess their progress towards (or achievement of) the learning objectives on a predefined scale. Finally, they can privately access tabulated reports containing the results of assessments with the final semester grade.

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# THE IMPORTANCE OF STUDENTS' ALGORITHMIC THINKING SKILL IMPROVEMENT

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***Abstract:** The paper deals with the author's experience in the field of students' algorithmic thinking skill building and improving. He describes his interpretations of data collected at the Faculty of Military Technology, University of Defence, Brno, Czech Republic. The author assumes that the validity of his findings (outcomes) is wider than his faculty environment and used approaches can inspire the academic staff who is interested in the described problem area.*

**Keywords:** algorithmic thinking, education, IT, problem solving, programming language.

## INTRODUCTION

The Czech high school graduates who enter universities, have different levels of their algorithmic thinking skill. Some of them have never used any programming language yet and their knowledge of appropriate terminology is also at a very low level. On the other hand, especially contemporary technical education has a close connection with IT and the achieved level of knowledge and skills in this field can be significant information for the work of teachers. The paper deals with the author's experience in this field gained from the environment of the Czech military university. He describes his interpretations of data collected there. The author assumes that the validity of his findings is wider than his faculty environment and the task of algorithmic thinking skill building and improving can also be supported by modern tools of distance learning.

## 1. FACULTY OF MILITARY TECHNOLOGY ENVIRONMENT

From the point of view of new students of the Faculty of Military Technology, the faculty environment can be described as follows:

Since the academic year 2014-2015, the Faculty of Military Technology has run, according to the new requirements of the Czech Ministry of Defence, its new five-year Master's degree program „Military Technology“. This study program has only one study field which is also named „Military Technology“. The subjects and study duties in the first 5 semesters are the same for all military students but from the 6th semester this study field is internally divided into 15 modules that correspond to the names of the required military specialties.

Since the academic year 2015-2016, the new three-year Bachelor's degree program „Technologies for Defence and Security“ has been offered for civilian students. This study program has three study fields:

- Communication and Information Technologies;
- Technologies for Protection of Assets and People;
- Weapons and Ammunition.

In the winter semester of the first year of studies the subject „Information Technology“ (IT) is included in all four study fields above. The current specification of this subject in the first part of its content follows (Hrubý 2012) and (Hrubý 2013). The subject IT is planned for 48 teaching hours for military students and 60 hours for civilian students.

## **2. CRUCIAL INFORMATION ABOUT A TARGET GROUP**

According to the author's experience, teaching of the subject IT should respect some crucial information about every member of a target group such as:

- Previous education type and duration (where the leaving exam was passed; next possible education after high school graduation);
- IT education content;
- Computer ownership;
- The current average duration and methods of use of a computer;
- The current ambitions in IT.

The thinking style of students is often significantly affected by the type of their high school where they took their school leaving examination. In the Czech education environment it is suitable to distinguish:

- 8-year grammar school;
- 6-year grammar school;
- 4-year grammar school;
- vocational high school;

- apprenticeship with a school leaving exam.

A minority of new University of Defence students had also completed higher vocational education or studies at another university. Some students had also tried to study at another university in the past but they stopped their studies before successful completion.

IT education content during the previous education, view of its usefulness, view of the outcomes and especially current knowledge and skills gained in the IT field can help the teacher to set the optimal methods and steps.

The ownership of a computer seems to be a current standard and the teacher should enable the students to use their own computers if possible. The knowledge of methods of using a computer by students and how many hours daily a computer is used can be useful for instance for the preparation for lectures and selection of suitable examples.

The current ambitions in IT can differ depending on self-confidence of students. If possible, the teacher should enable the appropriate individually tailored development in compliance with students' ambitions.

### **3. ROLE OF THE SUBJECT IT**

The goal of this chapter is to introduce goals of the subject IT, a study plan of the subject IT, its teaching methods and rules for granting the credit. The findings from the first semester teaching at military students are included.

#### **3.1 Goals of the subject IT**

First of all it is necessary to keep in mind that new military university students are coming from various types of secondary schools. Their IT knowledge and digital competences can radically differ. The course especially builds on secondary school knowledge of mathematics and physics, improves skills for PC usage and forms algorithmic thinking necessary for technically educated military professionals and civilian experts. Gained knowledge is useful for the study of next subjects in the curriculum.

Teaching both groups of students (military and civilian) is planned separately. Due to the obvious characteristics of new students and their educational needs, the goals of the subject were specified in two main aims for military students and three main aims for civilian students. These aims are as follows:

- Algorithms and programming (32 teaching hours);
- Computer networks (16 teaching hours for military students, 22 teaching hours for civilian students);
- Geographical data and GIS (6 teaching hours for civilian students).

Students should gain knowledge of methods of problem analysis, basics of programming techniques, principles and practical usage of event programming, the meaning of IT technical terms and principles of operation of various types of computer networks. They should be able to divide the problem into sub-processes, to create applications in particular development environment, to solve simple applications as a support for engineering activities, to assess the basic network components configuration for workstations, to design simple local computer network, to design methods of obtaining the status of network components in workstations. Students should be acquainted with the basics of analytical and programming work on a local computer and within a computer network. It was planned that laboratory topics from programming should be implemented using selected higher programming language (Python, JavaScript, C# or Visual Basic).

Finally, JavaScript programming language was selected as the most suitable tool for the practicing of programming skills. This programming language was evaluated at the department level as a modern and popular tool which is available free of charge as a component of contemporary web browsers. Teachers and students can access many good information sources on the Internet, e.g. (Haverbeke, 2015), (JavaScript tutorial, 2015), (Moncur, 2015), etc.

### **3.2 Content of the subject IT**

The first part of the subject is focused on algorithms and programming. Firstly, three lectures (3 x 2 teaching hours) are provided:

- Introduction into algorithms;
- Data types and data structures;
- Statements of a high level programming language, structure of a program.

Then, 26 teaching hours are given in the form of laboratory practicing of the topics such as:

- User interface of the program (application);
- Programming of the input and output;
- Usage of an array;
- String processing;
- Subroutines and user defined functions.

The second part of the subject focused on computer networks starts with a few lectures (8 teaching hours for military students, 14 teaching hours for civilian students):

- Introduction to computer networks, history, types and forms of realization;
- Network architecture reference model ISO/OSI, model TCP/IP;

- Local computer networks including wireless computer networks, Ethernet
- Fundamental suite of TCP/IP protocols;
- Planning the address space, CIDR, VLSM, routing.

Then, 8 teaching hours are given in the form of laboratory practicing of the topics such as:

- Addressing in a simple network (configuring user devices and basic network devices);
- Realization of simple network and their diagnostics (configuration of simple networks in practice, their diagnostics and troubleshooting).

The third part of the subject (only for civilian students) which is focused on geographical data and geographical information systems (GIS), starts with two lectures (2 x 2 teaching hours). Then, 2 teaching hours are given for practical work with GIS systems in a computer laboratory.

### 3.3 Teaching and Assessment of the Subject IT

The lectures are provided in a high capacity lecture hall for all faculty students at the same time but separately for military and civilian students. Lectures focused on algorithms and programming and lectures focused on computer networks are realized by two vocational specialists. Laboratory classes are provided for the groups of 25 students. In the academic year 2014-2015 five members of CIS Department academic staff took part in laboratory exercises. The teaching process was coordinated by the guarantor of the subject. For clarification, the three examples of tasks from programming are as follows:

#### *Example No 1:*

One-dimensional array (vector) named Charles has 13 elements. Give each element random whole number from the interval  $<10; 99>$ . Find out how many numbers which are stored in the array Charles meet the interval of which limits are set by the user, e.g.  $<55; 70>$ . Display all used data in the form which you find as the most suitable.

#### *Example No 2:*

Two-dimensional array (matrix) contains the results of written work from the subject Mathematics. The work was done by a group of 32 students. According to the position of a teacher's desk and each student's place in the classroom, the results of students are characterized as:

Teacher

1 2 2 3 3 1 2 1

1 3 2 1 2 2 3 3



3 4 2 2 4 1 2 2

2 3 2 3 1 4 4 3

Evaluate the occurrence of individual classification levels. Display all used data in the form which you find as the most suitable.

*Example No 3:*

Declare and check a user's defined function which has to make a calculation of the monthly cost of water for swimming pool cuboids with dimensions  $l$  (length) /  $w$  (width) /  $d$  (depth), which will be filled to  $p$  %. Water in the pool is completely changed  $n$ -times per month. The price of water is  $x$  CZK per  $m^3$ . Realize displaying the used parameters and the calculated cost on a web page. Suggest this listing in the form which you find as the most suitable.

From the three examples above it is evident that programming tasks are especially focused on the array data structure and statements of branching, switch and cycles. When solving practical tasks, the students should be familiarized with three basic control structures (sequence, branching and cycle) and their use in writing algorithms by means of a high level programming language (in its integrated development environment). The algorithmic thinking skill of the students is developed step by step.

The military students' knowledge and skills assessment is realized independently in two phases while the civilian students' knowledge and skills are assessed independently in three phases. Firstly, in the first part of the subject the students have to accomplish the tasks in algorithms and programming (written task and portfolio of solved examples). Secondly, later in the second part of the subject they have to accomplish the tasks from computer networks. Civilian students are also tested from the third part of the subject IT. The tasks are set by the teaching academic staff and each group of students has to fulfil the goals during their laboratory exercises. Finally, the students, who fulfil the stated goals in both two parts (civilian students in three parts) of the subject, receive the course credit.

#### 4. GAINED EXPERIENCE

The first experience from the teaching process is the follows:

- It is a necessity to improve the algorithmic thinking of students.
- Inclusion of the subject "Information Technology" in the education of all Faculty of Military Technology students is very important for their future studies.
- The 1st semester is the optimal time for teaching the subject.
- The content of the subject, focused on algorithms and programming and computer networks, seems to be well done but it will be suitable to be

prepared to slightly modify the subject content appropriate to the experience gained.

- The current number of 25 students in the laboratory classes would be reduced to the number of 10 to 15 students in the interest of better communication and individual approach which is sometimes needed.
- If possible, it is necessary to encourage students to use their own notebooks because these students can make better progress thanks to the usage of devices they are familiar with.
- It is suitable to have all students install and use the same web browser. It makes better conditions for discussions among students and their teacher about various solutions of programming tasks.
- The topics of programming tasks should be selected carefully according to the contemporary knowledge of students in the laboratory groups and their interests.
- The teachers should creatively use connections to the problem areas of other subjects, e.g. work with vectors and matrices in mathematics.
- The author assumes that evaluation of the usage of different high level programming languages according to the teachers' offer and students' selection could bring interesting results for the subject guarantor.

## CONCLUSION

The subject "Information Technology" is a mandatory subject for all new military students at the Faculty of Military Technology, University of Defence, Brno, Czech Republic in the first semester of their Master's degree program since 2014. The same subject has been a mandatory subject for all new civilian students of Bachelor's degree program since 2015. It is a subject of so-called core knowledge. In previous study programs realized at the Faculty of Military Technology was no subject of such content which was mandatory for all students of the faculty.

The students are warned that the subject requires significantly different demands due to the previous knowledge and skills of students in the ICT field, especially focused on algorithms and programming. Both students and teachers have to keep in mind this fact.

Acquiring the algorithmic thinking skill is sometimes a long distance run but this type of thinking is a necessary prerequisite for successful studies at the military technical faculty and an important element of a contemporary professional profile.

The author assumes that students' assessment should always consist of a written part and a practical part. From the algorithms and programming point of view the written part should be focused on understanding of key concepts and connections among

key terms used in this vocational field, including understanding of simple parts of the code. On the other hand, in practical part of assessment the students should demonstrate their current programming skill. They should be capable of creating a required code and explaining their thinking process which led to this code.

Department of Communication and Information Systems which is guarantor of the both versions of the subject IT (48 teaching hours for military students, 60 teaching hours for civilian students), also supports algorithmic thinking development by organizing two conferences as follows:

- Distance Learning, Simulation and Communication (DLSC, 2015);
- Mathematics, Information Technologies and Applied Sciences (MITAV, 2015).

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# CONSCIOUSNESS AS A SET OF INFORMATION AND QUANTUM PROCESSES IN THE BRAIN

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**Abstract:** *All the material presented in this thesis as well as the author's implications prove that a living organism can be perceived as a complex electronic device similar to technical devices, whereas biological materials (proteins, DNA, RNA) - as components of electronic devices. These arguments allow us to state that a biological system can be considered to be a quantum computer that functions on the basis of entangled quantum states and optoelectronic phenomena. Melanin and neuromelanin are involved in the central control of all biological, physiological and psychological processes. Numerous modular communication systems and signaling pathways that transmit signals into cells are generated under the influence of light. Melanin and neuromelanin function as a multireceptor of a full range of electromagnetic, acoustic, soliton waves, torsion fields and bioplasma which does not receive so much information as the senses do, but receives it constantly. The role of photoreceptors, receptors of hearing and touch is limited to a single reception of a stimulus, whereas melanin and neuromelanin play an integrative function, combining stimulus elements in a whole, namely movement with space and time, sound with light, space and time.*

**Key words:** bioelectronic processes, bioplasma, biocomputer, consciousness, perception.

## 1. BIOELECTRONIC MODEL-ITS ROLE IN PERCEPTION AND MENTAL PROCESSES

L. Bertalanffy formulated the concept of a living organism as an open system that collects and gives back material substance, and maintains a constant value of mass relationships within a continuous variation of material components, energy and information in a continuous flow between the body and the surrounding environment (Bertalanffy 1976).

Therefore, the principal feature of the living world is the organization of structures filled with mass and energy as an information carrier. Information is in fact defined

as the ability to organize the system or maintain it in an organized state, while energy is defined as the ability to perform work (Latawiec 1995: 38).

Human life is not just a matter of biology and biochemistry; it also constitutes a cybernetic-information and bioelectronic structure, which has an impact on health, disease and human behaviour. This bioelectronic structure creates a "*homoelectronicus*" with its electronic personality. In this new bioelectronic paradigm one can notice quantum psychology and human cognition in terms of quantum processes occurring in the biological system, which is understood as a bioelectronic device that processes, stores and manages information. A quantum individual is the same individual as an anatomical and physiological one, but living in the world of quantum dimension. In addition to the traditional, well-known biochemical reactions occurring in living organisms, a new reality is opened for science that functions on the basis of a model of bioelectronic life. This model shows that the particles that determine the molecular substrate of biochemical reactions are also a manufacturer of biological structures, such as proteins, melanin, nucleic acids, bones, etc., which are an electronic material having piezoelectric, pyroelectric, ferroelectric and semiconductor properties (Sedlak 1977: 156).

Apart from using biochemical channels, the human biological system, in order to transfer information uses electromagnetic, acoustic, soliton waves; electric, electromagnetic and torsion fields as well as bioplasma. This communication is applied not only in biological processes, but also in all mental functions. Control of the human biological system is accomplished by a grid of information channels: electron, photon, phonons, soliton, spin, ionic and bioplasma. Each of these channels may in itself be a carrier of information to a biological system, or it can function as a team in the bioplasma system (Sedlak 1980).

The biochemical model explains the mechanism of mental life in an abstruse manner. The transmission from inanimate matter to living matter has yet to be explained. It still cannot explain the nature of consciousness and the transition from inanimate matter to living one. Where is the threshold and what is the role of biochemical processes in consistency of soma and consciousness as well as in building a mental structure? The author supports the propositions that the nature of mental processes is inexplicable as far as interactions of biochemical processes are concerned and it is much easier to describe it in the light of quantum processes (Adamski 2006: 70 ).

## **2. BIOELECTRONIC PROPERTIES OF BIOLOGICAL STRUCTURES**

Studies on the electronic properties of biological structures in various research centres have shown the following: Piezoelectricity for amino acids, proteins, collagen, keratin, elastin, actin, myosin (Fukada 1974: 125), (Fukada, Yasuda 1964), as well as for tendons (Athenstaedt 1974, muscle (Fukada 1970: 846),

blood vessels (Fukada, Hara 1968: 779), DNA (Fukada, Ando 1972: 567), bone (Yasuda 1954: 268), (Lang 1966: 705), (Shamos, Lavin 1963: 87), (Athenstaedt, Claussen, Schaper 1982: 1019), neural tissue (Athenstaedt 1987: 459). (Giuzelsu, Akcasu 1974).

In living organisms, in addition to piezoelectrics and pyroelectrics, also biological semiconductors were found to exist. Semiconduction occurs in materials with an ordered internal structure, such as crystals (Nye 1962: 134). Rozenberg (1962) and Bardelmeyer (1973) announced, on the basis of their research that collagen at water content of 10% shows electron conduction. In addition, there is also the proton and ionic conductivity. Nucleic acids were also studied in terms of semiconducting and phot-conducting properties. Eley (1972) and Suhai (1974) carried out conductivity measurements on dry nucleic acids. The amount of activation energy they received ranged from 2.5 eV to 2.7eV. Liang and Scalco demonstrated the phenomenon of photoconductivity in DNA, and adenosine. Thermal energy activation of photoconductivity ranged from 0.90 eV to 1.18 eV (Liang, Scalco 1963: 1326).

Semiconducting in amino acids, proteins, muscle fibres was also demonstrated (Cope 1975: 32). Thanks to semiconductor properties of proteins and melanin, electrons can travel over long distances without losing energy. Ion currents expire at short distances because ions are much larger than electrons. In semiconductors the electron energy of the protein would be preserved and passed on as information. In terms of bioelectronics, the background of bio-communication in the human biological system may be an electromagnetic wave, electronic and acoustic, the latter resulting from biological piezoelectric electrostriction. Piezoelectric phenomenon consists in changing mechanical energy into electrical energy, together with electricity an electric field is created (Krajewski 1970). A piezoelectric placed in an alternating electric field is deformed and generates an acoustic wave. This phenomenon is referred to as electrostriction or quantum-acoustic effect. The ability of piezoelectric crystals to polarize at the expense of mechanical interaction and ability to deform at the expense of electric fields allows us to consider them as electromechanical transducers. (Krajewski 1970: 59).

Piezoelectric properties were acquired by each organism at the moment of its creation on earth and these properties are required to run bioelectronics processes that are necessary for the functioning of organisms. These processes occur throughout the body, but are especially noticeable in the following systems: cardiovascular, musculo-skeletal while walking and exercising, breathing, mechanoreception, baroreception, sense of hearing, as well as during sexual arousal, etc. Among these systems or senses, the stimulating role is played by mechanical, hydrostatic and acoustic energy, which polarizes bio-logical piezoelectrics, and thus they become carriers of information in the form of electrical field and the acoustic wave for the biological system.

Shamos and Lavin (1963: 92) carried out detailed measurements of piezoelectric effects in human long bones while the subjects were walking and mechanically leaning, and these activities generated an electric field. The body needs this field to:

- activate the enzyme function and communication (Shimomura 1991: 57);
- record perceptual experience in the brain (Adamski 2006: 99);
- synthesise melanin (Adamski 2005: 31), Cieszyński 1990);
- integrate the biological unit into a hierarchy of cell-tissue-organ-organism, ecosystem.

The high speed of information transfer in living organisms proves that coordination at various levels of biological complexity requires minimal energy requirement but more information (Molski 2005: 209).

### **3. PHYSICAL-ELECTRONIC PROPERTIES OF MELANIN IN THE HUMAN BIOLOGICAL SYSTEM**

Melanin, in terms of its electronic and physical aspects, is characterized by the following features:

- A. Donor-acceptor properties;
- B. Proton conduction property (Matuszak, 2001: 80);
- C. The ability to absorb light of all wavelengths;
- D. Properties of photoconductors and amorphous semiconductors (Strzelecka 1982: 227), (Chedekel, 1995);
- E. Increased resistance to light and ultraviolet light;
- F. Generation of excitable electrons and photons (Nicolas 1997);
- G. High oxygen demand (Prota 1993: 79); selective vulnerability to phonons - this means that cells containing melanin have the ability to selectively absorb phonons (Sarna Swartz, 1994: 339);
- H. Can fulfil the function of phonons photon transmitter and vice versa (McGinnes, Corry Proctor, 1974: 854);

Melanin and neuromelanin absorb and convert electromagnetic energy in acoustic energy. This process may also occur in the opposite direction, during which the spin fields are produced which solitons are to be found. Solitons are responsible for human unconscious states (Adamski 2013). The transformation of light quanta into an acoustic wave, or a photon into a phonon becomes a carrier of information for psychobiological structures in the human body.

- I. Exhibits paramagnetic properties of melanin (Schultz, Kurtz, Wolfram, Swartz, Sarna 1987: 45);

J. Characterized by properties of photoconductivity in pheomelanin (Wilczok 1979).

K. Melanin is a semiconductor, which allows you to transform light into electrical energy. Melanin is also treated as transforming electricity into electromagnetic energy (Bruno, Nicolaus 2005: 794).

L. Melanin is a piezoelectric - under the influence of an alternating electric field emits an acoustic wave. In addition, all melanins of the biological system exhibit diverse physical properties such as absorption, disappearance of light and sound, the binding of organic chemicals, storage of liquids and gases (Bruno, Nicolaus 2005: 793).

Light and electric field are the most important factors regulating the biosynthesis of melanin, the absence of these factors results in the biosynthesis of melatonin. Melanin reduces the amount of free radicals in the biological system. The most important feature is the ability of melanin to absorb light, ability of retention, storage and renewal of energy (Nordlund et al., 1998: 347)

Melatonin provides information on the time of day and the time of year to each tissue. Melatonin functions as an internal clock. Measures time for seasonal phenomena, processes of adaptation and development, for example. Adolescence - melatonin activates sexual drive, directs the process of pregnancy, etc. (Adamski 2005).

Melanin is a piezoelectric semiconductor and it allows one to transform different kinds of energy into electrical energy which is related to electric fields. The effect of an electric field on a piezoelectric produces electrostriction, and this in turn triggers phonons, which is an acoustic wave. The biological system has transducers, which are transform electromagnetic energy into an electrical impulse (eyesight), thermal energy into electricity (pyroelectric- temperature-sense), mechanical energy into electricity and vice versa (the sense of touch), sound energy in electrical impulse (sense of hearing). The biological system in different ways ensures that it has appropriate density of the bioplasma state, thanks to which melanin combines in itself a wide range of fields and elementary particles.

Free radicals play an important role in the process of imprinting information on the nucleus. Free radicals, formed upon irradiation of UV melanin, are able to change settings of nuclear spins, and make a permanent record of information in the nucleus, which is contained in the biological structure (Hu, Wu., 2004: 7).

Free radicals are also responsible for the formation of the quantum states of entangled nuclear particles, or the entire structure of information and images produced in the bioplasma of melanin and neuromelanin. Changing the nuclear spins entails the change of the field strength of the spin or solitons field, which is held responsible for the nature of mental processes. Entanglement is a phenomenon in which there is a combination of two or more objects that are interrelated. In the process of splicing bilateral link between objects occurs, and the first object cannot



be described without taking the other into account. This leads to a correlation between the physical properties of the objects, even when they are apart. This phenomenon is known in the scientific world as the EPR paradox.

The phenomenon of quantum entanglement can occur for a wide variety of micro-world objects, like atoms, elementary particles, or spin-entangled electrons. Entanglement is an instantaneous phenomenon and the distance between objects does not matter.. For example, when two electrons are entangled, the quantum state making changes to one instantly changes the quantum state of the other.. A method of transferring information using quantum entanglement in physics is known, and is based on the schema quantum teleportation and dense coding (Bouwmeester et al, 1997).

Teleportation allows for transferring messages stored in the form of the quantum state of the system, while the dense coding can increase channel capacity through the exchange of quantum information. Since the teleportation scheme can be extended to multiple qubits, it is possible to transmit longer messages in this way. (Barrett et al. 2008).

According to the author, entangled quantum states are used in sensory perception - especially in the sense of sight, but also in the creation of an act of consciousness. When during photoreception light falls on the iris of the eye, which is filled with melanin. Melanin activates free radicals that have an impact on the setting of nuclear spins. Change spins make a record of information in the nucleus, and at the same time entangled quantum states are created, controlled by bioplasma and received in the brain by neuromelanin. Information received by brain neuromelanin is a conscious act that allows humans to function. This mechanism for recording information is of great importance in the transmission of innate knowledge by biological structures. As a result of a newborn switching from placenta oxygen supply to breathing (first breath) oxygen level in arteries increases suddenly, causing oxygen shock, this increasing levels of oxygen radicals. This sudden increase in the level of radicals becomes the initiator of imprinting the current reality in which the infant resides. Melanin in the epithelium of the retina and iris epithelium is formed before birth, during labour, while the child is entering the world, the first eye contact very strongly activates the development of free radicals, which record in the child's biological system information about the surrounding reality and stops further synthesis of melanin after birth in these epithelia. This means that once the information is encoded in these structures, it becomes a benchmark for many biological processes such as mental health, adaptation to the environment, reception of tonality of sound, space and time, emotional state and behaviour of the individual, the formation of consciousness of one's body. According to the author, melanin and neuromelanin in their electronic structure create a spintronic device, which is necessary for the functioning of sensory perception. This is supported by the following data. In electronics, it is assumed that a spintronic device must include the essential elements: first, spin polarization must be generated, which is an excess of electrons with a particular spin orientation. This can be achieved by transporting

electrons from a material in which permanent polarization exists (that is, a ferromagnetic), or by appropriate optical stimulation, using semiconductor system selection rules. Secondly, it is necessary to be able to control the spin, the easiest way is to achieve this is in semiconductors due to their unique physical properties. The pumping spin problem arises, because the spin polarization is sufficiently unstable in time, hence the important role of controlling the spin relaxation processes (Barnas 2002). (Fabian et al, 2007).

It should be recognized that while melanin and neuromelanin are exposed to light, spins are pumped to bioplasma, which is important for qubit resolution in spin biocomputers. In such computers fuzzy logic is applied. The number of intermediate states depends on the resolution of the computer, and, the resolution value, in turn, is determined by bioplasma density. Melanin controls free radical reduction in a biological system, which results in increasing or decreasing the rate of spins being pumped to bioplasma which is responsible for putting together information as data sequences and strings in biocomputers. In addition to its function of spin pumping, melanin also has the ability to accelerate to decelerate photons and phonons, which is utilized in creating an information language in spin biocomputers.

Spintronics will revolutionize computer design and information processing. Traditional computers carry out calculations by means of controlled flow of electric charges and changes in current flow are information carriers. Spintronics demonstrates that instead of changes in current or in light intensity, information can be transmitted by spin direction (left or right). Unlike in traditional computers, particles can remain in the state of superposition, i.e. their spin can be both negative and positive at the same time. This means that such a particle has the “0” and “1” state at the same time as well as the entire infinite sequence of values in between. The traditional computer adds numbers sequentially (one after another), while a quantum computer can carry out a very large number of mathematical operations simultaneously. A computing machine made of several hundred atoms would be able to carry out billions of calculations simultaneously (Jacak 2001) (Marecki 2002).

#### **4. MANAGING INFORMATION IN A BIOCOMPUTER-LIKE MANNER IN THE HUMAN BIOLOGICAL SYSTEM**

Signal transmission in a biological system need not only be effected under the influence of ionic conductivity, electromagnetic wave, acoustic and electric fields or electromagnetic fields; what would be involved here is soliton waves, spin field called nonlocal processes that affect the state of energy and information of human bioplasma and his behaviour (Adamski A., 2005), (Brizhik 2002), (Brizhik 2003).

Solitons are independent entities, solitary high power pulse in motion, which does not blur during contact with another particle, wave, or from the field. There are solitons of light, water and sound, which can strongly interact with other solitons,

but after the impact remain unaltered in their form and structure, e.g. when two soliton waves are close to each other, they "acknowledge each other's presence" and penetrate each other, but do not impose themselves on each other, and then spread out in the same order in which they came into contact. They just temporarily penetrate each other, without losing their identity. Soliton waves transmit signals without having to move the environment as a carrier wave. Only spatial relations are transferred, i.e. constellation geometry of water and air molecules, without their physical participation – the environment participates as a "spirit" as a structural standard (Brizhik 2003). The author concludes that a biological system can use multiple biocomputers in a single or serial arrangement. Here are a few examples:

**Protein biocomputer** – the cell membrane is made of a protein and lipid structure. Proteins are piezoelectrics. Proteins contain unpaired electrons that make up free radicals such: a hydroperoxyl radical, hydroxyl radical and nitrogen oxide. Free radicals have the ability to activate spins: electron spins, photon spins, other elementary particles and atomic particles. Activating spins to gyrate to the right or left involves generating a spin field that can be used for binary information recording, spin movement to the left – 1, and to the right- 0 (Hu, Wu 2002, 2003).

Protein biocomputers in biological membranes make up a biointernet network, they are supplied with power by an electric field generated during the piezo- and pyroelectric. In such biocomputers, the role of an information carrier would be performed by an acoustic wave created during the piezoelectric electrostriction, and a soliton wave generated by spin gyration, brought about by free radicals and Bose – Einstein condensate (Adamski 2015), (Shipov 1995, Shipov 1993).

**DNA biocomputer** - in 1953 Watson and Crick discovered that DNA was composed of a double helix and contained sugar, phosphorus and bases: pure bases – adenine (A), guanine, (G), and pyrimidine bases – cytosine (C) and thymine (T). In DNA information is recorded in four-letter language (Crick 1996: 88).

The DNA structure constitutes a matrix for protein synthesis, base sequences in DNA are used to code amino acid sequences in appropriate protein in order to replicate DNA. Polymerase and the four-letter language determine the structure of the DNA computer (Lewiński 1996: 153).

Albert Popp demonstrated that DNA emits laser light within the 200 nm - 800 nm range (Popp 1983).

The DNA biocomputer is powered with electricity generated by the piezoelectricity and makes up a biointernet network in which laser light and acoustic waves are information carriers.

**Melanin biocomputer** – it is the author's opinion that melanocytes contained in skin, hair follicles, in eyes, in ears, nerves, in substantia nigra and meninges are responsible for maintaining the structure of melanin biocomputers. The melanin synthesis process is determined by light, temperature and electric fields (Adamski 2005).

Melanin exhibits the ability to change light into acoustic energy, i.e. photons into phonons and the other way round. Melanin directs light, can speed it up or slow it down. Melanin can also transform light into a torsional field (informational), determined by the spin movement. In dense spin structures energy and informational fields are generated, together with solitons (Adamski 2011).

This continuous transformation of photons into phonons and the other way round, and also phonons into infons, serves as a basis for binary and qubit recording of information.

According to T. Stonier (1990) and M. Wnuk (1996), the world is filled with quantum information carriers referred to as infons.

- an infon is a photon with infinite wavelength

- a photon is an infon moving at the speed of light, so it does not have a momentum or rest mass; an infon is not energy, therefore – if speeds different than the speed of light exist, a quantum of energy is transformed into a quantum of information, i.e. an infon.

Stonier has put forward a hypothesis that photons are not fundamental particles, but are made up of two components: energy and information. An electromagnetic wave is composed of not just one, but two oscillation sets: (1) an oscillating electric field alternating with an oscillating magnetic field, and (2) regular changeability of information and energy. Assuming such a system exists, it can be concluded that an energon and an infon can continuously switch places during photon propagation and can perform the function of a quantum biocomputer.

When asked why our receptors respond to photons and do not respond to infons and tachions, Stonier says that children jumping rope are aware that it is not enough to jump at a specific frequency rate, you also have to make jump rope moves at a specific speed.

According to Hameroff, neural networks of the brain, together with synaptic connections are used for the transmission of information, just as is the case in traditional computers. However, synapses and neurons have a complex structure and should be considered as biocomputers (nanoprocessors). They are distinguished in that they have a high capacity for parallel processing (parallel computing) in microfilaments, microtubules, together with all the cytoskeleton. Performance cells should be considered in the context of a dynamic, but not static. The cytoskeleton is capable of collective processing of information in a cell area at the molecular level, and acts as a computer cluster. In learning to understand the functioning of the cytoskeleton many models of clusters have been constructed, but they did not meet the expected results. Research shows that artificial neural networks are not able to accurately reproduce the features that occur in the brain. They are not able to accurately determine the hierarchy of information changing in a dynamic way the brain has no problem (Hameroff 1992).

Hameroff believes that microfilaments, microtubules, along the entire cytoskeleton contain modules that have an inherent nature to assess the hierarchy of information. The multi-level neural network in the brain combines modules and has a comprehensive system to recognize the hierarchy of information and the highest global level information is combined with an act of consciousness. The cytoskeletons in the cell has the ability to dynamically change the intracellular organization, by changing their network connectivity and information, but also for connections with neighboring cells. They also have the ability to reconfigure. The main attribute of the cytoskeletons is the plasticity of sharing their resources in a collective way, which is important in the resolution and processing information. Cytoskeleton signaling processes takes place in the form of the cytoskeletal filamentous structure, which is composed of sequences of information and data strings in a manner similar to a phonetic language. Microtubules function as channels that carry information strings and strings of data and at the same time protect information against interference and crosstalk (crosstalk).

A similar point of view is held by Richard Tadeusiewicz, who believes that at the single cell level extraordinarily complex regulatory processes take place, cyber and information. The elements involved in these processes are single molecules, the information carrier is a structural protein, fatty DNA, RNA, melanin. In medicine man is viewed through the prism of nineteenth-century biochemistry. The body is treated as an object, in which chemical processes take place, but information processes taking place there are disregarded. In the field of bioinformatics Tadeusiewicz proposed a new approach of automatic understanding of visual images, which takes into account the psychology of visual perception. Tadeusiewicz shows that in image analysis systems, in the sense of sight, we face data in the region of tens of millions of bits per second. This clogs up computer memory. The retina captures this item of information which is subject to immediate processing and reduction. It turns out that out of these many millions of bits of information only few bits per second at most reach the decision-making zone. Processing of information goes on beyond the level of our consciousness. We can claim that a certain automatism is at work here that can be recreated in artificial control systems. The processing of this item of information may be effected by means of biocomputers which are incorporated into the structure of biological cells (Tadeusiewicz 1989, 2004), (Tadeusiewicz, Fire 2006).

Quantum computing is a field of science on the border of theoretical computer science and quantum mechanics. It uses the unique properties of systems governed by the laws of quantum physics. Information technology shows that such phenomena as interference of wave functions, parallelism quantum superposition of states, quantum entanglement and coherence can be used to calculate the information in quantum computers (Nielsen, Chuang 2000), (Lieberman, Minin, 1995), (Liber 2002)

The roles performed by bioplasma include also: integration, storage and management of information and energy processes in the human biological system.

According to Sedlak, bio plasma "is aware" of all that is going on inside it and around it. It provides information on the energy situation to the whole system as well as its parts. Bioplasma creates such a state of matter which is unity in diversity. It constitutes a material centre of life and the substrate of consciousness (Sedlak 1979: 265).

The other computer, which is located in the cell biological photoreceptors is a quantum bio-powered electric field resulting from the phenomenon of photoconductivity, piezoelectricity, pyroelectrics biological structures. This computer processes perceptual image and forwards it to bioplasma, which is entered in the content of solitons. It is then verified by bioplasma and compared with its own standard. Bioplasma corrects it, giving it a pattern of behaviour and way of thinking and of emotional responsiveness. It creates a unique specificity of the body, with his characteristic energy and full of information, structure of personality. Bioplasma determines the age, state of health, disease, thinking and human behaviour.

## SUMMARY

Human life requires for its existence the continuous acquisition of chemical structures of electrons from the semiconductor, photons, phonons and electric fields, electromagnetic, gravitational, solitons and spin. The energy balance of life is not only kilocaloric chemical bonds, but also energy and information carried by electromagnetic waves, acoustic waves and solitons. Life in the quantum scale can be considered as linking elementary particles with wave phenomena in bioplasma, supported biochemically. The biochemical model explains the intricate mechanisms of mental life. With the current state of knowledge one cannot explain what transition is from inanimate matter to living matter. Where is the cognizant threshold and what is its essence, the role played by the biochemical processes in the consistency of the soma of consciousness, and vice versa? A similar problem is with the other mental processes. In summary, the nature of mental illness is not within the biochemical model of life and it is inexplicable on the basis of biochemical interactions; again it is far easier to describe it in the terms of quantum processes, cybernetic-information that is managed by bioplasma and by biocomputers.

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