E-learning

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E-learning Methodology – Implementation and Evaluation

Scientific Editor
Eugenia Smyrnova-Trybulska

Katowice – Cieszyn 2016

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University of Silesia in Katowice,
Faculty of Ethnology and Sciences
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Monograph

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INTRODUCTION

"Good quality education, provided by trained and supported teachers, is the right of all children, youth and adults, not the privilege of the few", stressed participants of World Educational Forum – 2015. Quality learning is not only essential for meeting people's basic needs, but is also fundamental in fostering the conditions for global peace and sustainable development. All young people need to learn in active, collaborative and self-directed ways in order to flourish and contribute to their communities. Along with the basics, they need to acquire attitudes, values and skills as well as information. Their teachers, peers, communities, curriculum and learning resources must help prepare them to recognize and respect human rights globally and to value global well-being, as well as equip them with the relevant skills and competencies for 21st century employment opportunities. To achieve this, it is not enough to measure what learners learn; it is essential to target the classroom experiences that fundamentally shape student learning, and emphasize the range of skills required for lifelong well-being and societal cohesion." (http://en.unesco.org/world-education-forum-2015/5-key-themes/ quality-education)

The "new vision" of eLearning, based on educational aims and priorities, collaboration and community building, integration and partnership, with a strong innovation focus, may probably result more convincing. In Bergen the following elements were identified to be included in the *"Bologna process" vision of eLearning: - the use of ICT facilitates dialogue and communication among students,* and between teachers and students; - *eLearning provides an "extended learning context"* (more resources, more fellow students, more teachers) to all students; - *eLearning brings some elements of flexibility in time and place,* individualisation, and "ownership" of learning that encourage students to take an active role in managing their learning path; - *eLearning may support international virtual mobility,* international partnership among universities within and beyond Europe; - *eLearning brings investment logics into the delivery of higher education,* that may capitalise on the existing knowledge and know-how beyond the availability of individual teachers and researchers. (UNIQUe 2007)

The monograph *"E-learning Methodology – Implementation and Evaluation"* includes the best papers, prepared and presented by authors from nine European countries and from more than twenty universities during the scientific conference entitled "Theoretical and Practical Aspects of Distance Learning", subtitled: "*E-learning Methodology – Implementation and Evaluation*", which was held between 10-11 October 2016, organized by the Faculty of Ethnology and Sciences of Education in Cieszyn, University of Silesia in Katowice, Poland.

The speakers from the Open University in Lisbon (Portugal), University of Ostrava (Czech Republic), Extremadura University (Spain), Constantine the Philosopher University in Nitra (Slovakia), Curtin University in Perth (Australia), Catholic University College for Education, Graz (Austria), The Lisbon University (LU) (Portugal), Borys Grinchenko Kyiv University (BGKU), (Ukraine), Gdańsk

Technical University (Poland), 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), Jan Ámos Komenský University Prague, (Czech Republic), Cracow Pedagogical University (Poland), Lisbon Open University (Portugal), Centre for Innovation, Higher School of Economics in Katowice (Poland), 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), Jesuit University of Philosophy and Education "Ignatianum" in Cracow (Poland), Dragomanov National Pedagogical University in Kyiv (Ukraine), Ternopil University (Ukraine) and other educational institutions presented a lectures with interesting study, own research results, discussed about further way of scientific work.

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:

E-learning Methodology – Implementation and Evaluation:

- European and national standards of E-learning quality evaluation,
- Evaluation of synchronous and asynchronous teaching and learning, methodology and good example,
- MOOCs - methodology of design, conducting, implementation and evaluation,
- Contemporary trends of world education - globalization, internationalization, mobility

ICT Tools - effective use of education:

- Selected Web 2.0 and Web 3.0.,
- Massive Open Online Courses, etc.,

- Social media,
- To compare and evaluate, LMS (learning management systems), CMS (Contents Management Systems),
- VSCR (Virtual synchronous classrooms), SSA (Screen Share Applications), CSA (Contents Sharing Application),
- Cloud computing environment,
- Multimedia resources and didactic materials,
- Video-tutorial design.

E-learning and Intercultural Competences Development in Different Countries:

- Legal, social aspects of distance learning in different countries,
- Psychological and ethical aspects of distance learning in different countries,
- Teacher-student and student-student relationships in distance learning.

Theoretical, methodological and practical aspects of distance learning:

- Theoretical and methodological aspects of distance learning,
- Successful examples of e-learning,
- Distance learning of humanities: native and foreign language, philosophy, history, etc.,
- Distance learning of science and mathematics,
- Quality of teaching, training programs and assessment
- E-learning for the disabled.

Distance learning and lifelong learning:

- Computer training, for prospective and actual teachers, in distance learning,
- Lifelong learning supported by distance learning,
- Personnel, scientific, information and library services.
- E-learning in the Development of the Key Competences:
- Key competences in the knowledge society,
- Use of e-learning in improving the level of the students' key competences,
- Teachers' and learners' competences in distance learning and computer science.

Other alternative methods, forms and techniques in distance learning:

- simulations, models in distance learning,
- collaboration work in distance learning,
- distance learning systems,
- m-learning.

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 and Ryszard Kalamarz for their 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. EUROPEAN AND NATIONAL STANDARDS OF E-LEARNING QUALITY EVALUATION

EDUCATION, CULTURE AND TECHNOLOGY: TRIANGLE FOR DEVELOPING HIGHER EDUCATION

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Abstract: *As ICT infrastructures increase and saturate, a new dimension for evolution in Higher Education 'knocks on the door': International Student Exchange. What horizons emerge for university students and teachers the next decades? Will the curricula incorporate multi-cultural perspectives so that local and foreign students are needed in each of the academic assignments? Will diversity and multi-perspective replace national criteria? In how far can students participate via MOOCs and virtuality in courses abroad even before they land at an international campus. These are the questions to be addressed in this lecture.*

Keywords: Education, Multi-Culture, Technology, Higher Education

INTRODUCTION

Especially for the period 2017-2020 we may expect that education technology will have a role that exceeds the needs of pure intellectual outcomes. The larger topics world-wide are mutual cultural recognition, understanding, acceptation, tolerance and cooperation. Symptoms of this agenda are threatened international harmony, the need for fairer and more sustainable trade opportunities for developing countries, the need for citizens' awareness that refugees need the opportunity to assimilate in the receiving countries and not at least finding the balance between industrial, agricultural and service economies so that food and health get optimal attention and effect the coming years.

Higher Education in a Self-Propelling Evolution

In my view, the transition from the current to the next generation of ICT in Higher Education is the articulate presence of multi-culturality. This step can only be understood through discussing the next dimensions:

1. Current large-scale societal challenges/trends at the global level: Restructuring economies, large scale migrations and the growing need for multicultural understanding.
2. Reorientation from instructional into pedagogical targets: The combination of the transfer and transformational function of education needs to be clarified so that both policy makers, designers and the actual teachers can find the optimal balance in the very context they are working in.
3. The shift from reductionist ICT models into the larger scale (big) data and its subsequent potential for meaningful learning analytics. As big data and the meaningful combination of public monitoring like in the "smart cities" grow, the issue of privacy and human rights increase. For education it implies the guarantee that learners face a fair chance to develop and do not unnecessarily suffer from learning underachievement before.
4. The fuller acceptance of teacher competencies as key asset for arranging learning scenarios at the very moment of didactic decisions even when no anticipated curricular design is at hand.
5. Envisioning the need for more agile assessment methods like portfolios and evidence-based design agreement. The goal is to allow learners to exceed the ongoing learning goals and get reinforced to contribute to the standard curriculum. School achievement tests should acknowledge this on-the-fly added value processes and encourage critical thinking and constructivist learning.

Seen the magnitude and complexity of the shifts above, it looks inevitable to focus on the coming teacher skills, competences and attitudes towards autonomy-based upon self-efficacy, self-regulation and a continuous lifelong learning in communities of practice (Lave & Wenger 1991).

Web-Communities for Virtual Distance and Presence

Web-based communities and social media provide flexible, transparent and pervasive ways to integrate learning, working and playing. The two journals that I am leading in this respect are IJWBC and IJCEELL. Their Its main target is to demonstrate how ongoing research proves that learning and societal evolution need to go hand in hand. Its continuous conclusion is that teachers face the need for lifelong learning, both in didactic, pedagogical and domain expertise. Social media and web-communities have great potential, not only for sharing best practices, but also to collaborate in designing and implementing new educational methods and evaluations.

Similarly, there is the teachers' need to a find sufficient density of face-to-face meetings with peer teachers from various countries. For this reason, I have instigated the next conferences during the last decade:

1. Web-based Communities and Social Media
2. ICT, Society and Human Beings
3. International Conference on Educational Technologies
4. E-Society

Mobile learning: In terms of concrete teacher skills, knowledge and attitude, we may expect a further penetration of learning via mobile devices.

Mobile Learning and the Need for Local Context

One trend is to accept that instead of desktops and laptops, students will continuously use their smart phones to access learning resources. The other trend is that teachers search for sound rationales to limit the mobiles in the classroom as the natural full face-to-face interaction among students and the teacher might be hampered like recently claimed by Sherry Turkle in her newest book and the New York Times bestseller, "Reclaiming Conversation: The Power of Talk in a Digital Age" (Penguin Press October 2015), which investigates how a flight from conversation undermines our relationships, creativity, and productivity.

Future Vision

My vision on the transition from the ICT Competency Framework (ICT CFT) Version 2 to Version 3. Version 2 has been welcomed by the educational field, as it delineated the two dimensions: 1) Technology Literacy via Knowledge Deepening to Knowledge Creation and 2) Understanding ICT, Curriculum, Pedagogy, Administration to Teacher Professional Learning. By bringing both dimensions in a matrix it gave the message that for its real-school implementation and integration, all transitions need care and support. Version 3 still need the same operational precision in my view. On top of that it needs a number of dimensions that I already mentioned in my introduction:

Consequence for Teacher Training

1. ICT in education will continuously face its role in societal, (multi-)cultural, emancipatory and ecological value transformation. Teachers' ICT competences need to orient to these more recent agendas that go beyond the pure academic and intellectual priorities. One can also say that these new value transformations soon need to be embedded in the curricular install base. However, ICT competences will have a decisive role in it as teachers need to be nurtured by ready-made best practices so that they can complement their improvisations with templates of proven lessons and classroom exercises.

2. Especially in societies undergoing large in- and outgoing migrations of its population, the function of social media becomes vital in connecting with one's motherland, but also in facilitating the assimilation in one's new country. Social media have that potential but also the risk of social segregation, bullying and exclusion. Teachers need the awareness, skills and tools to monitor social media in order to help students to benefit rather than suffer from its possibilities.

3. As large data streams can be combined and interpreted in terms of learning progress, teachers need the awareness, knowledge and skills to use its signalling function towards students' learning progress, but also to interpret the symptoms towards threatening drop-outs. The big-data technologies are expanding quickly and courseware publishers use the longer-term logging of learner interactions with tests and even their web excursions. While essentially Learning Analytics based upon Big Data offer teachers suggestions for needed didactic and pedagogical interventions, there is a threat of privacy violation and unwanted commercial use.

4. Teachers face the new modalities of governance in which school federations tend to grow in size and contrive efficiency instead of the quality of learning. Social media and social networking enable teachers to find and join existing teacher communities in order to mentally survive in their job. Social media have already helped the transformation towards 'servant-based leadership'; It helps to create the pedagogical atmosphere in schools in which the management and the pedagogical climate are compatible.

5. Teachers need to keep up in awareness, knowledge and skills in new technologies like Mobile Learning, 3D immersive experiences like Virtual Reality, exploratory learning with elementary programming tools like Scratch, 3D Printing, Learning Games, Simulations, etc.

The Need for Updated Teacher ICT Competences

As overall strategy to build the transition from the ICT Competency Framework (ICT CFT) Version 2 to Version 3, I think that Version 2 stays a valid message and intact for several years. Version 3 will cover the new phenomena like the five dimensions above. However, we see a large diversity in the educational field in terms of infrastructure, ideological priorities and ambitions. So I propose Version 3 to offer road maps that allow teachers and school organizations to 'pick-and-mix' ingredients from the ICT competence menu. Version 3 of the ICT Competency Framework (ICT CFT) should help its readers to self-orient and tune its message to the actual state of art in one's own situation. Also, it might be a good idea to bring the new ICT Competency Framework (ICT CFT) Version 3, not only as a web document, but as a social media entity like Web-Community including blog and repository with best practice examples. However, this last option needs an extra planning in terms of ongoing projects like the IRNet and similar ongoing EU projects.

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REFERENCES

Lave, Jean; Wenger, Etienne, 1991: *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press. ISBN 0-521-42374-0.; first published in 1990 as Institute for Research on Learning report 90-0013

Recent Publications

Deursen, Alexander J.A.M. van and Bolle, Colin L. and Hegner, Sabrina M. and Kommers, Piet A.M., 2015: *Modeling habitual and addictive smartphone behavior: The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender.* Computers in human behavior, 45 . 411 - 420. ISSN 0747-5632

He, Zhangying and Kommers, P.A.M., 2015: Editorial *"Special Issue on Rethink the Challenges and Opportunities in the Emerging of Mobile and Web Community"*. International journal of web based communities, 11 (2). 115 - 117. ISSN 1477-8394

Isaias, Pedro and Kommers, Piet and Issa, Tomayess, 2015: Preface *"The Evolution of the Internet in the Business Sector: Web 1.0 to Web 3.0"*. In: Pedro Isaias & Piet Kommers & Tomayess Issa (Eds.), The Evolution of the Internet in the Business Sector: Web 1.0 to Web 3.0. IGI Global. ISBN 9781466672628

Issa, Tomayess and Isaias, Pedro and Kommers, P.A.M., 2015: Preface *"Multicultural awareness and technology in higher education: global perspectives"*. In: Tomayess Issa & Pedro Isaias & Piet A.M. Kommers (Eds.), Multicultural awareness and technology in higher education: global perspectives. Advances in higher education and professional development (AHEPD) book series . Information Science Reference, Hershey, PA, XX - XXIII. ISBN 9781466658776

Issa, Tomayess and Issa, Theodora and Kommers, Piet, 2015: *Feedback and learning support that fosters students' independent learning: an Australian case study*. International journal of learning, 19 . 29 - 39. ISSN 1447-9494

Kommers, P.A.M. and Isaias, Pedro and Issa, Tomayess, 2015: Preface *"Perspectives on Social Media: A Yearbook"*. In: Piet Kommers & Pedro

Isaias & Tomayess Issa (Eds.), Perspectives on Social Media: A Yearbook. Routledge, New York. ISBN 9780415854160

Kommers, Piet and Isaias, Pedro and Issa, Tomayess, 2015: *Perspectives on Social Media: A Yearbook*. Routledge. ISBN 9780415854160

Kommers, Piet, 2015: *Foreword: Social media in identity transfer - Web presence in ordinary life. In: Jonathan Bishop* (Ed.), Psychological and Social Implications Surrounding Internet and Gaming Addiction. IGI Global. ISBN 9781466685956

Kommers, Piet and Simmerling, Margriet, 2015: *Editorial Special Issue on the Future of Lifelong Learning MOOCs, e-Learning Platforms and Web Communities.* International journal of continuing engineering education and life-long learning, 25 (2). 135 - 137. ISSN 1560-4624

Kommers, Piet A.M. and Smyrnova-Trybulska, Eugenia and Morze, Natalia and Issa, Tomayess and Issa, Theodora, 2015: *Conceptual aspects: analyses law, ethical, human, technical, social factors of development ICT, e-learning and intercultural development in different countries setting out the previous new theoretical model and preliminary findings*. International journal of continuing engineering education and life-long learning, 25 (4). 365 - 393. ISSN 1560-4624

DISTANCE EDUCATION IN EUROPEAN COUNTRIES

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Abstract: *The article deals with distance education and e-learning. The support for the development of distance education and e-learning is still a major priority for the European Commission. The development of distance education is also supported financially by the EU. Not only education programmes are supported financially, but also research projects dealing with this issue.*

The article maps out the current situation in distance education developments and opportunities of distance learning in adult education in various European countries.

Distance education in various European countries is at different levels of development. We can also notice various implementation models of distance learning in European countries and different levels of government involvement in the development of distance education.

Key words: e-learning, distance education, lifelong learning, foreign experience, open distance learning

INTRODUCTION

Nowadays, the emphasis on lifelong learning, learning, self-study, and education is becoming a regular part of everybody's life. Since society realises the fact that combining work and family responsibilities and study requirements is demanding, it is already possible to acquire higher qualifications in many fields of study through distance learning using an electronic system of learning, i.e. e-learning.

The concept of e-learning originated as for the English term meaning electronic learning (Zounek 2009). This concept began to appear in the literature at the end of the 1980s. It represents an effective use of the Internet and computer technology in education. The core of e-learning is the use of electronic and didactic resources leading to effective achievements of educational goals (Zounek 2006).

There are new opportunities at the level of university studies. Universities are faced with the fact that demand exceeds supply. In other words, universities are not able to admit all prospective candidates. The interest of lifelong learning at universities is also growing.

1 DISTANCE EDUCATION

The distance education system, especially at universities, is not implemented in our country as it is in other countries. Introducing distance education in the Czech Republic subject to many challenges and uncertainties such as lack of information and interpretation accuracy as far as terminology is concerned. In practice, it usually leads to confusion between the concepts of distance learning and combined studies. Therefore, we must define the concept of distance education and distance learning first.

Combined studies are modified full-time studies that conform to external students' time schedule at weekends or evening hours. Students of combined study programmes have lectures and seminars although with a lower number of lessons than full-time students.

Distance learning is a form of education based on self-directed learning (Brocket, Heimstra 1991, Knowles 1975). Students may freely study away from their education institution in the distance form of study (Keegan 1996, Race 1998).

The advantage of distance learning is the fact that it allows people who cannot attend full-time or combined studies for some reason to get the education they need. Accordingly, this form of study is suitable for people with disabilities, mothers on maternity leave, persons doing a sentence, persons serving in the military service, but is also suitable for people living in regions with insufficient transport infrastructure, etc.

In the Czech Republic, distance learning can be supported in two ways at universities. It is possible to apply for distance learning pre-graduate and graduate study programmes (bachelor's, master's, or doctoral programmes) or lifelong learning courses.

1.1 Distance education and e-learning

It has been speculated about the use of computers in education since the very beginning of the computer era. But it was the advent of personal computers that made the idea reality. Electronic teaching has become available to the general public. The Internet has occupied an important role in the development of distance education. Significant development of the Internet has increased effectiveness of distance education. It enables self-study which includes elements of management and communication between teachers and other learners (Zounek 2009).

In connection with the use of the Internet, the term e-learning has come into existence. It refers to online education, i.e. distance learning as a guided self-study in a virtual learning environment on the Internet. Learners use multimedia educational materials for their self-study and a substantial part of these learning materials is distributed via the Internet. Discussion "rooms" are part of virtual classes where students can discuss their problems with teachers (tutors) or with each other (Muňoz 2010, Suebnukarn 2009, Bednaříková 2008).

E-learning covers all advantages of distance learning. There is an individual choice of time and place of study and study pace. E-learning eliminates barriers that students must face within full-time or combined studies, such as lack of time, work and family responsibilities, health problems, etc. In addition, it expands possibilities of communication (Barešová 2012, Nocar 2004).

Tutors play an influential role in distance learning. They help students during their studies and explain some discrepancies related to learning materials or individual work (Muňoz 2010, Suebnukarn 2009, Kheng 2008, Bednaříková 2008, Bednaříková 2013, Bennet, Lockyer 2004).

2 DISTANCE EDUCATION IN EUROPE

In order to implement effective e-learning education, the state has to meet requirements such as introducing accessible Internet infrastructure of high quality, a large percentage of fully literate people including computer literacy, emphasis on lifelong learning in a particular country, and culture which values education and supports lifelong learning, etc.

E-learning with the full backing of national institutions is regarded as the significant factor (Mackeogh 2004).

Scandinavian countries are remarkable for their excellent information infrastructure and people's readiness for ICT integration into all areas of life (Paulsen 2003, Zlámalová 2007). In Sweden, a tradition of distance education dates back to 1898, when the oldest Swedish institution, providing distance learning, Liber Hermonds, was founded and still exists. Finland with its high level of ICT is sparsely populated which is considered to be ideal conditions for the development of distance learning. Denmark has a great tradition of evening and weekend study forms. The idea of lifelong learning has been applied there since the 19th century. The concept was popularized by N.F.S. Grundtvig, a founder of the so-called folk colleges focusing on students' personal development. Norway has a highly developed system of distance learning which represents a part of its education system. Norway was the first country where the distance form of study was regulated by a specific act. The Act of Education concerning distance education was adopted there in 1947.

In most European countries, open and distance learning up to the level of secondary education is mainly guaranteed by local authorities (e.g. they organize ad hoc projects at the level of schools) or there are active private education providers in this field. It seldom happens that national institutions take measures or perform some activities in this field (Kostolányová 2013, Zlámalová 2007, Mackeogh 2004).

The issue of adult education and distance learning is dealt with systematically in most developed countries. However, the form of distance learning is a matter of course in most developed countries. Usually, this form of studies is fully or largely supported by the government (Baumeister 1999, Hampl, Česal, Vaškovic 2008).

Distance learning is particularly widespread in Belgium, where the form of distance learning is provided by twenty commercial institutions (Kostolányová 2013, Zlámalová 2007). Distance learning represents a principal part of the education system in Spain. In France, the form of distance learning has a long tradition where National Centre for Distance Education is the largest institution in the world in terms of distance learning. Universities operate about 30 distance learning centres which fall within the authority of the International Association for Distance Learning (Federation Interuniversitaire de l'Enseignement a Distance). It ensures co-ordination in distance learning activities at universities. The largest European Open University is located in the UK (Kostolányová 2013)) and provides open and distance education. Distance learning is widespread in Norway, which is a pioneering country in advancing the concept of distance education (Zlámalová 2007, Hampl, Česal, Vaškovic 2008).

In Europe, we can find different implementation forms of distance learning within the education system of each country (Baumeister 1999, Hampl, Česal, Vaškovic 2008).

There are enormous differences in distance education within European countries. Western European and Scandinavian countries have a long-established tradition of distance education realized in the correspondence form of studies. Central and Eastern European countries have rather a tradition of evening and combined learning supported by their governments. In these countries, the development of distance learning started in the 1990s (Baumeister 1999, Mackeogh 2004, Hampl, Česal, Vaškovic 2008).

2.1 Models of distance education

According to V. Jochman (cited by Palán 1997 and supplemented), it is possible to define several different models of distance learning that we encounter in European countries. Naturally, there is a certain simplification. The variety of distance learning models and distance education is caused by different cultural aspects of the given countries and different education systems. Furthermore, there are different legislative norms, laws regulating the education and education systems including distance learning. The tradition of distance education and distance learning also plays a major role. The development of information and communication technology together with its use in the education, school environment, and adult education performs a significant role. A principal aspect, which supports the development of distance education and distance forms of studies, covers the population density in a particular country and accessibility of education institutions for all the population in terms of spatial dimensions (Hampl, Česal, Vaškovic 2008).

British model

In the UK, a large institution, which is financially supported by the government, is widespread throughout the country and has branches in other European countries. The branches are also set up in the Czech Republic, Slovakia, and Spain. This large institution is specializing in distance education of all types and levels.

The UK is known for its Open University, which is the largest open university in Europe. The university offers education of high quality and graduates of the British Open University achieve full recognition and are highly ranked in the labour market (Zlámalová 2007). The British Open University is also the largest European education institution that confers an MBA degree (HEA 2009, Zlámalová 2007).

Distance learning in the UK is not regulated by the government and there is no state law regulating the distance form of studies. This is because the education institutions, which provide distance learning, are completely independent of the government (Owusu-Boampong, Holmberg 2015).

German model

In Germany, a specialized distance university of the central European type is implemented and focuses only on the university education. The German model is also implemented in Portugal and the Netherlands (Zlámalová 2007). In the Netherlands the use of media in Higher Education is encouraged by the ministry of higher education (Kommers, Smyrnova-Trybulska, Morze, Noskova, Yakovleva, Pavlova, Drlík, Malach, Delgado, Pinto, Issa, Issa 2014).

In Germany, the distance form of studies is regulated by the Student Protection Act to protect students who study at distance learning programmes (Owusu-Boampong, Holmberg 2015). In Portugal the distance form of studies is also regulated the government (Kommers, Smyrnova-Trybulska, Morze, Noskova, Yakovleva, Pavlova, Drlík, Malach, Delgado, Pinto, Issa, Issa, 2014)

French model

France has cherished a tradition of the distance form of studies since the 1920s when the radio used to broadcast education courses implemented by

Sorbonne University. France is characteristic of state-supported institutions for distance learning These institutions are interdisciplinary structured and enable education at all levels (Kostolányová 2013). The institutions, which offer distance learning, are interconnected with traditional universities, colleges, and other education institutions providing full-time studies (Zlámalová 2007).

The distance form of studies is also regulated by state. Further Education and Training Act and the Apprentices Act define the distance form of studies as an integral part of the education system in the context of continuing education (Zlámalová 2007).

Irish model

Universities and other education institutions cooperating closely with National Distance Education Council, which is set up and supported financially by the government, are promoting distance learning. The National Distance Education Council covers distance education in Ireland, makes evaluation and measures its quality, and encourages the development of distance education (Zlámalová 2007, HEA 2009).

Irish education institutions, which provide distance learning, are often linked to the British Open University they co-operate with (Owusu-Boampong, Holmberg 2015, HEA 2009).

Nordic model

The Nordic model of education is typical of its association of universities and other education institutions offering distance learning. These universities and other education institutions mostly have a mutual managing authority within the association, i.e. a common regional centre (Amft 2014). These institutions are typical of a dual education system – that is, a combination of both full-time and distance learning at the same time (Kostolányová 2013). These education institutions provide graduate studies and various types of adult education courses (Owusu-Boampong, Holmberg 2015).

The Nordic model is implemented in Sweden, Denmark, Finland, and Italy.

In addition to these five models of distance education, mixed models also exist and they only adopt some organizational elements.

3 DISTANCE EDUCATION IN THE CZECH REPUBLIC

The tradition of distance education in the Czech Republic does not exist. This is why its implementation is quite complicated and lengthy (Hampl, Česal, Vaškovic 2008, Poulová 2009). Besides several attempts to introduce distance learning in education institutions focusing on adult education, such as the Jan Amos Komenský Academy or the European School for Correspondence Courses, this form has gained gradual acceptance mainly at universities. They are especially

Brno University of Technology, Palacký University Olomouc, and Technical University of Liberec which started to organize this form of studies in the 1990s. Later they were followed by University of West Bohemia, University of Ostrava, University of Economics Prague, and Metropolitan University Prague.

Nowadays, the issue of distance education and distance learning support is discussed in the Czech Republic. This form of studies meets the needs in education process of adults who have work, family and study responsibilities and it is sometimes extremely difficult to handle them all (Barešová 2012, Nocar 2004, Poulová 2009). The government of the Czech Republic also deals with the issue at the level of strategic documents, for example the government document on the Strategy of Lifelong Learning in the CR.

In terms of distance education and distance learning, a law recognizing the so-called dual model and its support was introduced in the 1990s. This means that universities and colleges may prepare, implement and obtain accreditation to their study courses in full-time and distance learning. This decision is enacted in the Accreditation Committee Decree and the University Act. (Kostolányová 2013, Poulová 2009).

CONCLUSION

A new information society has emerged recently where ICT play a principal role. ICT services are expanding to our daily activities as well as education. Distance learning, supported by ICT, has been also developing in the Czech Republic for the last decade.

E-learning courses are very beneficial and students evaluate them positively (Liška, Česal 2008, Kheng 2008, Barešová 2012, Nocar 2004). Their most significant advantage is their accessibility as you can study anytime and anywhere (Kheng 2008, Barešová 2012, Nocar 2004). The only condition is to have the Internet access. Distance learning remains independent in terms of the distance between students and a teacher. As a result, this form of studies is highly effective in education of women on maternity leave or people with disabilities, etc. (Barešová 2012, Nocar 2004). However, there are some disadvantages of distance learning for students. One of the downsides is a teacher’s physical presence, or rather absence (Klement, Dostál 2012). Students gain nearly all study materials from e-learning materials, textbooks, or essays and get feedback via the test questions, tests, self-tests, individual tasks and exercises (Klement, Dostál 2012).

Students’ online testing brings real benefits for teachers. After the test, both students and the examiner obtain a result immediately which saves a lot of time (Zatloukal, Ulrich 2008). Distance learning has also some disadvantages for teachers. One of the downsides is an arduous process of creating study texts, which are suitable for this form of studies. Creating an efficient and high quality study material, suitable for e-learning and effective in self-study, is more demanding than creating a textbook for full-time studies. Teachers' inexperience in e-learning may also put them at disadvantage. They are used to teaching in a traditional way, i.e. direct methods of teaching, lectures and seminars, and e-learning environment is unusual for them and consequently very demanding (Maier et.al., 1999, Chute et al., 1998).

Although it is possible to state that students can study any subject in distance learning courses, not every subject matter is suitable for distance learning. However, it is necessary to think about a percentage of full-time learning that should be included to reach a high level of effectiveness of a particular subject of study. Full-time studies are irreplaceable although knowledge can be also spread effectively to distance learning students. Conversely, it is difficult to teach skills in this way and it happens frequently that it is not feasible to impart teaching them in distance learning.

REFERENCES

Amft A. 2014. *Higher Education in Sweden. Status report.* Stockholm: Swedish Higher Education Authority. [online] at http://www.uka.se/download/18.7ff11ece146297d1aa65b4/higher-education-in-Sweden-2014-status-report.pdf (accessed 9 August 2016)

Barešová, A. *E-learning ve vzdělávání dospělých*. Praha: VOX, 2012. 200 p. ISBN 978-80-87480-00-7

Baumeister, H. P. 1999. Western Europe. In K. Harry (Ed.),*Higher Education Through Open and Distance Learning: World review of Distance education and open Learning*.New York: Routledge, pp. 244-255. ISBN-0-415-19791-0

Bednaříková, I. 2008. Role tutora distančního vzdělávání – reflexe aktérů této činnosti. In *Distanční vzdělávání v České republice – současnost a budoucnost*. Praha: NCDiV and Ústí nad Labem: PF UJEP. 16 p. ISBN 978-80-86302-43-0.

Broket R..G., Heimstra R. 1991. *A conceptual framework for understanding self-direction in adult learning, Self direction in Adult Learning: Perspectives on Theory, Research and Practice.* Lonodon: Routledge. ISBN 0-340-20919-4.

Hampl, S.; Česal, J.; Vaškovic, P. 2008. *Srovnání role a postavení e-learningu ve vzdělávacím systému vybraných zemí*. Praha: ČVUT. ISBN 978-80-01-04007-2.

HEA (Higher Education Authority), 2009. *Open and Flexible Learning* . HEA Posititon Paper.

Chute A, Thompson M., Hancock B. 1999. *McGraw-Hill Handbook of Distance Learning.* New York: McGraw-Hill Companies, Inc. 236 p. ISBN-13: 978-0070120280

Keegan D. 1996. *Fundation of Distance Learning.* London: Routledge. 240 p. ISBN-13: 978-0415139090

Kheng S. 2008. The challenges of upgrading from ISPO Category II level to Bachelor Degree level by distance education. *Prosthetics and Orthotics International,* Vol. 32, No. 3, pages 299–312. ISSN*:* 0309-3646

Klement M., Dostál J. 2012. Využívání a role e-learningu v současném vysokoškolském vzdělávání. *Aula,* No. 1 s. 93-110. ISSN 1210-6658

Kommers P, Smyrnova-Trybulska E., Morze N., Noskova T., Yakovleva T., Pavlova T., Drlík M., Malach J., Delgado S.C., Pinto P., Issa T., Issa T. Contrastive analysis and evaluation of the ICT and e-learning competences in Australia, Czech Republic, the Netherdlands, Poland, Portugal Russia, Slovakia, Spain and Ukraine within the Framework of the irnet international research networ project In E-learning and Intercultural Competences, Development in Different Countries edited by SMYRNOVA-TRYBULSKA E.,. Katowice-Cieszyn: Universities Silesia in Katowice, 2014. ISBN 978-83-60071-76-2.

Kostolányová K. 2013. *Distanční vzdělávání.* Ostrava: Ostravská univerzita. 130 s. [online] at https://publi.cz/download/publication/27?online=1 (accessed 9 August 2016)

Liška, V.; Česal, J. *Postoje studentů vysokých škol k E-learningu*. Praha: ČVUT, 2008. 64 p. ISBN 978-80-01-04214-4

Mackeogh, K. 2004. *EU Policies in Distance Education*, *Mass-individualisation of higher education for the knowledge -based society*. Open University of Netherlands: European Association of Distance Teaching Universities.

Maier P., Barnett L. Warren A., Brunner D. 1998. *Using Technology in Teaching and Learning.* London: Kogan Page. 138 s. ISBN 0-7494-2515-6

Muňoz D.C.2010. *Effective e-learning for health professional and medical students: the experience with SIAS-Intelligent Tutoring system*. Studies in Health Technology and Informatics, Vol. 156, pp 89–102. ISSN 0926-9630

Nocar, D. et al. 2004. *E-learning v distančním vzdělávání*. Olomouc: UP. 78 p. ISBN 80-244-0802-3.

Owusu-Boampong A., Holmberg C. 2015. *Distance education in European higher education – the potential.* UNESCO Institute for Lifelong Learning, International Council for Open and Distance Education and Study Portals B.V.

Palan, Z. 1997. *Výkladový slovník vzdělávání dospělých*. DAHA, Olomouc, 159 p. ISBN 80-902232-1-4

Paulsen, M. F. 2003. *Online Education and Learning Management Systems – Global Elearning in a Scandinavian Perspective*. Oslo: NKI Forlaget. 337 p. ISBN 82-562-5894-2

Poulová, P. 2009. The role of E-learning in University Education in the Czech Republic. In ŠIMONOVÁ I.; POULOVÁ, P.; ŠABATOVÁ, M. *On contribution of modern technologies towards developing key competences.* Hradec Králové: M. Vognar, 191 s. ISBN 978-80-86771-38-0.

Race P. 1998. *500 Tips for Open and Flexibility Learning.* London: Kogan Page. 172 s. ISBN 0 7494 2410 9

Suebnukarn S. 2009. Intelligent tutoring system for clinical reasoning sklil acquisition in dental students. *Journal of Dental Education*, Vol. 73, No. 10, pages 1178–1186. ISSN: 0022-0337

Zatloukal, Ulrich. 2008. E-learning a malé školy In *Klady a zápory e-learningu na menších vysokých školách a nejen na nich.* Praha. Soukromá vysoká škol ekonomických studií. 64 p. ISBN 978-80-86744-76-6

Zlámalová H. 2007. Distanční vzdělávání a elearning v evropských zemích. *Aula*, Vol. 15, No. 4. ISSN 1210-6658

Zounek, J. 2006. E-learning a vzdělávání. Několik pohledů na problematiku e-learningu. *Pedagogika,* Vol. 56, 414-418 p. ISSN 0031-3815

Zounek, J. *E-learning – jedna z podob učení v moderní společnosti*. Brno: Masarykova univerzita, 2009. 161 p. ISBN 978-80-210-5123-2.

PHILOSOPHIZING WITH CHILDREN USING OPEN EDUCATIONAL RESOURCES (OER)

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Abstract: *This paper deals with the ethical learning for students aged 3 to 15. The main question is: What's the advantage of Open Educational Resources (OER) for ethical learning:*

- How can we make students realize the importance of recognizing, assuming, reflecting and incorporating values, especially taking responsibilities with PowerPointPresentation in preschools and kindergartens?

- Is internet with OER helpful for philosophizing with children to ethics and values education? The author sees a great chance in the ICT medium for philosophizing with children, to develop ethical issues like respect, tolerance, friendship and responsibility – to be seen on the EU-projects ETHOS (2012 – 2014) and ETHIKA (2014 – 2017).

Keywords: Philosophizing with Children, ETHIKA, words – answer – responsibility; taking responsibility in kindergarten and elementary school, educational material

INTRODUCTION

Knowing that Ethics is a science with the aim of acting (and not just speaking how to act), it's also necessary to distinguish what is meaningful in a specific situation, because there are very seldom black-white, right-wrong, good-bad decisions. Therefore to foster value and ethical education we work with stories, conflict stories and dilemmas to encourage critical thinking with the method Philosophizing with Children (PwC).

The author wants to discuss, how to teach values with the medium of the Internet – using educational materials which were developed in the EU-project ETHOS: *Ethical Education in Primary and Pre-primary Schools for a Sustainable and Dialogic Future*. In this project the method of PwC is crucial. In an example the necessity of words will be discussed (word was given to me so I am able to respond and to become a responsible person).ETHIKA (http://www.ethics-education.eu) represents a recent EU project of ethical education targeting a sustainable, dialogical future.` A User Needs Analysis´ was carried out in six European countries - eight essential ethical issues are mentioned and one of them is "responsibility". To properly understand this, it is, inter alia, the "philosophy to ethical issues" which must be taken into consideration.

1. FOR A DIALOGICAL SUSTAINABLE FUTURE: ETHOS and ETHIKA

Picture 1. Logo of the EU-Project ETHOS
Source: www.ethos-education.eu

Picture 2. Logo of the EU-Project ETHIKA
Source: www.ethics-education.eu

The projects ETHOS and ETHIKA give the chance to realize values. Those projects for ethical education in primary and pre-primary schools for a sustainable and dialogic future address the needs of primary, lower secondary and pre-primary school teachers and other educators and offer them lifelong learning opportunities in ethics education, employing dialogical (philosophy with children) and integrative (holistic) methodology and approach. The main outputs of the projects are educational materials and tools for teachers that are prepared in relation to the previous User Needs Analysis (UNA) and then they are tested in piloting activities and test-beds by teachers and other educators in the classrooms. The core motivation for the projects was awareness that the challenges that the EU countries and the rest of Europe are facing now are not merely economic or political, but also societal, cultural and especially ethical.

The results also include establishment of a European network of ethics and value educations that will build synergy, reinforce cooperation and exchange good practices and experiences. In the future the ETHIKA researchers are planning to sustain and broaden network of associated organizations, provide support for users and provide space for exchanging experience and good practices.

The project will enhance innovation and internationalization in the school sector and strengthen cooperation (capacity building); critical thinking will raise the level of key competences and skills and encourage active participation in society (Erasmus+; EU 2020).

In the project ETHOS 2012 – 2014 universities and research institutions of seven European countries were involved; in the following project ETHIKA 2014 – 2017 work institutions of six countries (without Bosnia-Hercegovina), but with Bundesverband Ethik (BVE) Germany and two schools in Slovenia.

The main objectives of the project are to provide helpful lifelong learning possibilities for teachers and educators using innovative methodology and integrative approach in the field of ethics education and especially to stimulate the rise in the level of ethical knowledge, awareness and critical thinking.

1.1 Main aims of ETHOS and ETHIKA

„The most relevant topics addressed by the project are ethics and values education utilizing the approach of critical thinking and philosophy with children in order to strengthen the skills of school teachers in this field.

Critical discussion, especially in the field of ethics and values is one of the most challenging tasks for teachers, especially in the light of cultural and social diversity that open up several key issues that could be developed through this process.

The project aim primarily to develop new and innovative curricula, open educational resources, educational methods and training courses, which would then multiply and due to organization of network for ethics and value education and follow-up activities lead to policy development and change in this field“ (http://www.ethics-education.eu/project/project01.htm).

1.2 User Needs Analysis (UNA) of ETHOS and ETHIKA

By using online survey (for teachers and parents) the researchers found out that teachers and parents who were involved in a survey have similar needs and expectations concerning:

a) what topics they consider as most relevant for ethics education;

b) on which thematic aspects they would like the educational material and tools to be developed.

Based on these answers of the focus group the researchers of ETHOS have created a shortlist of eight key ethical topics: moral values, respect, tolerance, responsibility, environment, social skills / conflict solving, relationship / friendship, different religions.

In February 2015 the Austrian ETHIKA-team organized two Focus Group Meetings attended by 27 teachers (teaching students aged 3 to 15), experts in moral education. To the question "*What topics are the most relevant in the process of teaching ethics and values education at school?*" most of the answers were about the dialogue: sensitivity to others, respect, tolerance, acceptance, empathy, self-worth, self-confidence, awareness, esteem, nonviolent communication, peace, solidarity …

Answers to the questions *"How do you manage to develop ethical sensitivity to ethical issues (e.g. cyber bullying ...) in the students, in the personal environment and globally?"* and *"How do you manage to teach in a character-building way so that students learn to stand for their opinions and actions?"* brought revealing results: self-perception, mindful dealing with each other, stating the personal opinion, sharing things, celebrating, negotiating rules, searching for good solutions, being appreciative, empathy, helping each other, comforting each other, honesty, trust, teamwork, fairness, personal relationships with the pupils, teacher as a role model, encourage good, individuality, permission to express emotions such as pity, compassion, joy, anger, gratitude.

The results of the UNA of ETHIKA-Austria are comparable with the results of the ETHIKA-UNA in all six participating countries: self-esteem, honesty, appreciation (as the psychological basis for communication), dialogue, relationships, respect, friendship, conflict solution, co-operation, responsibility, moral values, justice, acceptance, empathy, compassion, (as very important values in dialogic pedagogy) (presented by Evelyn Schlenk [FA-University Nurenberg-Erlangen] at the ETHIKA teacher training in Ljubljana on February 23rd 2015). In general we can say that teachers perceive the importance of communication in ethical learning processes.

2. OPEN RESOURCES (OER) FOR ETHICAL EDUCATION

Based on the results of User Need Analysis (UNA) of ETHOS the eight ethical key topics were narrowed down to five central topics: respect, tolerance, responsibility, values and friendship. A set of educational materials on these topics was developed for different age groups. All this was then tested in piloting and test-beds activities. A project website with basic information about the project and its results is reachable at: http://www.ethos-education.eu/; Facebook page: www.facebook.com/ethoseducation.

The Information and Communication Technology (ICT) supports face-to-face-communication and is very useful for philosophizing with children. The set of educational materials for the use of teachers and educators for different age groups (ages 3 – 5, 5 – 7, 7 – 9, 9 – 11, 11 – 15) is presented in the internet. It can be used in the teaching process according to the Creative Commons Non Commercial Share Alike license.

2.1 Educational tools – an Overview

In the section „Learning Materials and Tools“(http://www.ethics-education.eu/tools/index.htm) the website presents the ETHOS and ETHIKA tools. The materials can be downloaded. The Creative Commons license permits the free use.

In this section a question is also asked: „Do you need resources that help you discuss values in your classroom? In these pages you can find teaching materials and manuals prepared by our project team.

Picture 3. International Logo of the Creative Commons Non Commercial Share Alike license

Source: www.ethics-education.eu

They will allow you to craft your very own project. Some important recommendations:

- Feel free to adapt duration so that it fits into your time schedule.

- Same for the age group. The cognitive development of pupils can vary a lot. Decide what material fits your class best.

- Remember to leave most of the time to discussion with your class!

- Discussion in class can be open ended. Do not feel frustrated if the discussion does not come to a conclusion. What counts is installing a dialogue.

- If you feel the need to adapt names of stories coming from other cultures to a more familiar context feel free to do so.“ (http://www.ethics-education.eu/tools/index.htm)

The educational tools were developed within the framework of Ethos. Friendship, Moral Values, Respect, Responsibility, Tolerance are the five topics chosen together with teachers and parents coming from Austria, Bosnia-Herzegovina, Croatia, Germany, Italy, Slovenia and Spain through focus groups and questionnaires.

EDUCATIONAL TOOLS FOR THE AGE 3 TO 5:

„**Friendship**, Teacher Manual: *Good and bad in friendship* (PDF-459KB, English)
Moral values, Teacher Manual: *Marijana goes to kindergarten* (PDF-502KB, English)
Respect, Teacher Manual: *Marko in kindergarten and Marko at home* (PDF-468KB, English)
Responsibility, Teacher Manual: *Game of Compromise* (PDF-427KB, English)
Tolerance, Teacher Manual: *Game of Sharing* (PDF-444KB, English)”
(http://www.ethics-education.eu/tools/tool01.htm)

EDUCATIONAL TOOLS FOR THE AGE 5 TO 7:

„**Friendship**, Presentation: *Creature from Jupiter* (PPTX-2449KB, English)
Friendship, Teacher Manual: *Creature from Jupiter* (PDF-438KB, English)
Moral Values, Teacher Manual: *Good Angel and Bad Imp* (PDF-470KB, English)
Respect, Teacher Manual: *Stop* (PDF-465KB, English)
Responsibility, Presentation: *Hippo and Bee* (PPTX-1667KB, English)
Responsibility, Teacher Manual: *Hippo and Bee* (PDF-459KB, English)>
Tolerance, Teacher Manual: *Common Drawing* (PDF-439KB, English)”
(http://www.ethics-education.eu/tools/tool02.htm)

EDUCATIONAL TOOLS FOR THE AGE 7 TO 9:

„**Friendship**, Teacher Manual: *My Best Friend* (PDF-227KB, English)
Moral Values, Story: *The Little Ones and the Big Ones* (PDF-1181KB, English)
Moral Values, Teacher Manual: *The Little Ones and the Big Ones* (PDF-219KB, English)
Respect, Story: *Story of Fluffy* (PDF-343KB, English)
Respect, Teacher Manual: *Story of Fluffy* (PDF-445KB, English)
Respect, Additional activities: *Story of Fluffy* (PDF-344KB, English)
Responsibility, Presentation: *Teddy's Pear* (PPTX-24.887KB, English)
Responsibility, Teacher Manual: *Teddy's Pear* (PDF-444K2, English)
Responsibility, Additional Materials: *Teddy's Pear* (PDF-374KB, English)
Tolerance, Presentation: *Blue Horse* (PPTX-2976KB, English)
Tolerance, Teacher Manual: *Blue Horse* (PDF-436KB, English)“
(http://www.ethics-education.eu/tools/tool03.htm)

EDUCATIONAL TOOLS FOR THE AGE 9 TO 11:

“Friendship, Presentation: Friendship (PPTX-2393KB, English)
Friendship, Teacher Manual: Friendship (PDF-623KB, English)
Moral Values, Story: The Dog and the Wolf (PDF-333KB, English)
Moral Values, Story: The House of the Hedgehog (PDF-932KB, English)
Moral Values, Story: The King Midas and Diogenes (PDF-332KB, English)
Moral Values, Presentation: Moral Values (PPTX-1517KB, English)
Moral Values, Teacher Manual: Moral Values (PDF-631KB, English)
Respect, Teacher Manual: What Could Happen (PDF-475KB, English)

Responsibility, Presentation: Responsibility (PPTX-1607KB, English)
Responsibility, Teacher Manual: Responsibility (PDF-543KB, English)
Tolerance, Presentation: Diversity (PPTX-4418KB, English)
Tolerance, Teacher Manual: Diversity (PDF-584KB, English)"
(http://www.ethics-education.eu/tools/tool04.htm)

EDUCATIONAL TOOLS FOR THE AGE 11 TO 15:

„**Friendship**, Teacher Manual: *Defining the Friendship* (PDF-263KB, English)
Moral Values, Story: *Valeria and a Pearl* (PDF-352KB, English)
Moral Values, Teacher Manual: *Valeria and a Pearl* (PDF-476KB, English)
Moral Values, Additional Activities: *Valeria and a Pearl* (PDF-343KB, English)
Respect, Teacher Manual: *Online Discussion about Respect* (PDF-236KB, English)
Responsibility, Story: *A Fully Unexpected Event in Almond Street No. 31* (PDF-57KB, English)
Responsibility, Teacher Manual: *A Fully Unexpected Event in Almond Street No. 31* (PDF-553KB, English)
Responsibility, Additional Activities: *A Fully Unexpected Event in Almond Street No. 31* (PDF-374KB, English)
Tolerance, Teacher Manual: *Defining the Tolerance* (PDF-294KB, English)"http://www.ethics-education.eu/tools/tool05.htm

ETHIKA Tools are being developed in these months and translated into six languages

2.2 The educational material WORD–ANSWER–RESPONSIBILITY

We'd like to present one of the newest educational materials, which got tested by most of the teachers (see chapter 3.3).

The educational material "WORD-ANSWER-RESPONSIBILITY" is a package consisting of
- PowerPointPresentation with 24 slides for the lesson.
- Teacher Manual (7pp)
- reflection for students (1p)
- Evaluation for teachers (2pp)

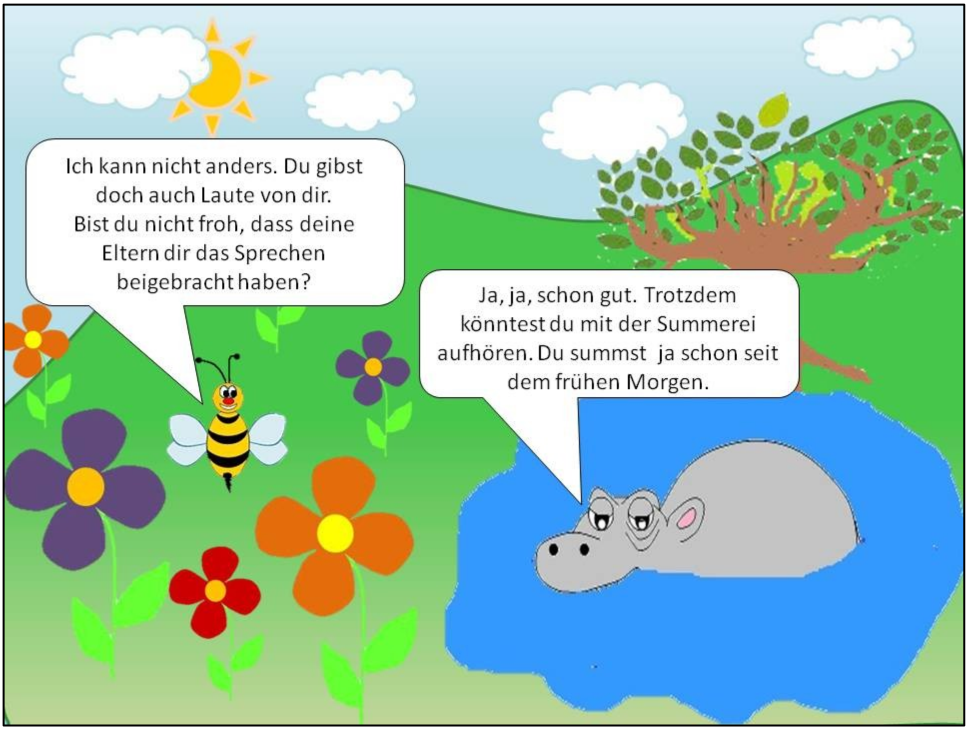
For use in the classroom, there are several possibilities. We suggest:
First watch the whole presentation with the pupils.

In a second round only look at these slides, which help you to philosophize with the pupils.

With this presentation other topics can be tangled, such as the question of identity, thankfulness, satisfaction, etc.

Two animated characters – a hippo and a bee – are talking. The dialogue evokes a lot of philosophical questions, affecting the own life. For this article there are chosen a few sentences:

Slide 5: Hippo: *"Stop humming!"* Bee: *"Why are you yelling at me? Humming is part of a bees life. It is part of me."*
Questions: *What's part of you? What is characteristic of you?* (Question of identity)



Picture 4.WORD-ANSWER-RESPONSIBILITY
Source: Weinberger 2016, 62

Slide 7: Hippo: *"Yes, you are right. At day I rest comfortably in the water and occasionally I sleep. But at night I'm very active. I build paths and I'm looking for food.*"
Questions: *How about you? When do you need to rest? How often/long? How important is the balance of being active and resting?*
Slide 8: Bee: *"And you are satisfied with your life?"*
Questions: *Are you satisfied with your life? Why? Why not? What would you like to change?*
Slide 10: The hippo starts to be interested. It wants to know more about the bee. The bee tells him about her duties and what she is useful for.
Slide 12: The hippo thinks about what he is useful for.
Questions: *What does it mean 'being useful'?*
Slide 14: The hippo is getting tired again and wants to rest. But the bee doesn't*: "I can't. You are also making noises. And surely you are happy that your parents taught you how to speak."*
Questions: *Do you know which words your parents said to you very early? Can you*

remember a special word or sentence?
Slide 16: Bee: *"Tell me, do you have specific duties which you have to fulfill?"*
Questions: *What can the bee mean? Which duties do you have to fulfill? How did you realize that you have duties? Is it important for you that someone shows you how to do things or that he/she tells you how? Why?*
Slide 17: Bee: *"Yes, that's true. Our life is a gift."*
Questions: *Do you think your life's a gift?*
Which things do you get for free, without doing anything to get it?
Which specific characteristics are a part of you?
Slide 18: Bee: *"Are you thankful for your life?"*
Questions: *What are you thankful for?*
Slide 19: Hippo*: "I'm responsible for myself!"*
Questions: *In what way do you assume responsibility for your life?*
Slide 20: Hippo: *"It's enough! I'm a pygmy hippo! Everyone lives alone and we like it. Only the children stay together with their parents."*
Questions: *When do you prefer to be on your own?*
Slide 21: Bee: "*We are a community."*
Questions: *What makes a good community up? How's the community in your class? How are the duties spread? How do you speak to others and about what? How do you tell them about your feelings?*
Slide 24: The pygmy hippo thinks about what the bee said: *"There are so many things I'm thinking about. A beehive for hippos? Maybe companionship would do me good ... Who knows?"* (reflection).
Questions: *How can good words from your colleagues help you?*

2.3 Philosophizing with Children

"Philosophy for children and philosophy with children approaches are not limited to ethical themes and questions, but represent a method. As a method it is primarily focused on the way to approach – with our thinking – to various topics, questions and challenges. Philosophy for children (P4C) and philosophy with children (PWC) are contemporary philosophical and pedagogical disciplines, which have a common goal of developing reflective, critical thinking in children and developing their argumentative skills. Mathew Lipman, one of the founding fathers, gives a very nice explanation for developing P4C: 'Philosophy for Children didn't just emerge out of nowhere. It built upon the recommendations of John Dewey and the Russian educator, Lev Vygotsky, who emphasized the necessity to teach for thinking, not just for memorizing. It is not enough for children merely to remember what has been said to them: they must examine and analyze that material. Just as thinking is the processing of what children learn about the world through their senses, so they must think about what they learn in school. Memorizing is a relatively low-level thinking skill; children must be taught concept-formation, judgment, reasoning, etc.' (Lipman 2003). Most approaches in P4C/PWC realm include a multidisciplinary use of the insights from child psychology, sociology, pedagogy etc. to complement philosophy as a starting point." (Ćurko, B, Feiner, F., Gerjolj, St., Juhant, J., Kres, K., Mazzoni, V., Mortari, L., Pokorny, Sv., Schlenk, E. & Strahovnik, V., 2015).

2.3 How to lead a philosophical dialogue?

It is recommended that children sit in a circle (U-form), while talking, so that they can see each other as well as the PPP.

The facilitator can interrupt the reading/listening of the story, take up a dialogue and later on continue with reading the story. Or they first listen/watch/read the story and at the end of the story it is followed by a dialogue.

The general principle is to start from something familiar to children's experience, something clear to them. The dialogue continues from the concrete towards the abstract.

The inductive method is visible in the issues that make the plan discussions.

The experience of students should be taken into account, urging them to give examples.

The goal is to touch the most general questions. It is important that children by themselves do the process of thinking, and that no answers are suggested. The facilitator gives his/her opinion only if asked to do so. If he/she notices that the discussion requires some explanation or some factual knowledge that children do not have, but which is relevant to the debate, he/she should provide it.

The students who do not participate in the debate voluntarily should not be forced to say anything, but one should try to encourage them by posing questions (Lena, what do you thinkabout Dominik’s statement?).

2.4 Holistic ethics and values education

There exists a lot of concepts for ethics education (Heinrichs, Oser & Lovat 2013), eg. Lawrence Kohlbergs approach to moral judgment (Kohlberg 1982). Like Carol Gilligan (1982) criticized, this approach is too cognitive and she found, that it is necessary to aware the emotional side of moral development. But Kohlberg doesn’t just work with dilemmas, he says that the aim of education is development. And he emphasizes, that fictive dilemmas are important for the development of the moral judgment, but more important is the development of just communities (1978, 215 – 259). We appreciate the holistic approach of Kohlberg.

Because ethics is a science of acting, Hans Küngs concept of “Weltethos” is very important. His approach is global, because Küng emphasizes, that all the religions have the same ethical potential, e.g. the Golden Rule, and they have to engage for acting in the world.

In our research and development projects of ethics and values education we combine our approach with the concept of multiple intelligences of Howard Gardner (1983), since he offers a broad understanding of the construct of intelligence and states that every person has a set of multiple intelligences. Gardner's approach puts the learner in the focus with all of his or her multiple intelligences around. This theory is a holistic approach: educators are able to appreciate the strengths of their students, to encourage and support students to direct their individual way of learning (Gardner 2003). With our educational materials we want to realize all the multiple intelligenzes of H. Gardner.

Picture 5. Howard Gardners multiple intelligences
Source: Schlenk 2014, 12

3. EXPERIENCE AND INVESTIGATION

From February to July 2016 an actual research project at the KPH Graz asked the question: How effective are the new ETHIKA materials? Due to this, teachers could show their interest working with the newest tools. On the one hand, about 400 teachers in Styria/Austria received information and invitation by the newsletter

"Flaschenpost". On the other hand, teachers of the focus groups, who had contributed to the User Needs Analysis, were invited directly by mail. The teachers, who were interested in this experience got access to the Dropbox, where the newest tools were located. The teachers of students in the age 3 to 15 in kindergarten, primary schools and gymnasiums could choose educational materials between the topics self-esteem, responsibility, justice, conflict resolution...

A questionnaire with 12 items should bring results, which are helpful for decisions in the case and question, which materials should be preferred, translated into six languages, presented in the internet for free use in the teaching process according to the Creative Commons Non Commercial Share Alike license.

3.1 Methodology

The design of the study is descriptive and uses surveys developed through the implementation of a questionnaire described as follows (Straßegger-Einfalt & Feiner 2016).

The sample sonsists of students of the Catholic University College for teacher education KPH Graz and the teachers Renate Straßegger-Einfalt and Franz Feiner as project mangager of ETHIKA-Austria.

The complete version of the questionnaire can be located at:
https://www.ph-online.ac.at/kphgraz/webnav.ini
57 persons participated at the research project, 75,4% (n=43) female and 22,8% (n=13) male, 1 person did not state the sex.

AGE OF THE RESPONDENTS

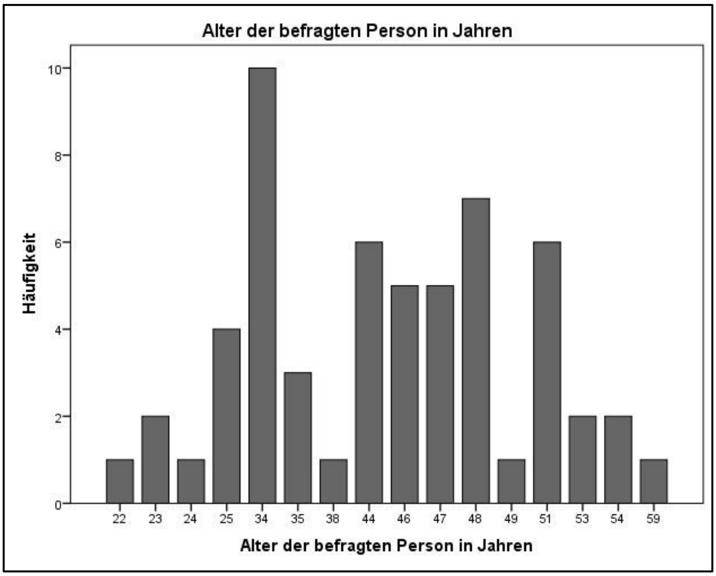


Figure 1. Age of the respondents
Source: Fasch & Gruber-Stadler 2016, 5

The youngest participant of the survey is 22 years old. The oldest participant is 59 years old. The with 10 people most frequently reported age is 34 years. The calculated average of all respondents is 41.54 years.

YEARS OF SERVICE

47 of the 57 respondents gave information about their years of service. 10 participants gave no comment. The 11 people most frequently mentioned period of years of service is 6 years. 7 people said, 3 years to work as a teacher or educator. Each 6 people have been working for 10 or 19 years in their chosen careers. The longest-lasting service time of 33 years was specified by 2 people. 2 participating subjects indicated less than 1 year to work as a teacher or educator.

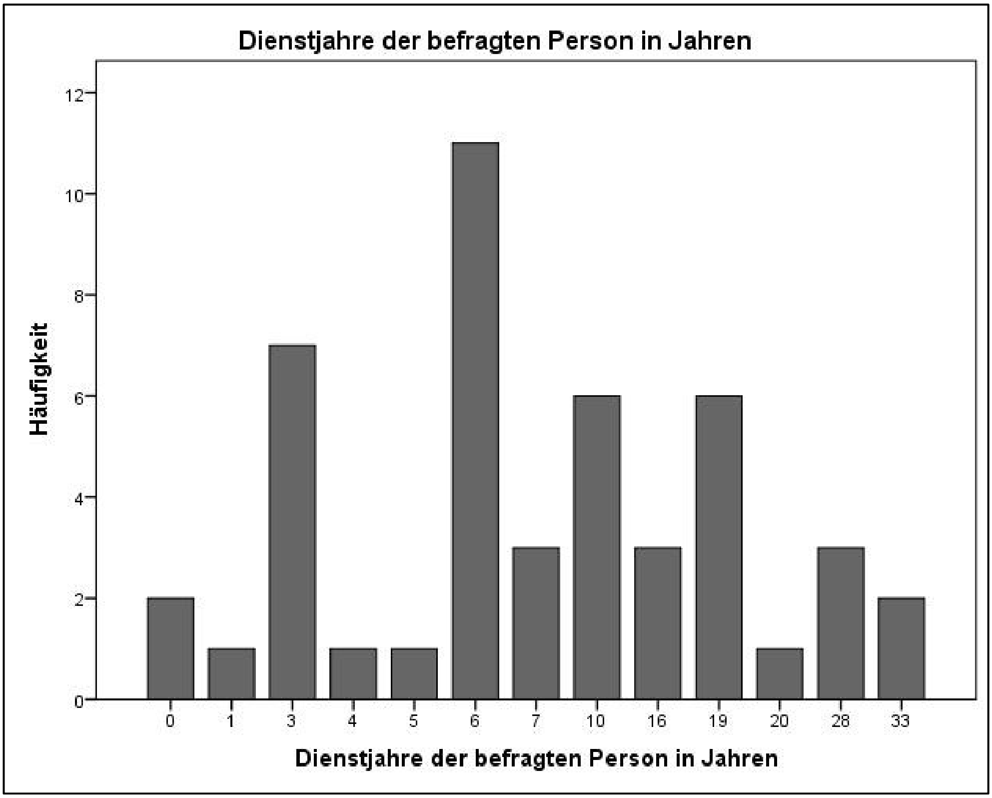


Figure 2. Years of service as a pedagogue
Source: Fasch & Gruber-Stadler 2016, 6

INSTITUTION

53 people of 57 respondents provided information on their institution. 22 people are working in an elementary school. 21 people teach in a New Middle School or a gymnasium. In kindergartens work 10 of those interviewed.

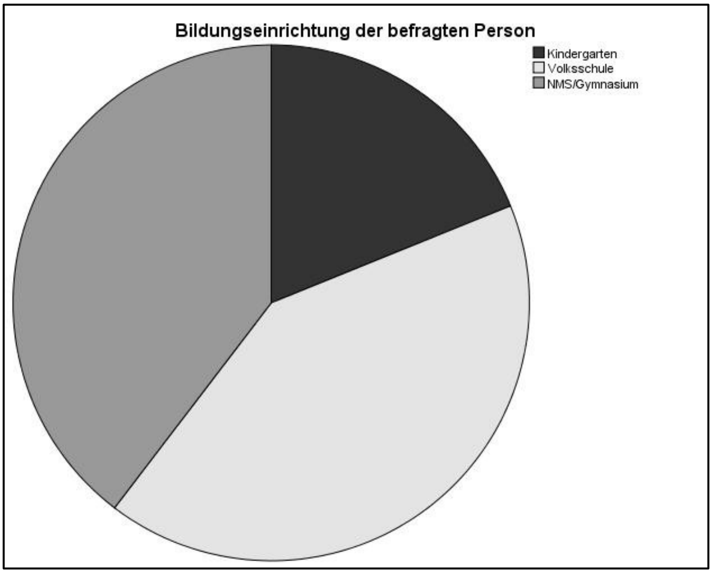


Figure 3. Institution of the respondents
Source: Fasch & Gruber-Stadler 2016, 6

3.2 General Results

EDUCATIONAL MATERIAL USED

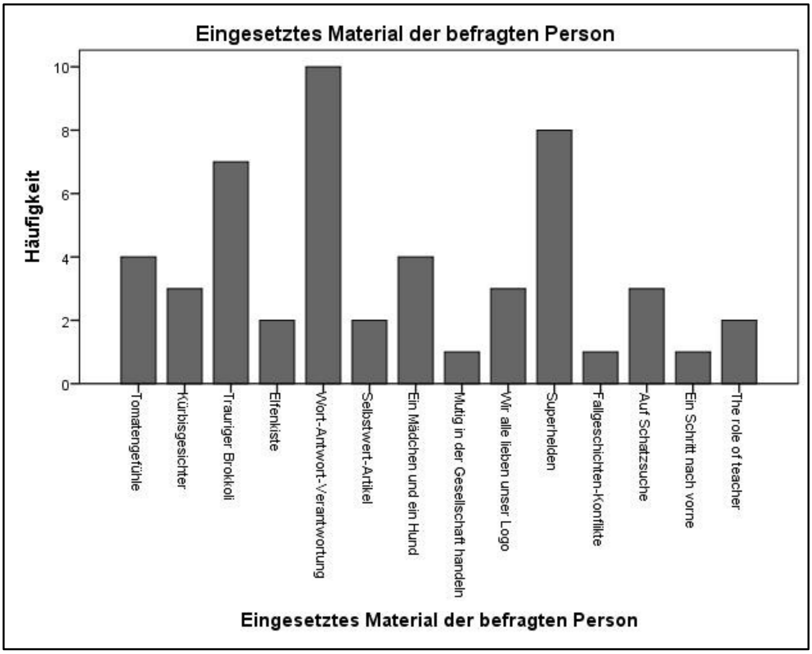


Figure 4. Educational material used
Source: Fasch & Gruber-Stadler 2016, 7

51 people of the 57 respondents gave statements to their used material. 10 people worked with the material “word-answer-responsibility”. This therefore recorded the most popular building material. 8 people used the material “superheroes” and 7 people the Material “Sad broccoli”.

AGE GROUP

54 responses were made in relation to the age group in which the materials were used. Each 12 people used the material in the age group from 7-9 and 11-14. 11 people were working with students aged 5-7, 10 people in the age group 3-5 years. In the age group of 9-11 the material was tested by 9 people.

The tool word-answer-responsibility was used once in the age group 3-5, three times in the age group 7-9 and five times in the age group 11–14 (nine times), none in the age groups 5–7 and 9–11.

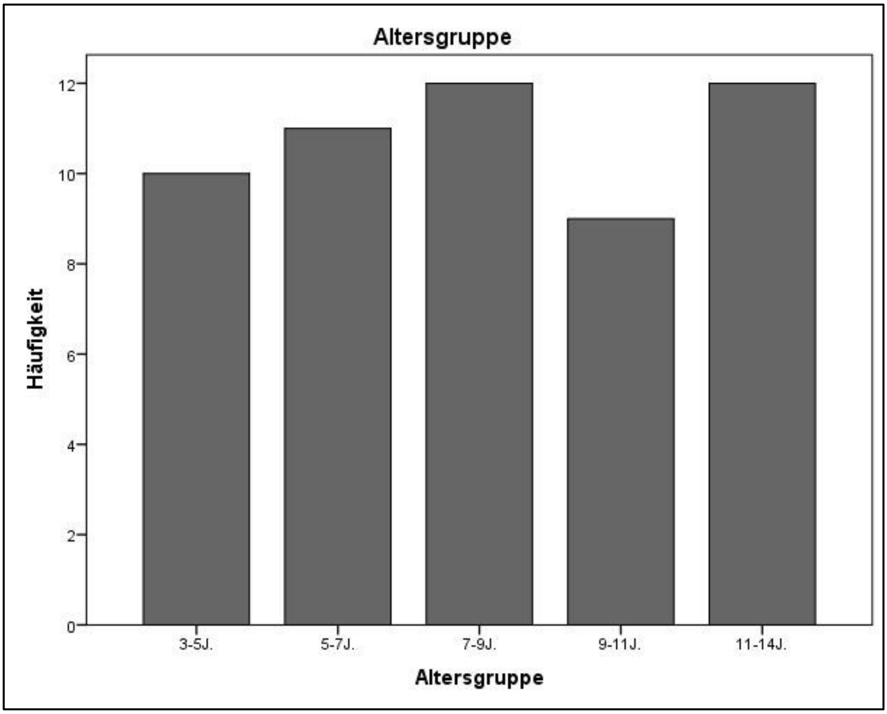


Figure 5.Age group
Source: Fasch & Gruber-Stadler 2016, 8

STRUCTURE AND INTELLIGIBILITY

48 people chose the answer category ‚agreed‘. 6 people ‚fairly‘, 3 people voted‚agrees less’less with this statement agreed. Nobody voted the category ‚that's not true’.

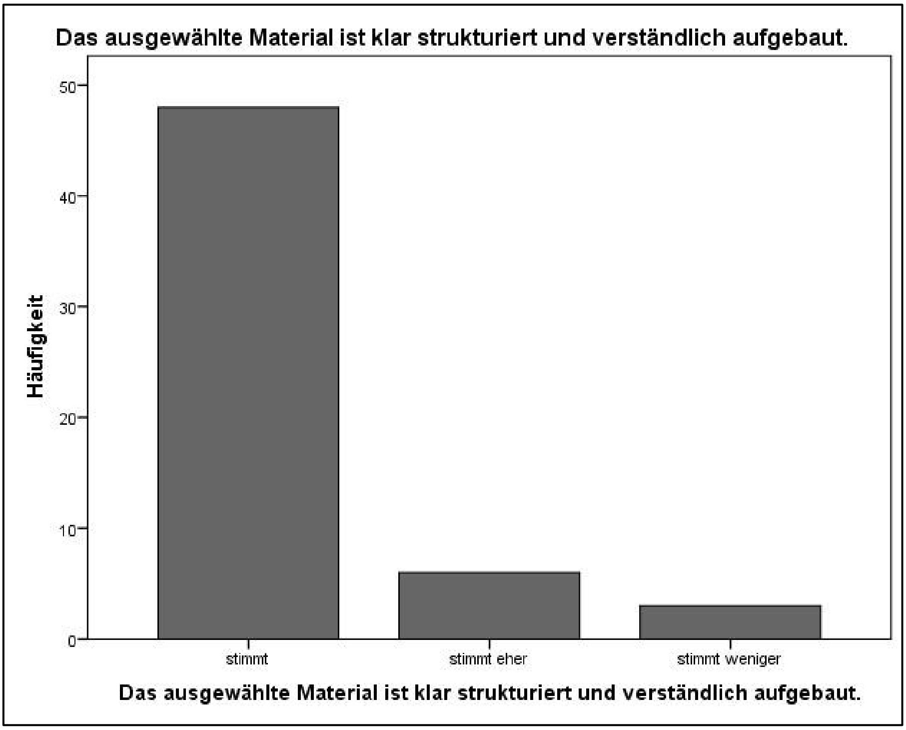


Figure 6.The chosen material is well structured and understandable
Source: Fasch & Gruber-Stadler 2016, 10

The discussion of questions asked *if the material supports ethical education, if it encourages students at critical thinking and if it is suitable in adapted form. The result of the next items will just be presented with words, without figures:*

THE MATERIAL SUPPORTS ETHICAL EDUCACTION

At this statement 54 of 57 people gave a response: 42 people agree with this statement; 10 people chose the option ‚fairly well‘. Only 2 people chose the response category ‚does less‘.

THE MATERIAL ENCOURAGES CHILDREN AND YOUNG PEOPLE AT CRITICAL THINKING.

73.7% (n=42) and thus the majority of respondents chose the answer option ‚is correct‘.‚Is rather‘ was elected by 22,8% (n=13),.the response category ‚agrees less‘got only 2 voices (3,5%).

THE MATERIAL IS SUITABLE FOR USE IN AN ADAPTED FORM.

At this statement 54 of 57 people gave an answer. 94,4% and thus the majority of respondents agree with this statement. The response category ‚fairly‘ wasselected from 5.6%.

INSTRUCTIONS, MANUAL, ETC. ARE HELPFUL IN THE IMPLEMENTATION.

54 of 57 people participated to this statement position. 46 of which chose the option right. Is rather was selected by 7 people. The possible answer ‚is right less‘ comes to only one vote.

Figure 7.Instructions, manual, etc. are helpful in the implementation.
Source: Fasch& Gruber-Stadler 2016, 14

I RECOMMEND THE MATERIAL TO COLLEAGUES.

46 of the surveyed 57 people would recommend the material to their colleagues. 9 people voted,fairly‘, only 2 people chose the option ‚agrees less‘.

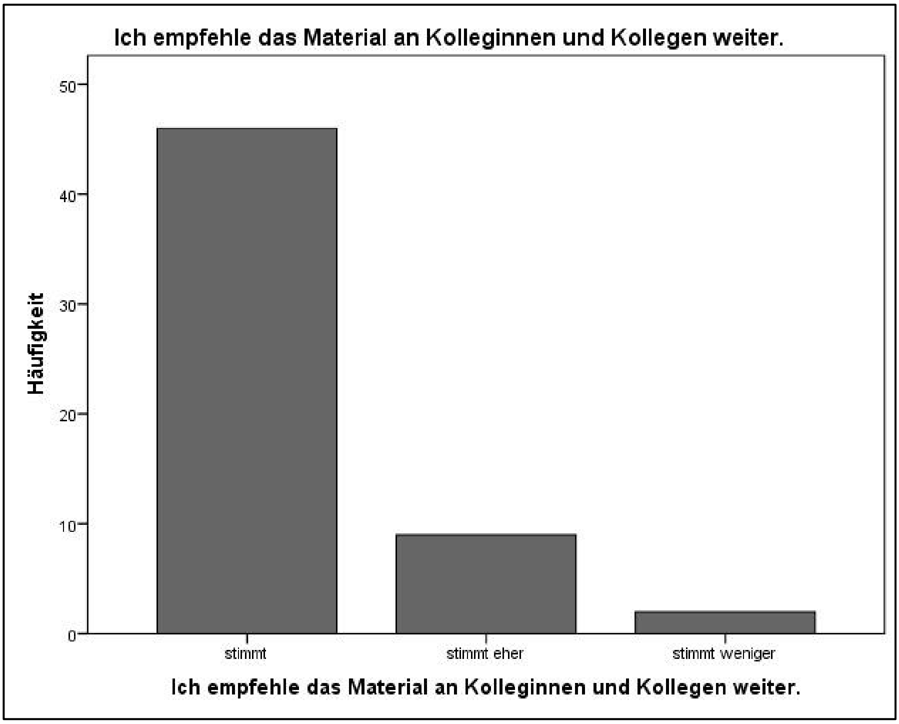


Figure 8. I recommend the material to colleagues
Source: Fasch & Gruber-Stadler 2016, 14

The results are very important for the European project ETHIKA because most of the researchers of this project develop educational tools at universities, and just a little group of them also work with students of the target age group 3 to 15. Therefore the researches also need teachers who are currently working in practise.

The most important result of the investigation is the practicability and usefulness of the tools: The predominant majority of the teachers of our study affirmed the structure and intelligibility of the material and that the tools support the ethical education. They also found the Teacher Manuals and the instructions "very helpful".

In cause of the method "philosophizing with children", the participating teachers said, that the tools "encourage children in critical thinking" and evoke questions of the students, what is crucial for this method.

Furthermore, the compliment to the developers of the materials: The great majority would suggest the material to other colleagues.

3.3 Results to the most used material "word-answer-responsibility"

The material "word-answer-responsibility" was used by 10 of the total 57 surveyed people.
1. The selected material is clearly structured and structured course.

All 10 people chose the answer category ‚agree‘.
2. The material is suitable for the recommended age group
was voted from the available range of options ‚agrees‘ 7 times and ‚fairly well‘ 3 times.
3. The material supports ethical education.
100% of respondents agree with the support in terms of ‚support of ethical education through the material‘.
4. The material encourages children and young people at critical thinking.
80% of respondents ‚agree‘ with the suggestion critical thinking in children or juvenile through the use of the material. The remaining 20%voted‚fairly well‘.
5. The stated objectives are achieveable with this material.
8 of the 10 respondents chose the category ‚true‘ and 2 option ‚fairly well‘.
6. The material can be readily put into practice.
The good implementation of the material in practice voted 8 people with ‚agree‘, for 2 ‚fairly‘.
7. The material is suitable for use in an adapted form.
An adaptation of the material is suitable for 9 respondents. (One questionnaire was in this
Statement is not filled out correctly).
8. The tasks are understandable.
All 10 respondents agree with the intelligibility of the task.
9. Instructions, manual, etc. are helpful in the implementation.
9 out of 10 respondents feel instructions, manual, etc. helpful in the implementation. (One invalid questionnaire in this statement).
10. The technical effort for the application of the material is possible.
80% of respondents perceive the technical effort for the application of the material with ‚agree‘, the remaining 20% chose the choice ‚fairly well‘.
11. The time required for the application of the material is fitting.
This item 8 people voted with ‚agree‘,1 person ‚fairly well‘ and 1 person with‚wrong‘.
12. I recommend further the material to colleagues.
10 of 10 respondents recommend the material to their colleagues.

Verbal comments

In an open questionaire we received a lot of helpful comments, e.g.:
„There are so many philosophical questions in this story and a great potential to work with it for several hours. We will continue our work with this tool the next lesson.“

„All students wanted to share their thoughts.“
„Very good impulses!“
„The time frame was fitting very well in the 3rd grade.“
„I suggest to shorten the PPP for younger students.“

The results of the investigation together with the verbal comments encourage us to develop good materials, which are useful for philosophizing with children, because they evoke new questions of the students.

In a deeper research in a BAC-thesis the author found, that students are sensibilized for crucial questions of live with the method philosophizing with children and with the medium PowerPointPresentation (Weinberger 2016, 96). As well children in the kindergarten as students in primary school were able to see the connection between the given word, the ability to answer and to gain responsibility (Weinberger 2016, 97). Weinberger found out, that the sensibilisation of the children depends on the teacher, who is competent with the method philosophizing with children, the interest of the students, their competence with the method philosophizing and the material: a PowerPointPresentation, which is evoking questions of the students (Weinberger 2016, 97).

DISCUSSION

There are a lot of desiderates in this research area:

- Is it possible to teach values via media (OER) on the internet?
- Which of the in the User Needs Analysis of the projects ETHOS dedicated values (respect, tolerance, friendship, responsibility and moral values) and ETHIKA (additional self-esteem, justice, conflict resolution) are supported best via internet?
- In which agegroup are persons able to work with the OER tools alone and when is a teacher as a facilitator needed?
- What's the advantage of learning values in a group?
- What kind of teacher training is necessary for ethical education with the method philosophizing with children? Because there are very different systems in the European countries, some teachers are prepared very well, for others this method is new.
- In the area of values education we have to regard the difference between ethical thinking, ethical feeling and ethical acting.

Together with the Karl Franzens University of Graz (Theological Faculty) and the KPH Wien-Krems we are doing a lot of deeper research in BAC and Masterthesis. Further research projects are planned with some of the associated partners of ETHIKA (http://www.ethics-education.eu/project/project02.htm).

CONCLUSION

The projects ETHOS and ETHIKA aim primarily to develop new and innovative curricula, Open Educational Resources (OER), educational methods and training courses.

We conclude, that OER gives a great chance for ethical learning and values education. With PowerPointPresentations OER help to realize the importance of recognizing, assuming, reflecting and incorporating values, especially taking responsibility in preschools and kindergartens. The Internet with OER is very helpful for philosophizing with children to the issue of ethics and values education. When OER contents not just cognitive, but also emotional aspects and gives impulses for acting, OER can give the chance for holistic learning. When OER sees the human being with all his intelligences and gives adequate impulses, it can be a great chance for holistic ethics and values education.

REFERENCES

Ćurko, B, Feiner, F., Gerjolj, St., Juhant, J., Kres, K., Mazzoni, V., Mortari, L., Pokorny, Sv., Schlenk, E. & Strahovnik, V., 2015: *Teacher Manual*, http://www.ethics-education.eu, – (accessed 15 August 2016).

ETHIKA – An Erasmus+ project, http://www.ethics-education.eu, – (accessed 15 August 2016)

Fasch, D. & Gruber-Stadler, B., 2016, *Forschungsbericht.* Ergebnisse der ETHIKA-MATERIAL-EVALUIERUNG. Unveröffentlichte Seminararbeit zur „Planung, Durchführung und Auswertung von Forschungsprojekten 2“ an der KPH Graz. LV.Nr. 110.3704.

Gardner, H., 1983: *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gardner, H., 2003: *Multiple intelligences after twenty years. Proceedings of the American Educational Research Association,* Chicago, Illinois, April 21, 2003.

Gerjolj, St., Feiner, F. & Resnik, M., 2015: *Etika in vrednote v šoli: 6-8 let*. V: Vzgoja (Etika v šoli), 66, XVII: 25-28, ISSN 1580-0482

Gilligan, C., 1982. *Die andere Stimme. Lebenskonflikte und Moral der Frau.* 224pp, Piper, München 1982, ISBN 978-3492028523

Heinrichs, K., Oser, F. & Lovat, T. (Eds), 2013: *Handbook of Moral Motivation: Theories, Models, Applications by Karin Heinrichs.* Springer, Heidelberg – Berlin, 2013, ISBN 978-94-6209-275-4

Juhant, J., 2013: *From Ethical Person to Dialogical Society. Challenges of*

Global Society: Lit, Münster, 2013, 195pp, ISBN 978-3-643-90415-7

Kohlberg, L., 1982: *Zur kognitiven Entwicklung des Kindes. Drei Aufsätze*, 470pp. suhrkamp, Frankfurt am Main, ISBN-13: 978-3518063880.

Kohlberg, L., Wassermann, E. & Richardson, N., 1978: *Die Gerechte Schul-Kooperative. Ihre Theorie und das Experiment der Cambridge Cluster School.* In: Portele, G. (Hrsg.), Sozialisation und Moral. Neuere Ansätze zur moralischen Entwicklung und Erziehung, 215 – 260, Beltz, Weinheim-Basel 1978, ISBN 3-407-51134-5.

Küng, H., 1990: *Projekt Weltethos.* 192pp. Piper, München, ISBN 978-3492216593:

Lipman, M., 2003: *Interview.* http://www.buf.no/en/read/txt/?page=sn-lip (accessed 20 March 2015).

Schlenk, E., 2014: *Methodology Guidelines.* http://www.ethics-education.eu/resources/D6_Methodology_Guidelines.pdf (accessed 19 September 2016).

Straßegger-Einfalt, R. & Feiner, F., 2016: *Fragebogen zum ETHIKA-Forschungsprojekt.* Unveröffentlicht. KPH Graz.

Weinberger, N., 2016: *Gegebenes Wort und Antwort als Fundament der Verantwortung. Förderung des ethischen Denkens und Handelns bei Kindern und Jugendlichen durch Philosophieren im Religionsunterricht.* 106pp. Bachelorarbeit an der KPH Graz.

E-LEARNING AND OPEN EDUCATION QUALITY – SOME EUROPEAN AND NATIONAL STANDARDS AND REGULATIONS

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Abstract: *This article describes and analyses selected European and national standards and regulations concerning e-learning and open education quality, such as the World Declaration on Education, Bologna Process, European Higher Education Area in 2015: Implementation Report, ENQA's report on "Standards and Guidelines for Quality Assurance in the European Higher Education Area", UNIQUe, European Universities Quality in e-Learning, Information Package, EFQUEL Brussels, as well as a number of national regulations: Austrian, Czech, Irish and Polish. The author also discusses some research results, obtained within the framework of the international IRNet project. At the end an analysis is presented of the "new vision" of eLearning, based on educational aims and priorities, collaboration and community building, integration and partnership, with a strong innovation focus, which are likely to produce more convincing results. The author also looks at elements which were identified in Bergen as concerning the "Bologna process" vision of eLearning.*

INTRODUCTION

"Good quality education, provided by trained and supported teachers, is the right of all children, youth and adults, not the privilege of the few", stressed participants of World Educational Forum – 2015. The World Declaration on Education for All (1990) was emphatic about the necessity of providing education for all children, youth and adults that is responsive to their needs and relevant to their lives. This paved the way for the concept of quality expressed in terms of needs based criteria. Addressing the crisis in quality learning requires redefining what education systems are for. The skills, knowledge, values and attitudes that learning and teaching promote must reflect and respond to the needs and expectations of individuals, countries, the global population and the world of work today. Not only teaching basic skills like reading and math, but encouraging critical thinking and fostering the desire and capacity for lifelong learning that adapts and shifts in local, national and global dynamics. (http://en.unesco.org/world-education-forum-2015/5-key-themes/quality-education)

In the World Educational Forum – 2015, organized with support by UNESCO, which was held on 19-22 May in Incheon, Republic of Korea, one of the most important topic among five key themes was Quality Education:

- Right to education
- Equity in education
- Inclusive education
- **Quality education**
- Lifelong learning

Teachers are the key to improving learning. They have a powerful impact on the quality of student learning. However, many countries, particularly the developing ones, are facing an acute shortage of qualified teachers, while serving teachers are paid poorly (and sometimes irregularly) and, because of the scant qualifications needed to enter, suffer from low social and professional status.

Quality learning is not only essential for meeting people's basic needs, but is also fundamental in fostering the conditions for global peace and sustainable development. All young people need to learn in active, collaborative and self-directed ways in order to flourish and contribute to their communities. Along with the basics, they need to acquire attitudes, values and skills as well as information. Their teachers, peers, communities, curriculum and learning resources must help prepare them to recognize and respect human rights globally and to value global well-being, as well as equip them with the relevant skills and competencies for 21st century employment opportunities.

To achieve this, it is not enough to measure what learners learn; it is essential to target the classroom experiences that fundamentally shape student learning, and emphasize the range of skills required for lifelong well-being and societal cohesion." (http://en.unesco.org/world-education-forum-2015/5-key-themes/quality-education)

BOLOGNA AND QUALITY

The Bologna Process has arrived at a crucial point. The commitments we will make at the Ministerial Conference in Yerevan in May will shape the reforms participants must undertake together in the coming years to complete the European Higher Education Area. Providing a solid basis for the discussions, this second edition of the Bologna Implementation Report charts progress so far, and points to the work ahead that is required to build a European space of university cooperation based on quality, openness and mutual trust. Over the last three years, 47 countries, more than 4 000 higher education institutions and numerous stakeholder organisations have continued to adapt their higher education systems, making them more compatible, modernising degree structures and strengthening their quality assurance mechanisms. (Tibor Navracsics In: The European Higher Education Area in 2015: Implementation Report)

The Bologna Process is associated with:

- *Changes in European higher education* with the use of the richness and diversity of national experience
- *Adaptation of higher education* to the current needs of society
- *Demographic changes*
- The processes of *globalization*
- Changes in the nature of work - the need for *mass education* at a higher level
- The need to prepare young people *"to the mobility of workers"*

In Yerevan in May 2015, the European Ministers of Education *identified four key priorities* for the future: - *enhancing* the *quality* and *relevance* of learning and teaching; -fostering the *employability* of *graduates* throughout their working lives; - making our systems more *inclusive*; implementing *agreed structural reforms* (http://ec.europa.eu/education/policy/higher-education/bologna-process_en.htm)

ENQA's report on *"Standards and Guidelines for Quality Assurance in the European Higher Education Area* " was published in February 2005 and refers to:

- *standards for internal and external quality* assurance arrangements for higher education institutions;
- *internal quality* assurance standards for quality assurance agencies;
- *cyclical review* of national quality assurance agencies; and
- *a European register of quality* assurance agencies aiming to further the development of the European Higher Education Area by creating and managing a Register that will provide clear and reliable information about reliable and trustworthy quality assurance agencies operating in Europe (E-learning Quality... 2007) *(ENQA's* - European Association For Quality Assurance In Higher Education)

Summary list of European standards for quality assurance

The standards are in three parts covering internal quality assurance of higher education institutions, external quality assurance of higher education, and quality assurance of external quality assurance agencies.

Part 1: European standards and guidelines for internal quality assurance within higher education institutions:

1.1 Policy and procedures for quality assurance:

1.2 Approval, monitoring and periodic review of programmes and awards:

1.3 Assessment of students:

1.4 Quality assurance of teaching staff:

1.5 Learning resources and student support:

1.6 Information systems:

1.7 Public information:

Part 2: European standards for the external quality assurance of higher education

2.1 Use of internal quality assurance procedures:

2.2 Development of external quality assurance processes:

2.3 Criteria for decisions:

2.4 Processes fit for purpose:

2.5 Reporting:

2.6 Follow-up procedures:

2.7 Periodic reviews:

2.8 System-wide analyses:

Part 3: European standards for external quality assurance agencies

3.1 Use of external quality assurance procedures for higher education:

3.2 Official status:

3.3 Activities:

3.4 Resources:

3.5 Mission statement:

3.6 Independence:

3.7 External quality assurance criteria and processes used by the agencies:

The processes, criteria and procedures used by agencies should be pre-defined and publicly available. These processes will normally be expected to include:

- a self-assessment or equivalent procedure by the subject of the quality assurance process;
- an external assessment by a group of experts, including, as appropriate, (a) student member(s), and site visits as decided by the agency;
- publication of a report, including any decisions, recommendations or other formal outcomes;
- a follow-up procedure to review actions taken by the subject of the quality assurance process in the light of any recommendations contained in the report.

3.8 Accountability procedures (http://www.enqa.eu/wp-content/uploads/2013/06/ESG_3edition-2.pdf)

QUALITY IN OPEN EDUCATION

In open education, it is the confluence of 5 concepts of quality (efficacy, impact, availability, accuracy and excellence) in relation to an institution's open education offer. (https://openeducation-qualitydimension.wikispaces.com/QUALITY+DEFINITION)

Quality in open education refers to the convergence of the 5 concepts of quality (efficacy, impact, availability, accuracy and excellence) with an institution's open education offer and opportunities (Camilleri, A., Ehlers, U.D., Palowski, J. 2014).

In relation to an institution's open education offer, the greater the confluence of the 5 concepts of quality explained below (efficacy, impact, availability, accuracy and excellence), the more reliable and trustworthy this offer will be for open learners.

- *Efficacy*: fitness for purpose of the object/concept being assessed.

- *Impact*: is a measure of the extent to which an object or concept proves effective. It is dependent on the nature of the object/concept itself, the context in which it is applied and the use to which it is put by the user.

- *Availability*: this is a pre-condition for efficacy and impact to be achieved, and thus also forms part of the element of quality. In this sense, availability includes concepts such as transparency and ease-of-access.

- *Accuracy*: is a measure of precision and absence of errors, of a particular process or object.

- *Excellence*: compares the quality of an object or concept to its peers, and to its quality-potential (e.g. the maximum theoretical quality potential it can reach) (Source: JRC IPTS report, 2014 In: Camilleri, Ehlers, Palowski, 2014)

The 10 Dimensions of Open Education (Opening up Education) illustrated on the Figure 1.

Figure 1. The 10 Dimensions of Open Education (Opening up Education)
Source: Inamorato dos Santos, A., Punie, Y., Castaño-Muñoz, J. (2016)

Hierarchical multi-level structure of a legal procedure and regulation of e-learning is presented in Figure 2.

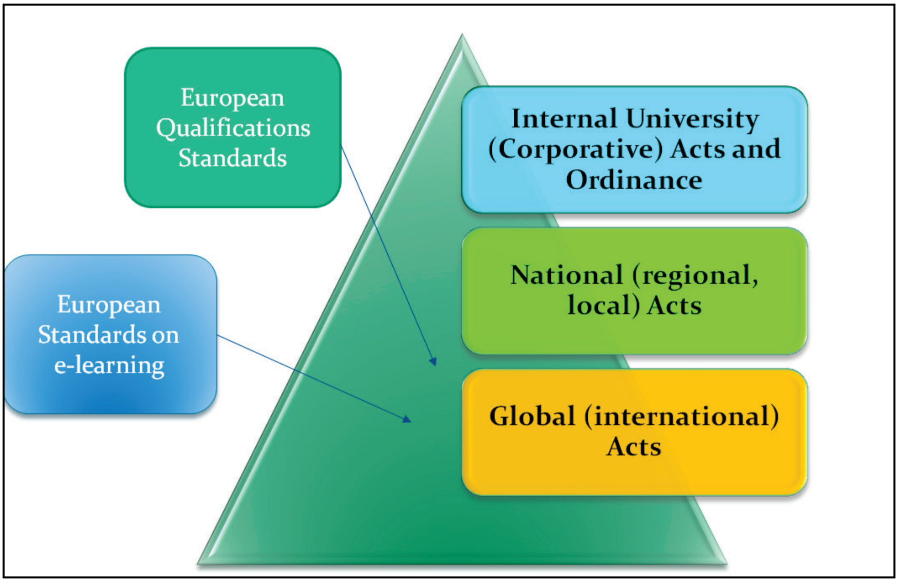

Figure 2. Structure of legal procedure and regulation for e-learning implementation at a higher education institution
Source: Own elaboration

Learning outcomes (effects) taking into account in the concept of SMART. Every effect of education must have all these features (Figure 3):

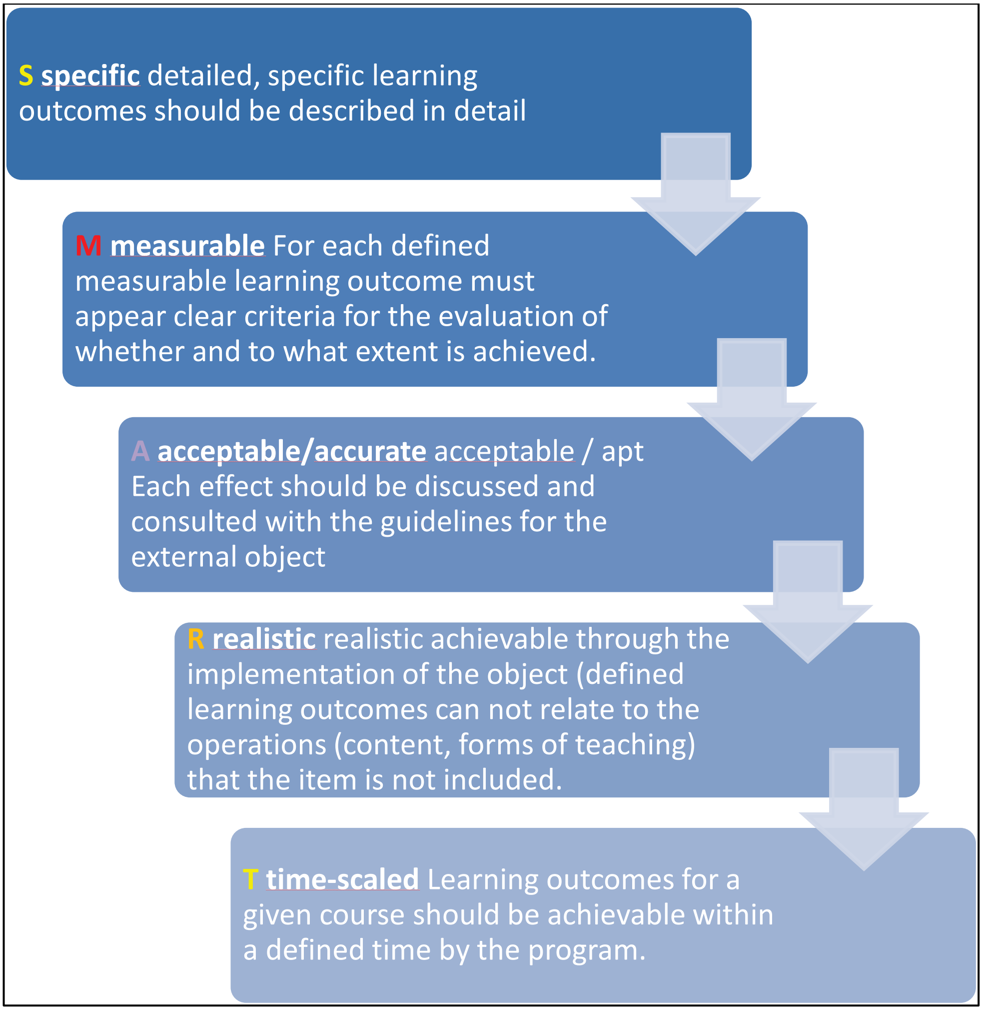

Figure 3. SMART Concept and Learning outcomes

Source: based on Doran, 1981

Award of Qualifications

In the qualification system built upon the Polish Qualifications Framework, qualifications award can be based on learning outcomes acquired in the following manner:

Through *formal* education: i.e. training (provided by institutions) leading to the award of qualifications.

Through *non-formal* education: i.e. by way of training courses, workshops.

As a result of *informal* learning: i.e. through self-study and involuntary learning.

In each of these cases, a validation process has to take place.

Validation of learning outcomes in formal education is presented in Figure 4:

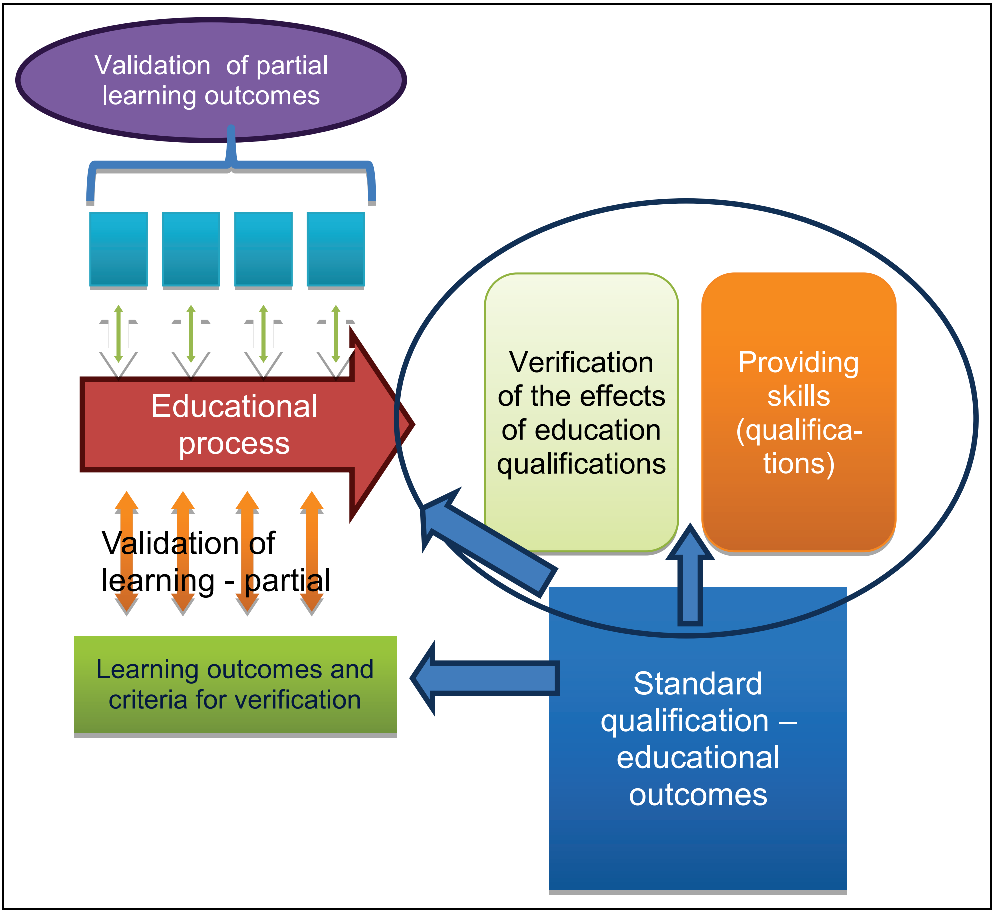

Figure 4. Validation of learning outcomes in formal education
Source: T. Saryusz-Wolski, D. Piotrowska (2012)

Validation of learning outcomes achieved in **non-formal** education and as a result of **informal** learning is illustrated in Figure 5:

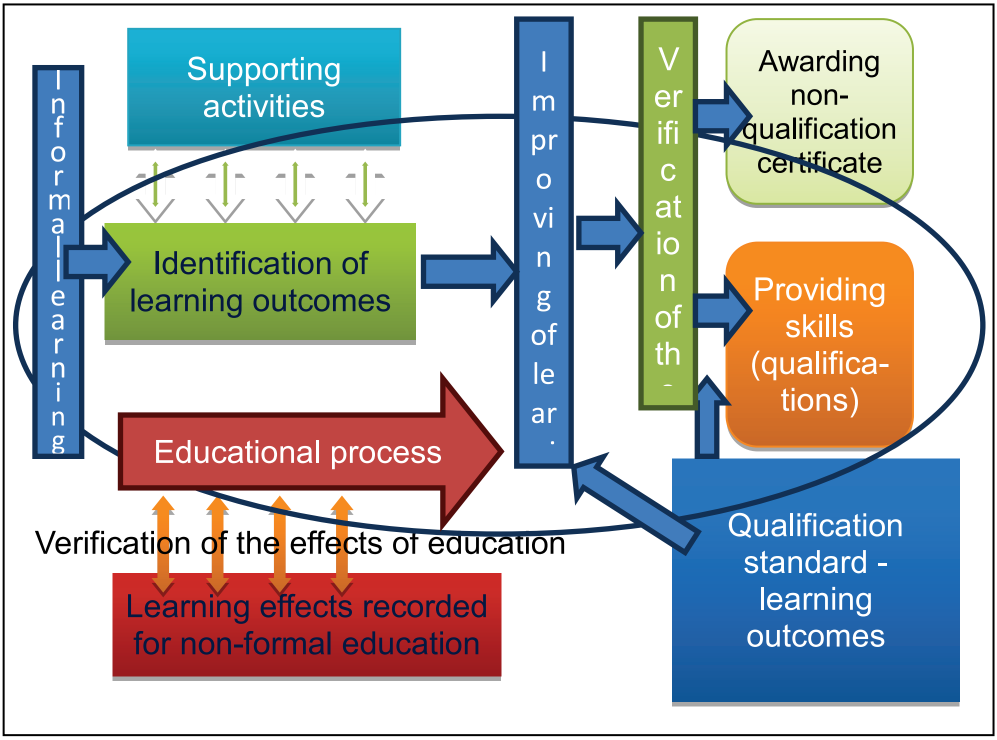

Figure 5. Validation of learning outcomes achieved in *non-formal* education and as a result of *informal* learning

Source: T. Saryusz-Wolski, D. Piotrowska (2012)

Most important outcomes (effects) of education includes knowledge, skills and social competences are shown in Figure 6.

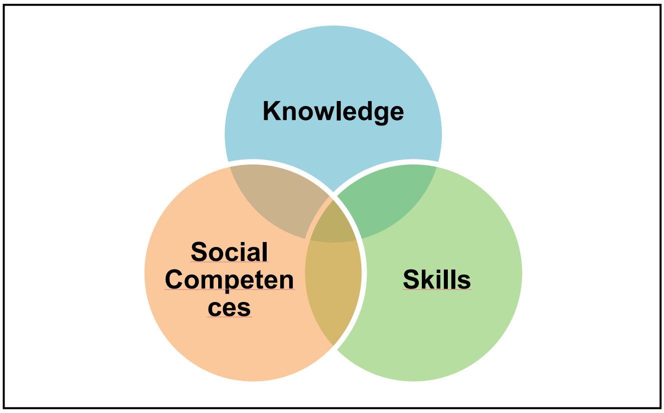

Figure 6. Main outcomes (effects) of education

One of the conclusions of the conference *Academic Validation in the context of the European Qualifications Framework* Warsaw, 8-10 November 2011 was that *Bloom's Taxonomy* is now widely used and at the moment there is *no better tool.* In addition to Bloom's Taxonomy most *effective taxonomies include: Marzano's Taxonomy, Dave's Taxonomy, Niemierko's Taxonomy*

E-learning Quality Standards. Low cost, community based certification for E-learning in Capacity Building

Quality of learning

A variety of quality marks and certifications have been developed to ensure quality on a course level. In particular, the ECBCheck certification produced by the European Foundation for Quality in e-Learning and the E-xcellence mark produced by the European Association for Distance Teaching Universities, are specifically targeted at comprehensively measuring e-learning course quality (Devedžič, Šćepanović, & Kraljevski 2011).

The ECBCheck certification analyses the organisation of a programme, target audience orientation, quality of content, programme/course design, media design, technology and evaluation and review. E-xcellence measures strategic management, curriculum design, course design, course delivery, staff support and student support (Williams, Kear, & Rosewell 2012).

The UNIQUe scheme for e-learning quality specifies institutional-level criteria for mainstreaming e-learning strategy and practice across Higher Education Institutions. By demanding proof of continuous iterative innovation in all aspects of institutional management, pedagogical design and course provision, it ensures a holistic and well-structured approach to the design, supply and evaluation of e-learning within institutions (EFQUEL, 2011). Figure 17 (EFQUEL, 2011) describes the areas covered by the certification.

The UNIQUe Criteria

The UNIQUe (European Universities Quality in e-learning) criteria demand proof of continuous iterative innovation in all aspects of pedagogical design and course provision. In addition, they have been designed to be complimentary to the European Standards and Guidelines for Quality Assurance in Higher Education, thus allowing for quality improvement in Technology Enhanced Learning (TEL), in alignment with ongoing adaptation of systems in line with the Bologna reforms The label focuses strongly on innovation in all its criteria. Since systemic processes of innovation are bound to enhance the use of information technologies, the label will take note of, and evaluate, the institution's entire innovation ecosystem.

UNIQUe is aimed at the institutional certification of universities for outstanding work in the use of ICT-based learning. Its quality label can be articulated in three areas: resources, processes and context (http://cdn.efquel.org/wp-content/blogs.dir/5/files/2012/09/UNIQUe_guidelines _2011.pdf).

The UNIQUe process is structured in six very distinct stages and offers a formalised approach in each of the steps: 0 - Inquiry 1 - Application 2 - Eligibility 3 - Self-Assessment 4 - Peer Review 5 - Awarding Body 6 - Continuous Quality Improvement.

These quality standards apply universally to traditional distance courses; however applying them to OER requires a more nuanced approach. The UNIQUe quality criteria break down as follows (Figure 7):

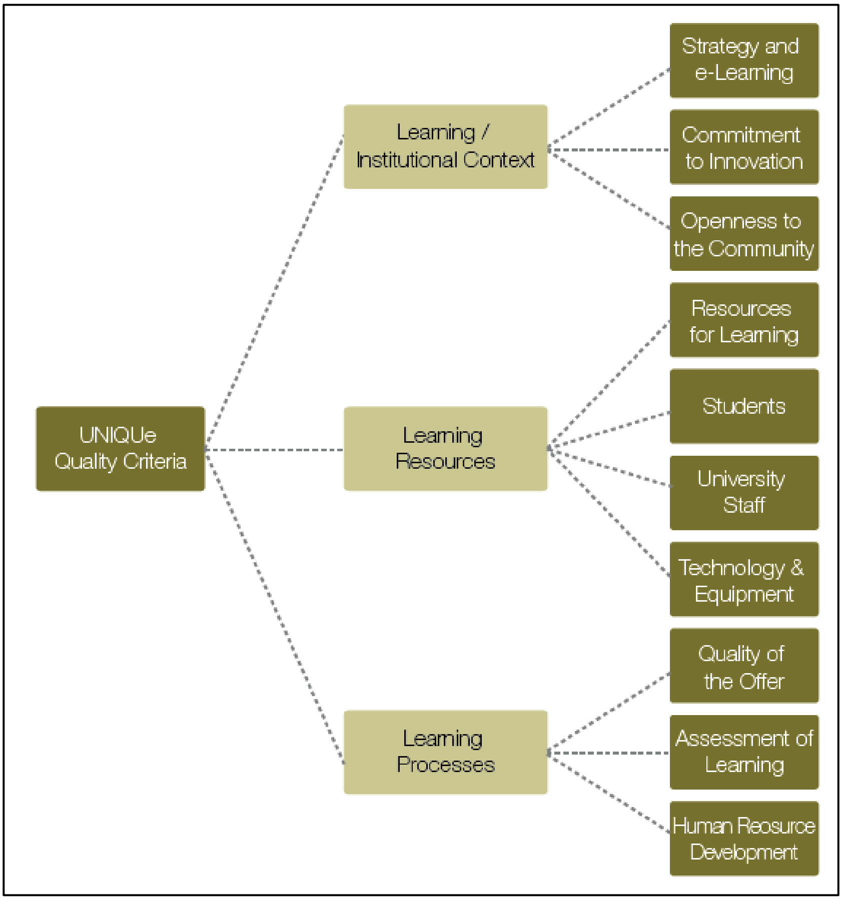

Figure 7. The UNIQUe quality criteria

Source: EFQUEL – European Foundation for Quality in e-Learning (2011) http://cdn.efquel.org/wp-content/blogs.dir/5/files/2012/09/UNIQUe_guidelines_2011.pdf

Figure 8 shows the Conceptual map of peer production in e-Learning (*Auvinen & Ehlers, 2009 In:* Camilleri, Anthony F.; Ehlers, Ulf Daniel; Pawlowski, Jan, 2014)

Enabling processes may include, for example active "communities of practice" within the organization to exchange learning experiences and good practices or support for intra-organizational and inter-organizational work in the area of peer production. Enabling tools may include wikis, blogs, collaborative working spaces, etc. (Table 1)

Table 1.

	Traditional review	**Peer assistance**
Aim	Evaluation	Learning, improvement of knowledge
Process-type	Collaborative but hierarchical	Collaborative and communal
Task	Criticise a Paper	Learn with and through a team
Reviewer-selection	Chosen by independent body	Members themselves choose the assistants
Reviewer-identity	Some actors are always reviewers	Actors can change role between reviewer and producer depending on the context
Guidelines	Based on rigid guidelines/instructions	Review conducted against broad criteria
Report	Mainly for the use of management	Process is for the aim of those who called for it (usually producers)

Source: EFQUEL, 2011

Open Educational Practices within an institution. The following stakeholders were cited in the case studies as being involved with different aspects of OEP:

- Teachers - finding, creating, using or repurposing OER

- Formal learners - finding, creating, using or repurposing OER

- Informal learners - finding, creating, using or repurposing OER

- Non-formal learners - finding, creating, using or repurposing OER

- Managers – decide strategy and implementation plan and resources related to OER

- Policy makers - implement policy around OER

- Technical editors - converting materials into online format

- Instructional designers – helping ensure the design of OER adheres to good ID principles

- Educational developers - helping staff gain the skills to understand and use OER

- Quality assurers - putting in place QA models and ensuring the quality of OER both in terms of content and processes

- Translators – converting OER into other languages

- International relations staff – dealing with cross-cultural issues

- OER mentors - providing support for collaborators in creating and using OER

- Wider community – for example, family members of learners

- E-learning and OER researchers – with an interest in exploring specific questions around the use and effectiveness of OER.

e-Learning Quality ECBCheck

e-Learning Quality ECBCheck is a quality improvement scheme for e-learning programmes, leading to the award of a certification label. It consists of:

- a professional community,
- a self-assessment procedure to enhance internal quality assurance and
- an external peer-review to provide recommendations for improvement as well as a label for quality.
- ECBCheck was initially designed for organizations working in capacity building, but is **open** to all e-learning organizations. (http://www.ecb-check.net/#sthash.TsCKx6Vz.dpuf)

E-learning quality criteria, ECBCheck. Open ECB Check Quality Criteria for Programmes:

A. Information About and Organization of the programme
B. Target group Orientation
C. Quality of the Content
D. Programme / Course design
E. Media Design
F. Technology
G. Evaluation & Review
H. Evaluation Results (Minimum criteria: "YES" if criterion is met. It not met leave the field blank Excellence Criteria: 0 = not met 1 = partly met 2 = met adequately 3 = met excellently

ECBCheck mission:

- Strengthening e-learning capacity globally

- Setting the Scene TRENDS & CHALLENGES IN DIGITAL EDUCATION
- Digital Education has a credibility problem Challenge
- Growth of Diploma Mills Globally (http://www.ecb-check.net/ecb-check-looks-to-the-future-at-online-educa-berlin/)

ECBCheck. Trends & Challenges :

- Provide graduates to supply the knowledge economy
- Increase efficiency of processes
- Extend reach of programmes
- Adapt content to ever- changing priorities
- Demands on education are rising
- traditional perceptions of quality are not always valid
- new societal / political values set new expectations from education
- disruptive innovations mean constantly shifting standards Quality itself is Changing

ECBCheck. Trends & Challenges

- How to manage the migration from traditional to more innovative learning paradigms?
- How to ensure quality of service at scale?
- How to ensure teaching meets student needs in an ever- changing environment? Institutions face new challenges do more, better, with less
- Designed to Build e-Learning Capacity; an appropriate response; **Quality** *Culture*; *Quality Verification*; *Quality Certification:*- to sustain your mission, to remain relevant amongst peers, to ensure recognition. Online Community, Self-Assessment Tool, Peer-Assessment & Certificate
- Online Toolkit
- Self-Assessments are conducted online through the ecb-check portal
- Registration is free for any individual or organization www.ecb-check.net
- Peer Assessment & Certification (http://www.ecb-check.net/ecb-check-looks-to-the-future-at-online-educa-berlin/)

ECBCheck. Trends & Challenges

Online Review Process involving:

- Self-assessment using online tool
- Peer-review

- Review of all course materials and progress in LMS
- Review of self-assessment report
- 2 reviewers – conducted online
- Assessment
- Award
- Certification Awarded for 3 years
- Intended for certifications of small courses and programmes
- Minimum of 20% course provided as e-learning
- Cost is variable depending on modality
- Reviewers come from a trained pool provided from the community Review Modalities (www.ecb-check.net, http://www.ecb-check.net/ecb-check-looks-to-the-future-at-online-educa-berlin/)

Lifelong learning & e-learning in „The European Higher Education Area in 2015: Implementation Report Bologna Process"

- *Lifelong learning* is a recognized mission in all higher institutions in most of the EHEA countries.
- Moreover, higher education institutions have a well-established flexible course provision in many countries, *offering various types of distance and e-learning, in addition to part-time studies* *(*http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/182EN.pdf)

Which standards meet requirements, and what form should the future development of quality standards take?

- The standards EFQM and ISO 9000 are used in initial and continuing training in particular, together with a large number of isolated approaches and certificates. These approaches have at least led to a widespread awareness of quality in organisations.
- A standardised process model was also developed to act as a reference model for comparing and describing process-oriented quality concepts. As a result, quality development is being conducted for the first time on a common basis.
- The following figure shows the processes and sub-processes.

Processes of the reference framework for the description of quality approaches presented on the Figure 8:

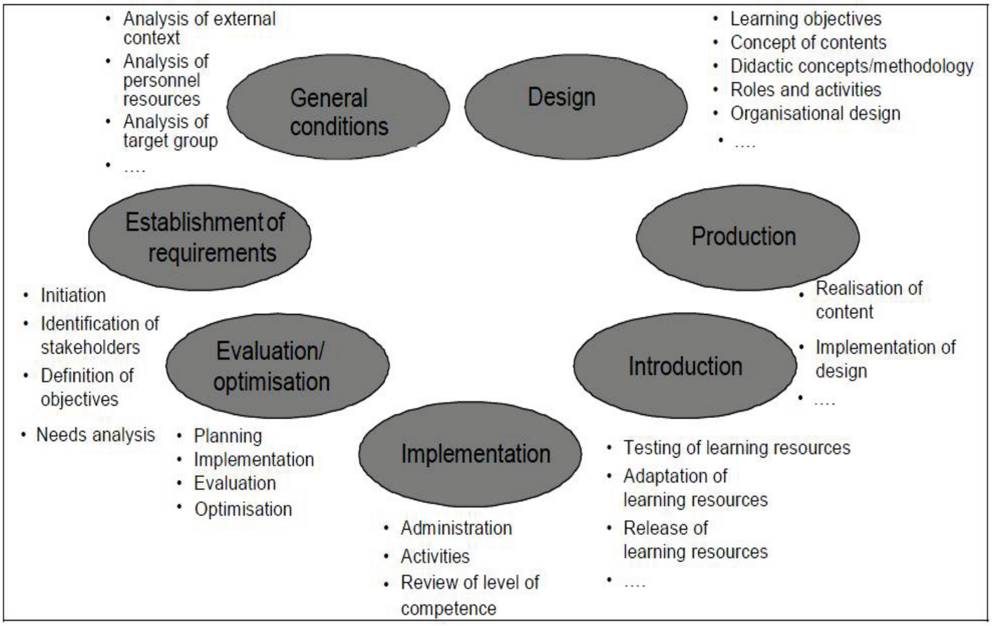

Figure 8. Processes of the reference framework for the description of quality approaches

Source: Quality in e-learning. Use and dissemination of quality approaches in European e-learning. A study by the European Quality Observatory

Organisations Creating Guidelines For Quality in E-learning or Distance Learning in HE

- Norwegian Association For Distance Education and Flexible Education (Nade) (Http://Www.Nade-Nff.No/)
- Council For Higher Education Accreditation (Chea) (Http://Www.Chea.Org/)
- European Association Of Distance Learning (Eadl) (Http://Www.Eadl.Org/)
- Inqaahe: International Network For Quality Assurance Agencies in Higher Education (Http://Www.Inqaahe.Org/)
- European Foundation For Quality In Elearning (Efquel) (Http://Www.Qualityfoundation.Org/) Ecb Check
- UNESCO / OECD (http://www.oecd.org/ - http://www.unesco.org/) (The Organisation for Economic Co-operation and Development (OECD)

Policy approaches targeting flexible delivery of higher education programmes

- In most countries, policy documents promote the delivery *of flexible higher education programmes.*

- For example, in *Ireland*, the National Strategy for Higher Education (2011) recognizes that the future delivery of higher education *must be flexible,* and the higher education institutions must accommodate and serve the needs of an increasingly diverse student body.
- In *Austria, the National Strategy for Lifelong Learning* 2020 states that the higher education institutions' self-understanding includes the use of group-appropriate teaching and learning methods, and making programmes more flexible to allow working students to participate in other ways than daytime classes. http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/182EN.pdf
- In the *Czech Republic,* the Higher Education Act 111/98 stipulates that on-site and distance studies (or a combination) have equal validity, and all students are entitled to equal rights and benefits.
- Distance learning or e-learning is one way of providing flexibility for students. As they do not have to be present at the institution, it offers them opportunities to combine studies with other commitments, which are commonplace, especially for mature students.
- These types of courses are offered in ca. one third of countries. Several countries also point out that distance learning can be combined with onsite study (http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/182EN.pdf)

Figure 9 shows Four Dimensions of Differentiation for Capacity Building

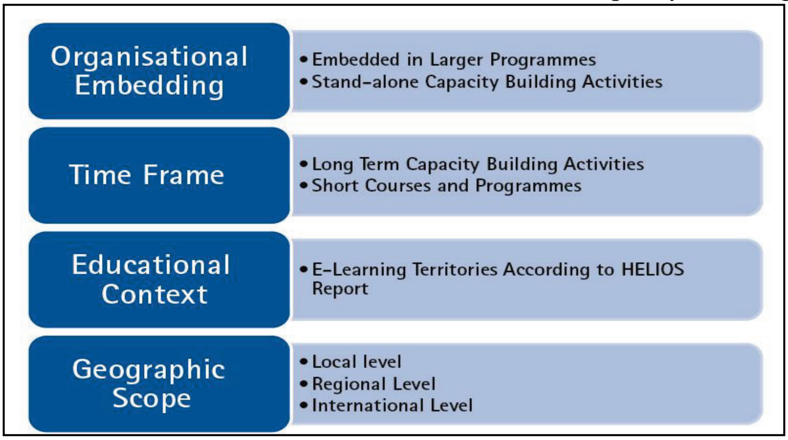

Figure 9. Four Dimensions of Differentiation for Capacity Building
Source: Open ECBCheck Low cost, community based certification for E-learning in Capacity Building

One of the most effective modes research in the area of e-learning is networking of an international consortium, for example, 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 *www.irnet.us.edu.pl*). In WP2 *"Analyses of legal, ethical, human, technical and social factors of ICT and e-learning development and intercultural competences in every partner country", an* analysis of legal documents of nine countries and ten universities was conducted and a comparison of legal factors of ICT and e-learning development in different countries was made, and identical, similar, overlapping data and differences in state policies and university regulations in different project partners were found. It was identified that in West European universities the MOOCs potential is adopted in a way stimulating the further use of other ICT tools and e-learning for flexible learning and teaching and for internationalisation of education. In Central European universities and in Australia, blended learning is implemented due to some regulations of the Minister of Science and Higher Education. For example, in Poland, up to 60% of hours can be taught in remote mode. (Kommers, Smyrnova-Trybulska, Morze, Issa 2015)

University of Silesia experience. Proper operation of university distance learning platforms and their availability is coordinated by the Director of the Distance Learning Centre (DLC) at the University of Silesia (www.cko.us.edu.pl) (Figure 10). A prerequisite for an academic teacher of distance-mode classes is to attend special training, organized by the DLC at the University of Silesia (5 hours for instructors and 20 hours for those who develop courses). The dean may exempt an academic teacher who has experience in the methods and techniques of distance education from the educational training.

Figure 10. Web-site of the Distance Learning Centre (DLC) at the University of Silesia in Katowice, Poland
Source: www.cko.us.edu.pl

Formally, one is allowed to teach up to 60% of classes in remote mode. Field activities, workshops and laboratories are not carried out in remote mode. An academic teacher can teach classes in distance mode during the academic year for no more than 50% of their normal working hours. (Decree No 66, Figure 11). There is a requirement to provide feedback and to research students’ opinions, by having them filling in surveys which are later analysed and assessed, in order to improve the quality of e-learning and conduct classes with use of remote mode.

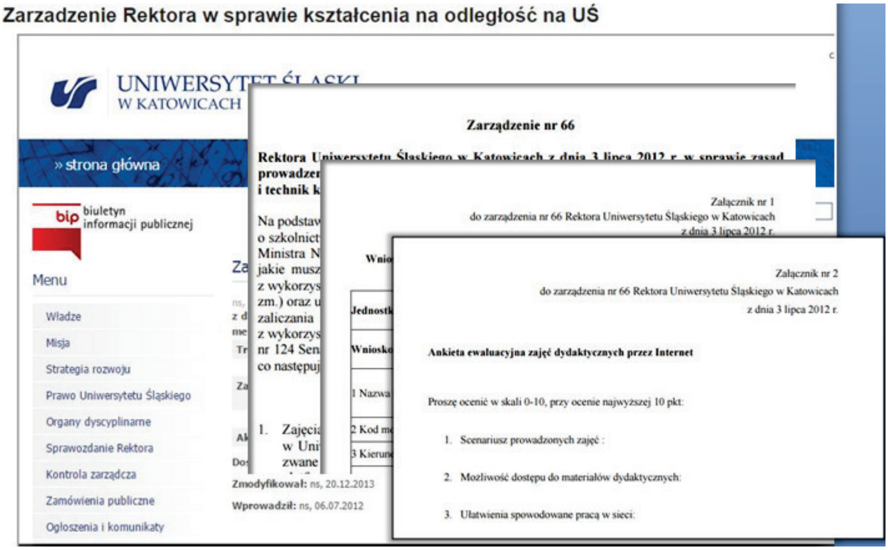

Figure 11. Decree No. 66/2012 dated 2012-07-03 Rector of the University of Silesia on the principles of teaching classes at the university with methods and techniques of distance education

Source: http://bip.us.edu.pl/zarzadzenie-nr-662012

One of the official documents relating to criteria for developing and evaluating e-learning courses is a document referred to as E-course Standards, developed by SEA. The document includes main criteria and key areas of evaluation. The organisational criteria are designed to assess whether conditions were created for the proper and effective conduct of online courses.

There are the criteria to assess whether protection is provided against unforeseen events that may occur during the course, both on the part of participants and the organizing institution.

The criteria take the form of a questionnaire, to which the possible answers are "yes" (criterion met) or "no" (criterion unfulfilled). It is also allowed to provide the answer "not applicable” (21 pages of criteria). A set of criteria for evaluating online course covers four areas:

- Organization of a course.
- Development of a course.
- Conducting of a course.
- Evaluation of the course (Polish Association of Academic E-learning www.sea.edu.pl)

CONCLUSIONS

The "new vision" of eLearning, based on educational aims and priorities, collaboration and community building, integration and partnership, with a strong innovation focus, may probably result more convincing. In Bergen the following elements were identified to be included in the *"Bologna process" vision of eLearning: -the use of ICT facilitates dialogue and communication among students,* and between teachers and students; - *eLearning provides an "extended learning context"* (more resources, more fellow students, more teachers) to all students; - *eLearning brings some elements of flexibility in time and place,* individualisation, and "ownership" of learning that encourage students to take an active role in managing their learning path; - *eLearning may support international virtual mobility,* international partnership among universities within and beyond Europe; - *eLearning brings investment logics into the delivery of higher education,* that may capitalise on the existing knowledge and know-how beyond the availability of individual teachers and researchers; - *by encouraging the "ownership" of learning by students,* eLearning may accompany the *integration of formal, non-formal and informal learning* results and provide tools (such as ePortfolio) to represent the individual identity as a lifelong learner; - if *eLearning is based on problem-solving,* collaboration with other learners and other active learning approaches, it may match with on-the-job seminars and training courses, so representing a strategic resource for universities activities in this domain; - *eLearning is almost never used alone,* so any fear of "exaggeration" on the isolated use of ICT should be removed: the panacea concept of blended learning is dominating the scene of good practice collection; every institution, every learning initiative may find an appropriate combination of eLearning, classroom sessions and work-based learning activities. (UNIQUe 2007)

Acknowledgments

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REFERENCES

Anderson, L.W., & Krathwohl D.R. (eds.) 2001: *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.* New York: Longman

Barker, K. C. 2007*: E-learning Quality Standards for Consumer Protection and Consumer Confidence:* A Canadian Case Study in E-learning Quality Assurance. Educational Technology & Society, 10 (2), 109-119.

Bates, A. W. 2015: *Teaching in a digital age; Guidelines for designing teaching and learning for a digital age*. open.bccampus.ca. [online] at http://opentextbc.ca/teachinginadigitalage/ (accessed 26 June 2016)

Belanger, V., Thornton, J. 2013: Bioelectricity: A Quantitative Approach - Duke University's First MOOC. [on-line] at http://hdl.handle.net/10161/6216.pdf (accessed 26 June 2016)

Brynjolfsson, E., & Mcafee, A. 2014: *The Second Machine Age* (1st ed.). New York: W.W. Norton & Company. [on-line] at https://tanguduavinash.files.wordpress.com/2014/02/the-second-machine-age-erik-brynjolfsson2.pdf (accessed 26 June 2016)

Camilleri, A. F., Ferrari, L., Haywood, J., Maina, M., Pérez-Mateo, M., Montes, R., Tannhäuser, A. 2012: *Open Learning Recognition: Taking Open Educational Resources a Step Further*. (A. F. Camilleri & A. Tannhäuser, Eds.). Belgium: EFQUEL - European Foundation for Quality in e-Learning. [on-line] at http://openaccess.uoc.edu/webapps/o2/handle/10609/21341 pdf (accessed 26 July 2016)

Camilleri, Anthony F.; Ehlers, Ulf Daniel; Pawlowski, Jan, 2014: *State of the Art Review of Quality Issues related to Open Educational Resources (OER).* Luxembourg : Publications Office of the European Union 2014, 52 S. - (JRC Scientific and Policy Reports) - URN: urn:nbn:de:0111-opus-91019

Decree No. 66/2012 dated 2012-07-03 Rector of the University of Silesia on the principles of teaching classes at the university with methods and techniques of distance education [online] at http://bip.us.edu.pl/zarzadzenie-nr-662012 (accessed 15 February 2014).

Downes, S., 2010: *Fairness and equity in education*. Huff Post Education, August 20, 2014, [on-line] at http://www.huffingtonpost.com/stephen-downes/democratizing-education_b_794925.html, (accessed 20 March 2016)

Doran, G. T., 1981: "*There's a S.M.A.R.T. way to write management's goals and objectives". Management Review. AMA FORUM.* ***70*** *(11): 35–36.*

EFQUEL – European Foundation for Quality in e-Learning (2011). UNIQUe Information Package. (Quality Manual). Belgium: European Foundation for Quality in e-Learning. [on-line] at http://cdn.efquel.org/wp-content/blogs.dir/5/files/2012/09/UNIQUe_guidelines_2011.pdf (accessed 20 June 2016)

Elearning quality in European universities: different approaches for different purposes (2007) Edited by C. Dondi and M. Moretti (MENON), UNIQUe

ENQA report on Standards and Guidelines for Quality Assurance in the European Higher Education Area [on-line] at http://www.enqa.eu/pubs.lasso, http://www.enqa.eu/wp-content/uploads/2013/06/ESG_3edition-2.pdf (accessed 26 August 2016)

European Commission/EACEA/Eurydice, 2015. *The European Higher Education Area in 2015: Bologna Process Implementation Report.* Luxembourg: Publications Office of the European Union.

Inamorato dos Santos, A., Punie, Y., Castaño-Muñoz, J. 2016: *Opening up Education: A Support Framework for Higher Education Institutions.* JRC Science for Policy Report, EUR 27938 EN; doi: 10.2791/ 293408

Jacobs, F. 2013: *Slagvaardig met ICT;* Ontwerpprincipes voor leeromgevingen die professionele digitale competenties van hbo-studenten versterken. Zuyd Hogeschool.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. 2014: *The NMC horizon report: 2014 higher education edition*. Austin, TX. [on-line] at http://cdn.nmc.org/media/2014-nmc-horizon-report-he-EN-SC.pdf (accessed 20 July 2016)

Kommers P., Smyrnova-Trybulska E., Morze N., Issa Tomayess, Issa Theodora, 2015: *Conceptual aspects: analyses law, ethical, human, technical, social factors of Development ICT, e-learning and intercultural development in different countries setting out the previous new theoretical model and preliminary findings*, Int. J. Continuing Engineering Education and Life-long Learning, Vol. 25, No. 4, pp.365–393. ISSN 1560-4624

Kuźmicz K. 2015: *E-LEARNING Kultura studiowania w przestrzeni sieci.* Gdańskie Wydawnictwo Psychologiczne / GWP Sopot 2015

Open ECBCheck Low cost, community based certification for E-learning in Capacity Building A Reader by Ulf Ehlers ISBN: 978-3-939394-64-8 [on-line] at http://www.ecb-check.net/files/2013/01/Open-ECBCheck_ handbook.pdf

Quality definition. Wikispaces. [on-line] at https://openeducation-qualitydimension. wikispaces.com/ QUALITY+DEFINITION pdf (accessed 26 June 2016)

Saryusz-Wolski T., Piotrowska D. 2012: *Prowadzenie procesu kształcenia i walidacji efektów uczenia się w warunkach wprowadzenia KRK* [on-line] at http://www.ekspercibolonscy.org.pl/sites/ekspercibolonscy.org.pl/files/ ii_tsw_dp_weryfikacja_3_4_1.pdf (accessed 26 June 2016)

Siemens, G., Gašević, D., & Dawson, S. 2015: *Preparing for the digital university: a review of the history and current state of distance, blended, and online learning.* Athabasca: Athabasca University. [on-line] at http://linkresearchlab.org/PreparingDigitalUniversity.pdf (accessed 20 March 2016)

UNIQUe. European Universities Quality in e-Learning. Information Package. EFQUEL, Brussels, Nov 2011, [on-line] at http://cdn.efquel.org/wp-content/blogs.dir/ 5/files/2012/09/UNIQUe_ guidelines_2011.pdf (accessed 22 June 2016)

DSTU AND KSMA KNOWLEDGE TRANSFER SYSTEMS

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Abstract: *This scientific work proposes the knowledge transfer as one of the main criteria of a successful modern economy. The authors have given principles of innovative university functioning on the basis of the "knowledge triangle". The work details achievements of the international project TEMPUS «Knowledge Transfer Unit – From Applied Research and Technology-Entrepreneurial Know-How Exchange to Development of Interdisciplinary Curricula Modules» in the area of Ukrainian higher education modernization are detailed. The article describes Dniprodzerzhynsk State Technical University (DSTU) and Kyiv State Maritime Academy (KSMA) Knowledge Transfer Units.*

Keywords: Knowledge economy, Knowledge Transfer Unit, TEMPUS.

INTRODUCTION

The main global trend of modern society formation is the global scientific and technological transformations. They cause a transition from the raw material industrial economy to the postindustrial knowledge economy. The necessity for the formation and development of the knowledge economy is acknowledged by numerous countries of the world. The European Commission developed the strategy "Europe 2020. Strategy of intellectual, stable and productive growth", in which the development of the economy, based on knowledge and innovations, is defined as the main priority (Medvedkin 2005, 2013).

The characteristic features of the knowledge-based economy are: domination of high-tech branches and intellectual services in the gross domestic product structure; formation of the major part of national income due to the innovative or technological rent; high level of capitalization of the companies. The main value of the companies is formed by non-material assets, in other words, by the intellectual component. The knowledge-based economy is a basis and a main component of the «innovative economy». Its fundamental basis is productive knowledge and high-quality substantial education, which determine the ability to embody humanistic and intellectual capital into productive activity results. The main difference between the knowledge economy and the market economy is in constant technological renovation of the production and in self-reconstruction of its «knowledge» factors, their non-expropriation in the economic exchange process, quick restoration and relative availability for use (Zemlyankin, Lyakh 2010).

The basic provisions of the knowledge economy are: transformation of knowledge into the main production factor; generation, distribution and application of knowledge in all the spheres of economy; human capital and intellectual labour role increase; prevailing of the non-manufacturing service over the manufacture in economy; increase of the number of scientists as main knowledge generators; directing investments to the knowledge-based spheres; transformation of knowledge into the main factor of competitiveness of the enterprises, the regions and the country as a whole on the world market (Geyets, Seminozhenko, www.semynozhenko.net).

1. KNOWLEDGE TRANSFER SYSTEM

1.1 Knowledge transfer is the main criteria of a successful modern economy

1.1.1 Knowledge transfer is the function of the innovation university

One of the main criteria for a successful development of the knowledge economy is the effective functioning of knowledge transfer system. The knowledge transfer is the transition of technology, experience and skills from producers to external customers, which leads to innovation in the economy and social sphere. Nowadays the knowledge transfer works successfully in developed countries: the USA, Japan, Sweden, Belgium, Austria, Canada, Norway, etc. At the same time the universities play a key role of economic engines in the process of creating new knowledge and its transfer to the non-academic sector (Critical Knowledge Transfer 2014).

The status of a modern university in a society and a state defines a new function of the university – the function of a knowledge integrator. The university becomes a leading member and organizational intermediary of the integration of educational and research institutions with production, cultural institutions and authority structures. The aim of this integration is solving interdisciplinary problems of education and science, as well as implementing innovation (Fedorov 2007).

The activity of a modern university covers all the elements of the "knowledge triangle" (education, research and innovation). The university development in these areas creates a synergistic effect, allowing to significantly enhance the level of development of each component of the "knowledge triangle". Scienific research results and tested methodology of innovation will become the new content of educational programs, and the professionals trained by these educational programs will be able to successfully meet both the challenge of industrial transfer of innovation and the challenge of new knowledge generation for the further continuous development of technology in a particular area (Dulepyn, Kazakova 2010).

It is recognized that the dominant since the beginning of the 19th century "German" model of university, better known as the "Humboldt University", cannot provide answers to all the challenges of an innovation society. The fundamental principles of this model are the academic freedom and the unity of research and education. This model assumes that a state and a society fully provide resources for working at the university scientists who generate fundamental knowledge, mainly according to their interests, and convey knowledge to the students in the amounts and forms that seem to be the most rational.

Formed before the 21st century global knowledge-based economy forces universities to find new models of development, adequate to the external conditions. New challenges of social development give universities additional opportunities to implement their intellectual potential. Apart from the ability to act under condition of the academic freedom (within the state financing), university researchers and teachers can also focus on the needs of business and take part in the competition for global scientific and educational market. The dominant concept becomes a concept of an innovative market-oriented university based on the "knowledge triangle". This concept is reflected in the documents of the Bologna process, where higher education system is positioned to be at the intersection of science, education and innovation. In a communiqué adopted by the meeting of Ministers of Education of European countries in London in May 2007, the leading role of higher education institutions as centers of «education, science, creativity and knowledge transfer» is emphasized. The symbolic concept of the «knowledge triangle» reflects the interaction between education, research and innovation, which together are the main driver of the knowledge-based economy. The generation of new scientific knowledge and educational activities are the two main pillars of the traditional research university operation (Kalynovska, Kosolapova, Proshkin, www.rae.ru).

The university based on the concept of the "knowledge triangle", also carries out a third kind of activity associated with the innovation production. The implementation of innovation requires existence of a knowledge transfer system at the university.

The universities directly influence the development of business community, enriching students with relevant skills. Currently, the Bologna process unambiguously identifies the need for adjustments to the system of relations of universities with companies, relating the knowledge transfer activity to the key components of a university development. In the Lisbon Treaty (adopted at the meeting of the European Council in Lisbon in March 2000) the universities are seen as a key factor in the movement to improve the competitiveness and innovativeness of the economy of Europe.

The knowledge transfer is possible if the university at the highest level implements traditional activities – research and education. Accordingly, the knowledge transfer involves two main processes: the commercialization of research results and implementation of market-oriented educational programs.

The first process is a so-called technology transfer – a term that appeared in the late seventies – early eighties of the last century. By a technology transfer we mean a process of organizing transfer of scientific and technical «know-how» from scientific laboratory to production under a market economy conditions. The knowledge transfer processes related to the commercialization of research results may include the organization of research under contracts with organizations and companies, the application of intellectual property rights to the results of scientific research of a university (licensing, creation of spin-off companies), participation in national and regional development programs, technological incubators and science parks operation.

The second major component of the knowledge transfer is related to the development and implementation of the market demanded innovative educational programs that enable the customer to receive necessary economic benefits from their sale. The organizational system on which it is based is a current university system of additional professional education (The knowledge transfer strategy of the Nizhny Novgorod State University N.I. Lobachevsky, www.unn.ru).

1.1.3. University infrastructure of knowledge transfer

Critical importance to achieving efficiency of the knowledge transfer processes is the presence of an appropriate institutional infrastructure at the university that serves as a “buffer exchange“ between external customers and departments of the university, its teachers and scientists. A key element of such infrastructure is a knowledge transfer unit, which aims at disclosing the commercial potential of the university to external customers. Professionals, involved in the organization of knowledge transfer at the university, must have both the skills of communication with the academic community (scientists and university professors), and the ability to interact effectively with companies and organizations, which means to speak the “language of business“. The efficiency of the university knowledge transfer in general depends largely on initiativeness and professionalism of the knowledge transfer unit. An important role is also played by creation of a system of motivating university employees to participate in the knowledge transfer activities and the formation of a university-wide “culture of knowledge transfer“.

For a successful transfer of knowledge and technology, and commercialization of research results a university uses different methods and techniques: participating in network structures, clusters, exhibitions, fairs, information events, advertising on the university website, e-mailing potential customers, etc (Sovershenna I.O, ena.lp.edu.ua).

1.2 Project TEMPUS “Knowledge Transfer Unit”

1.2.1. Project consortium, main goal, tasks, working packages

The project of the TEMPUS program «Knowledge Transfer Unit – From Applied Research and Technology-Entrepreneurial Know-How Exchange to Development of Interdisciplinary Curricula Modules» (KTU) is implemented in the institutions of higher education of Ukraine for the purpose of creating modern knowledge transfer units.

Registration number of the project: 544031-TEMPUS-1-2013-1-AT-TEMPUS-JPHES. Number of the Grant Agreement: 2013 – 5054 / 001 -001. Duration of the project: 36 months, 12/2013 – 11/2016).

The grant holder of the project is the Joanneum university of applied sciences (Austria, Graz). There are 17 partners taking part in the project, among them: the Joanneum university of applied sciences (FH JOANNEUM), Austria; the World University Service – Austrian Committee (WUS), Austria; the Budapest University of Technology and Economics (BME), Hungary; the Universitat de Girona (UdG), Spain; the Royal Institute of Technology (KTH), Sweden; the academician Yuriy Bugay International Scientific and Technical University (ISTU), Ukraine; the National Aerospace University «Kharkiv Aviation Institute» (KhAI), Ukraine; the University of Banking of the National Bank of Ukraine (NBU), Ukraine; the Khmelnytskyi National University (KhNU), Ukraine; the Kyiv State Maritime Academy named after hetman Petro Konashevich- Sahaydachniy (KSMA), Ukraine; the Dniprodzerzhynsk State Technical University (DSTU), Ukraine; Ukrainian Student Union (USA); the LLC «Centre of Innovative Machine Building Technology» (INNOTECH), Ukraine; the Association of Small Enterprises of

Ukraine (ASEU), the Transcarpathian Chamber of Commerce and Industry (TCCI), Ukraine; the Ukrainian Institute for Scientific, Technical and Economic Information (UISTEI); the Ministry of Education and Science of Ukraine.

The project execution involves eight working packages, within the framework of which it's necessary to do the following:

1. Create and develop the strategies for six Knowledge Transfer Units (KTU) in six Ukrainian higher educational institutions. The six KTUs will be equipped with the rapid prototyping technology (RPT) and get support and consultation from the European Union (EU) partners.

2. Establish possibilities and confirm the knowledge transfer in the six KTUs.

3. Implement pilot projects in every KTU, develop corresponding instruments and services.

4. Develop / modernize and implement the interdisciplinary curricula modules in the field of engineering and technical sciences and business administration.

5. Perform quality control and monitoring of the project.

6. Provide consistency of the project results.

7. Share the project results with the interested parties.

8. Perform project management.

The basic activities of every KTU are the following:

- communications: the KTU is a contact point for the companies / external partners having priority in knowledge transfer to a wide social circle (professional development, training courses and seminars);

- supporting and developing research activities: writing grant applications, project management;

- internal consultation, providing assistance to the KTU staff in market presentation of innovative decisions (commercialization), internal evaluation (intellectual property management, marketing research activities) and so on.

The main goal of the project is the effective, viable and influential operation of the Knowledge Transfer Units in all the partner domestic higher educational institutions during and after the project realization (Tempus project: knowledge transfer unit, my-ktu.eu).

1.2.2. Project results

Nowadays the KTU activity positively influences both educational and research activities in the mentioned universities. The staff of the Ukrainian knowledge transfer units went through training courses and internships in the European Union higher educational establishments, which are the KTU partners:

1. Joanneum university of applied sciences (Graz, Austrtia) – February 2014, April 2015.
2. Universitat de Girona (Girona, Spain) – June 2014, June 2016.
3. Royal Institute of Technology (Stockholm, Sweden) – November 2014, February 2016.
4. Budapest University of Technology and Economics (Budapest, Hungary) – February 2015.

As a result of the obtained experience and skills, the following documents have been developed:

1. Founding documents (the decision of the Academic Counsil, the order of the Rector, the regulations on the KTU, the order of the Ministry of Education and Science of Ukraine), according to which the oficially introduced to the organisational structure of the higher educational establishments.
2. Strategies of the national KTU in which their mission, focus, goals, staff, vision, target groups and services are stated in detail, the place of the KTU in the organisational structure of the universities is established.
3. KTU Business Plans (Activity and Operations Plan (table 1), Business Model Canvas (fig. 1), Monitoring tools).

Table 1.

Part of KSMA Activity and Operations Plan

	Global objective	Detailed objectives/Actions	Responsible	Others involved	Deadline
1. Basics	1. 1. Create and initiate KTU	1.1.1. Formally create KTU	Panin V.	Karpenko O.	Done
		1.1.2. Define and delimit functions	Panin V.	Karpenko O., Astafieva G.	Done
		1.1.3. Equip KTUs	Panin V., Gorban A.	Karpenko O., Astafieva G.	T4 2015
		1.1.4. Staff KTUs	Panin V.	Karpenko O., Astafieva G.	Done
		1.1.5. Web site	Panin V.	Karpenko O., Astafieva G.	T3 2015

Services related to transfer modalities	2. R&D contracts	2. 1. 3D printing technology	2.1.1. Development of Interdisciplinary Curricula Module "Transfer 3D printing technology"	Karpenko O.	Blyndaruk A.	T4 2015
			2.1.2. Training about 3D p technology (Pilot Project)	Karpenko O.	Blyndaruk A.	T2 2016
			2.1.3. Production and realization of 3D models (Pilot Project)	Astafieva G. Gorban A. Blyndaruk A.	Karpenko O.	T2 2016
		2.2. Transfer technology	2.2.1. Identify core specialities of research with commercial potential	Brazhnikova O. Gorban A.	Astafieva G.	T2 2016
			2.2.2. Identify potential industrial partners	Brazhnikova O. Gorban A.	Karpenko O.	T2 2016
	3. Intellectual Property	3.1. Intellectual property support	3.1.1. Information about intellectual property on the KSMA website	Brazhnikova O.	Gorban A.	T3 2015
			3.1.2. Consulting inside KSMA about patenting applications	Brazhnikova O.	Gorban A.	T1 2016
			3.1.3. Seminars about intellectual property	Brazhnikova O	Gorban A.	T2 2016

Source: Own work

4. KTU Portfolios (the list of oriented on customers KTU services and responsibility persons).

5. KTU Sustainability Plans (Benefits map, Vision and Desired Results, Community Relationships, Internal Capacity Building, Strategic Financing, Turning Plans into Action).

Within the framework of the «Knowledge transfer unit» project implementation the KTU was provided with modern equipment including the latest devices for 3D-scanning and printing.

Nowadays the knowledge transfer units are successfully implementing the pilot projects including:

1. GLOBAL DJ (KhAI).

2. IT PROJECTS «IT-MARITIME» (KSMA).

3. FIRST CONSULTING TECHNOLOGIES (DSTU)

4. AQUACOMPANY (Attention QUality Assurance COMPANY) (NBU).

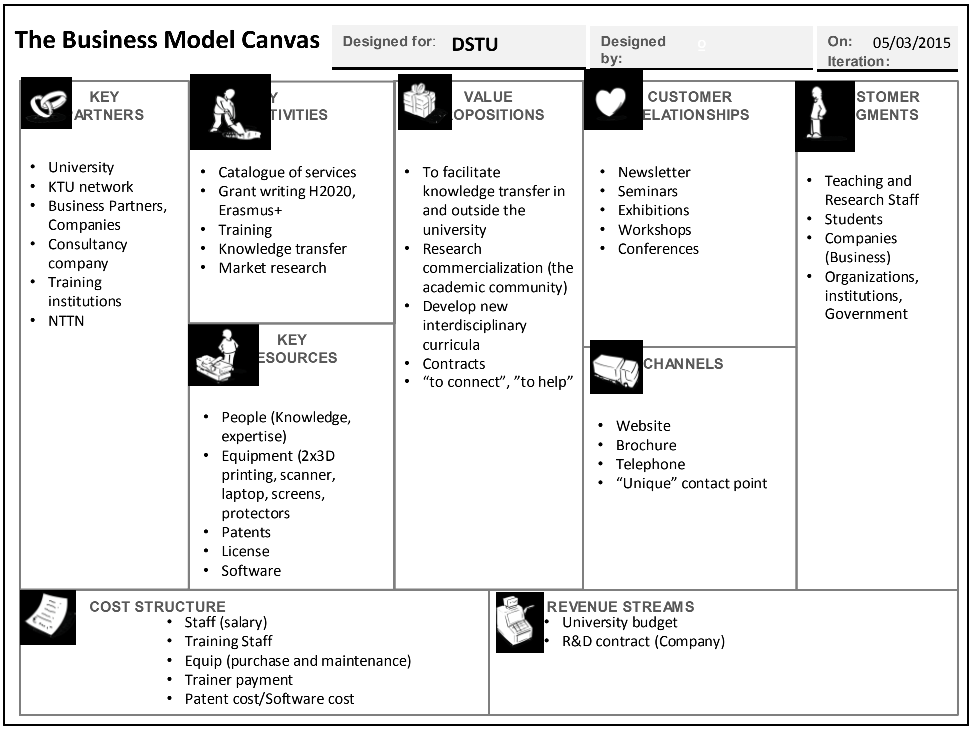

Figure 1. DSTU Knowledge Transfer Unit Business Model Canvas
Source: Own work

During the «KTU» project implementation 4 interdisciplinary curriculums and modules have been developed:

1. Transfer of 3D printing technology.

2. Using of eye-tracking technology for control (assessment and assurance) quality of human attention.

3. 3D modeling and printing technology.

4. Author's rights within international context. Intellectual property in e-commerce.

With a purpose of monitoring quality of the created methodic basis, the cross-evaluation of the modules by the KTU staff was performed and the corresponding versification forms were provided. Besides, the representatives of KTU of the universities of Ukraine have successfully performed an approbation of the developed modules by giving “guest lectures“ during which more than 200 listeners (students, post-graduate students, teaching staff of the institutions of higher education) became acquainted with the materials of each course.

During the project implementation the World University Service – Austrian Committee (Graz, Austria) has effectively performed the quality control by clear and detailed analysis of the corresponding questionnaires. Moreover, in May 2016 the monitoring visit took place, during which the EU universities representatives visited the universities of Ukraine and performed a detailed examination of all the aspects of Ukrainian KTU work. According to the examination results it was acknowledged that the KTU activity is efficient, and the project tasks are performed successfully and timely.

The project participants actively spread its results among all the interested parties. With a purpose of popularization of the KTU tasks, the web-site of the project and the web-sites of each of the units have been created. The project materials have been published in more than 20 scientific papers and presented at more than 30 scientific conferences (Actual Problems of Economy 2014, Problems of Mathematic Modeling, Intellectual Technologies in System Programming, Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications, Electrotechnical and Computer Systems: Theory and Practice, International Conference on ICT in Education, Research and Industrial Applications) (Tempus project: knowledge transfer unit, my-ktu.eu).

1.2.3. Dniprodzerzhinsk State Technical University and Kyiv State Maritime Academy Knowledge Transfer Units

In the DSTU KTU was created as a division of the R&D department (fig. 2).

The KTU establishes close relationships with existing structural units of the university, utilizing their potential, experiences and practice for the implementation of different services, providing knowledge transfer. KTU cooperates and partially integrates the functions of the following units:

research department (departments of organizational and informational support, the intellectual property questions unit);

study department, career planning centre center and the centre center of new information technologies (quality management laboratory of higher education).

The KTU is a high level unit within the university, supervised by Vice Rector for Research.

In the DSTU eight positions have been assigned to cover the activities and operations of the KTU: Director, Business Manager, Patent Manager, Marketing Manager, Project Manager, Software Engineer, and Administrator (DSTU Knowledge Transfer Unit, dktu.org.ua).

The KTU will be the focal point of the knowledge transfer network within KSMA. The KTU integrates the existing structures of KSMA by cooperating and networking with departments which conduct some functions in respect to knowledge transfer at KSMA.

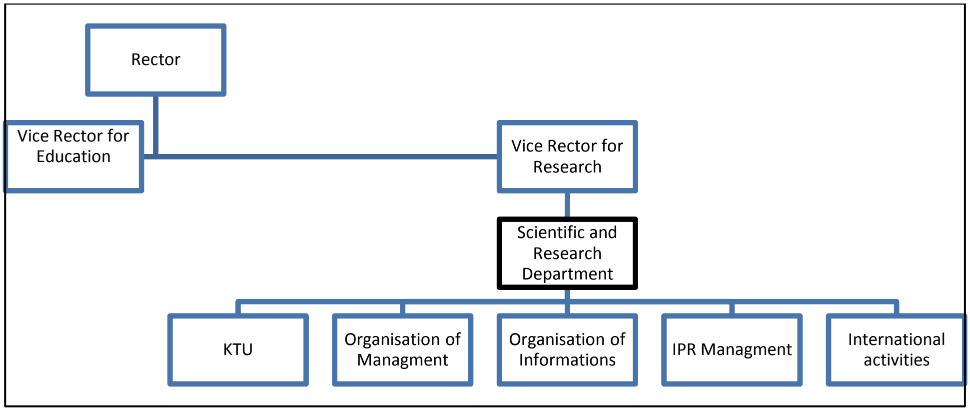

Figure 2. DSTU organization structure
Source: Own work

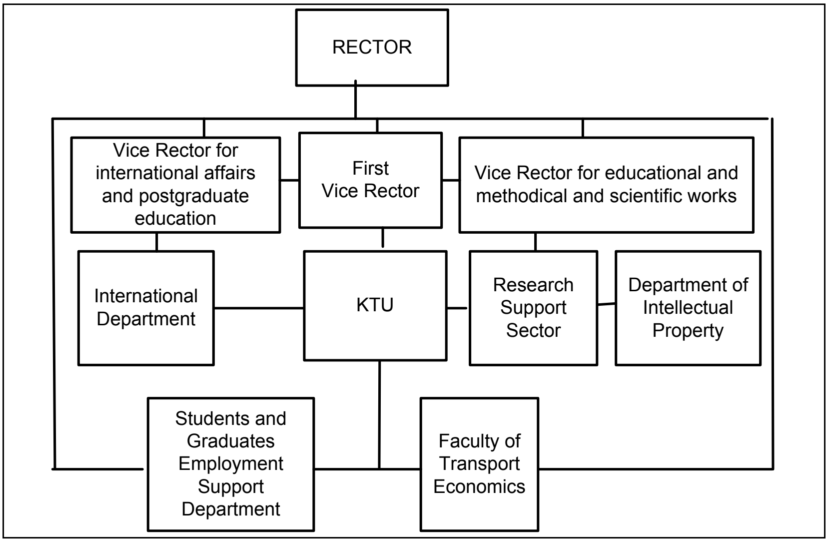

Figure 3. KSMA organization structure
Source: Own work

The following units already exist at KSMA and will partially participate in knowledge transfer (fig. 3):

International Department;

Research Support Sector;

Department of Intellectual Property;

Students and Graduates Employment Support Department;

Faculty of Transport Economy.

In the KSMA six (part time) positions have been assigned to cover the activities and operations of KTU: Director, Business Manager, Technology Transfer Manager, Marketing Manager, Project Manager, Software Engineer (KSMA Knowledge Transfer Unit, http://ktu-ksma.com).

You can find the full job descriptions for each position, responsible persons and their contacts on the DSTU and KSMA websites and in the DSTU and KSMA KTU strategies.

The mission of KTU is to serve as an interface between the university and the "outside world", helping university citizens (teachers, researchers, students) with appropriate knowledge transfer services to market their innovation and competencies.

The vision of KTU is the proactive promotion and management of research, transfer and innovation.

The values of KTU are:

1. Networking and team working. Networking and team working is the process of working collaboratively with a group of people in order to achieve a goal. Teamwork is a crucial part of a KTU's activities, because it is always necessary that KTU staff, researchers, teachers, students and business partners work well together and try their best in any circumstance. Teamwork means that people will try to cooperate, using their individual skills and providing constructive feedback, despite any personal conflict between individuals.

2. Professionalism. Professionalism is following of these principles for us:

   1. Customer satisfaction is the main goal for us;
   2. We always have to make expertise of our specialty and our competences;
   3. We should do more than our customers expect from us;
   4. We should always tell about what we do and always do what we say;
   5. High level of effective communication;
   6. We should follow our principles, mission and vision;
   7. We should share our knowledge;
   8. We should always say thank you to our customers;
   9. We should always keep smiling and have the right attitude to customers in our hearts.

3. Diversity of competences and skills among the staff.

Every member of KTU team is a professional on the different fields. Everyone is always willing to change and provide new creative ideas. Everyone always tries to develop professional level with help of different ways: training, seminars, modern conferences, meetings, special literature and others.

4. Personalized attention. Every our customer gets all our attention, support and interesting solutions. We use different especial approaches to different customers.

5. Focus on people. Focus on our customers and our staff.

6. Orientation towards client and user satisfaction. Developing a quality product appreciate by consumers; responding promptly and respectfully to consumer complaints and queries; and dealing sensitively with community issues.

Services of KTUs are:

1.Communication. Provide information about national and international trainings, seminars and conferences in the different areas of science, requirements on presenting the information, application forms, eligibility requirements and deadlines. Provide support during the application process. Help in formalization of travel documents. Support during the reporting process.

2. External consultation. Provide external consultation on patent support and marketing research. Perform preliminary analysis of the technical solutions proposed for patenting. Provide compilation of the utility model application or the invention application. Support marketing research to promote products and services of the customer on the regional, national and international markets.

3. Internal consultation. Provide internal consultation on patent support. Perform preliminary analysis of the technical solutions proposed for patenting. Provide compilation of the utility model application or the invention application. Give internal consultation on contracts to perform research at the expense of the customer: the form of agreement, the acts of acceptance, the calculation, the form of supplementary agreements. Give internal consultation on development of new interdisciplinary teaching methods. Help in choosing disciplines for interdisciplinary modules. Support during the process of interdisciplinary module's program creation.

4. Providing support for preparation and implementation of externally funded projects. Provide information about the content of the upcoming calls, priorities of the funding institutions, requirements on presenting the information, application form and its different parts with their respective content, eligibility requirements and deadlines. Provide formal requirements for obtaining documents from the university. Support during the application process and during the entire project implementation period. Support during the reporting process. Open new courses for academic staff training if it is necessary.

5. 3D printer. Printing, preparation and processing drawings. Provide possibilities for production of the products prototypes. The dimensions of the products are following: x:y:z. Requirements for the design: the files with the design are accepted in the specified formats. The staff of the KTU provides support to the customers during the model development and production periods (DSTU Knowledge Transfer Unit, dktu.org.ua, KSMA Knowledge Transfer Unit, http://ktu-ksma.com).

DSTU pilot project «FIRST CONSULTING TECHNOLOGIES» is the establishment of links with two Dniprodzezhynsk industrial companies:

1. Limited Liability Company Scientific and Production Association «Dniprofmash».

The advantage of our products - the reliability and quality. Qualifications of performers, professional experience and adopt modern technology besides guarantee.

Scientific and Production Association «Dniprofmash» expanding its network of consumers of metal products and invites You to be our partner. Issuing a contractual relationship with us, You will gain a reliable manufacturer of special sections of industry destination and critical metal elements and structures.

2. Limited Liability Company Scientific and Innovative Enterprise «Diya».

«Diya» provides a full range of services for the development and implementation of automated process control systems (PCS) in the chemical, petrochemical, oil and gas, metallurgy, oil and gas, food, energy and other industries.

KTU is project co-founder, and provides different types of support:

Create conditions for the technology transfer and commercialization of research-and-development works of the DSTU and the «Dniprofmash» («Diya»), including:

- conditions for carrying out the technological audit and scientific and technological examination of the «Dniprofmash» («Diya») by the KTU representatives;
- conditions for the information exchange between the representatives of the DSTU and the «Dniprofmash» («Diya») on the results of performed research-and-development works for their further commercialization, usage in the educational process, introducing intellectual property objects into the economic circulation;
- conditions for the information exchange on the technological inquiries of the industrial sector of economy in Ukraine and worldwide;
- conditions for the joint realization of actions on the knowledge transfer: seminars, trainings, conferences, scientific and innovative competitions,

training courses, qualification courses, joint participation in grant programs (DSTU Knowledge Transfer Unit, dktu.org.ua).

KSMA pilot project «IT-MARITIME» is the organization of every year competition of students‘ IT projects.

Contest «IT-Maritime» aims to identify innovative projects in the field of information technology and to set up a system of interaction between students, teachers and experts of the IT industry, deepening the creative potential of future specialists.

The final stage of the annual students contest of IT projects «IT-Maritime» took place at Kyiv State Maritime Academy on15-17 December 2015. Participants presented their software products in the following categories: «Mobile applications», «2D-3D-graphics», «Cloud Technology», «Video Games», «Social IT-projects». During the event students also had the opportunity to attend educational lectures and master classes held by leading experts in the field of IT technologies (KSMA Knowledge Transfer Unit, http://ktu-ksma.com).

Besides the above mentioned ones, the achievements of the KTU of Dniprodzerzhynsk State Technical University and Kyiv State Maritime Academy include:

popularisation of information on grants, conferences, seminars, and possibilities for publishing the scientific research results (DSTU and KSMA websites);

preparation and organization of training courses and seminars. Thus, in November 2015 the training on ERAZMUS+ grant applications preparation for the teaching staff, post-graduate students and students was held on the basis of DSTU. In January 2015 the seminar on project management software usage was held at DSTU. In April 2016 the training on 3D-scanning and printing equipment usage was held on the basis of KSMA;

grant applications preparation (COMPETE, EnSaT projects);

organization of courses (the courses of English language for the teaching staff and students are organised; the curricula for the courses of Polish language, computer layout, 3D-prototyping technology, Moodle software usage are prepared);

looking for potential partners and signing contracts on collaboration (the contracts with the NTTN, the Chamber of Commerce, city and regional administrations) (DSTU Knowledge Transfer Unit, dktu.org.ua, KSMA Knowledge Transfer Unit, http://ktu-ksma.com).

CONCLUSION

To sum up, results of international project TEMPUS «Knowledge Transfer Unit – From Applied Research and Technology-Entrepreneurial Know-How Exchange to Development of Interdisciplinary Curricula Modules» are the basis for he functioning of Ukraininan knowledge transfer infrastructure. Also, these are the principles for the formation of the national knowledge and innovation economy. The KTU department is the base of innovation university developed on the «knowledge triangle» conception: cooperation of education, research and innovations.

The main expected results of operation of the KTUs, created on the basis of higher educational institutions, are the following:

strengthening the positions of higher educational institutions in the world scientific and technical cooperation;

creating the basis for integrated development of science and higher education, optimized according to the directions of activities and the location;

organizing the cooperation of higher educational institutions, research institutions, enterprises and organizations of the national economic complex, public authorities in the innovative development of productive industries;

growth in the number of documented results of intellectual labor;

implementation of the innovative technologies and developments at the enterprises and organizations.

REFERENCES

Critical Knowledge Transfer: Tools for Managing Your Company's Deep Smarts. — Publisher: Harvard Business Review Press, 2014, 240 p.

Dniprodzerzhynsk State Technical University Knowledge Transfer Unit [online] at dktu.org.ua. (accessed 26 June 2016)

Dulepyn Y.A., Kazakova N.V.: *Strategy of Innovation Transfer in the Innovation Systems* [online] at www.v-itc.ru/investregion/2010/04/pdf/2010-04-09.pdf, (accessed 26 June 2016)

Fedorov M.P.: *The role of universities in the innovation economy.* Innovation, 2007, 02 (100), 71-75.

Geyets V. M., Seminozhenko V.P: *The doctrine of the knowledge economy: project* [online] at www.semynozhenko.net, (accessed 26 June 2016)

Kalynovska T.G., Kosolapova S.A., Proshkin A.V.: *The triangle of knowledge as a factor of innovation development* [online] at www.rae.ru/snt/?section=content&op=show_article&article_id=6359, (accessed 26 June 2016)

Kyiv State Maritime Academy Knowledge Transfer Unit [online] at http://ktu-ksma.com (accessed 26 June 2016)

Medvedkin T.S., 2005: *Innovative development of Ukraine economy on the context of the world technology market globalization*. Donetsk National University, Donetsk, 2005, 20.

Medvedkin T.S., 2013: *The imperative of international knowledge transfer in the system of global scientific and technological transformations*. Institute of Industrial Economics of NAS of Ukraine, Donetsk, 2013, 40.

Sovershenna I.O.: *University technology transfer centers - an important link of the innovation infrastructure* [online] at ena.lp.edu.ua:8080/bitstream/ntb/18760/1/16-71-75.pdf (accessed 26 June 2016)

Tempus project: knowledge transfer unit - from applied research and technology-entrepreneurial know-how exchange to development of interdisciplinary curricula modules [online] at my-ktu.eu/ (accessed 26 June 2016)

The knowledge transfer strategy of the Nizhny Novgorod State University N.I. Lobachevsky [online] at www.unn.ru/general/transfer.html, (accessed 26 June 2016)

Zemlyankin A.I., Lyakh I.I.: *Summary of knowledge transfer approaches as part of the innovation process*. Journal of Economic Science of Ukraine, 2010, № 2 (18), 43-46.

II. THEORETICAL AND METHODOLOGICAL ASPECTS OF DISTANCE LEARNING

SOCIAL MEDIA FOR SHAPING PROFESSIONAL EXPERIENCE OF MASTER DEGREE STUDENTS

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Abstract: *The paper focuses on practical results and experience of training specialists in the field of education to the attainment of professional goals with the use of social media. The Institute of Computer Science and Technology Education of Herzen University (Russia) implements jointly with the UNESCO Institute for Information Technologies in Education a course "Social Media and New Education Practices" for master degree students, majoring in pedagogical education. Because of the course, students were able to reach a higher level - to design education practices that run in a networked environment with interactions unfolding in electronic formats.*

Keywords: Social media, professional experience, professional competences, e-learning.

INTRODUCTION

Social media have gained enormous popularity as a means to maintaining social ties among friends, colleagues, and those who have common interests. People today, especially youth, use social networks to communicate, in order to be always connected and informed about current events and news. Social media is widely used to address university education and curricular issues (Benson & Morgan, 2016). Today, social media is treated and used for various purposes, in diverse focus groups of learners (Khatri et.al, 2015) and as new communication formats (Ricoy & Feliz 2016). Moreover, for receiving feedback (Palaiokrassas et.al, 2016). Therefore, teachers as education experts need to know the capabilities, limitations and dangers of social media in order to get along with students

(Lamanauskas & Pribeanu 2016), to find and use new and unique possibilities for joint training, creativity and professionalisation.

The listed above interrogation are the part of the international research project scope - IRNet (http://www.irnet.us.edu.pl). During the past two years, the international research group has studied, among many other issues, the attitude of students to collaboration and cooperation as the basis for a network learning community engagement (Noskova et.al, 2015), social media as a means of university study support (Chmura et.al, 2015).

Modern electronic space is a new environment of interactions. A peculiar virtual medium, to some extent reflecting the social reality, has been formed. At the same time, the virtual world derives a new society with its network norms, rules and ethics. For teachers, it is particularly important that the electronic space becomes a habitat for the today youth - forerunners of the information society. This space is different from face to face classroom interactions. It takes place in a different establishment of social relations. A person receives a large variety of information resources and social contacts. At the same time, there are significant risks to physical and mental health, and personal development of a growing person. Teachers need to “cultivate the culture” in an electronic space, developing new education practices. However, they need to focus not only on their professional and life experience but also be deeply aware of the needs and demands of young people, being active and initiative in the social media environment.

Social media is a variation of mass communication through the Internet, a historically new kind of communication. It is defined as a group of Internet-based applications, ideologically and technologically Web 2.0 based, allowing participants to communicate in social networks and to create content in the process of exchanging it (Lai & Wong 2015). Social media is a part of e-environment interactions in which a user opens a media channel to broadcast content in a certain direction, addressed to a wide audience. This audience is based on self-organization and participants begin to interact with each other in the discussion of media messages and create new messages in this regard as a result of a network of cooperation. Message content producers enter into a relationship with the consumers of these messages and involve them in further content production. Participants of electronic interactions can share knowledge, experiences, opinions, news, videos, photos, music, links to websites, and so on to establish and develop social contacts.

1. THEORETICAL BASIS

Today, various education practices are based on social media implementation. Acquisition of different skills occurs in the remote interactions. Communication includes not only texts but also images and multimedia. A network communication is formed by a variety of dynamic and interrelated resources that are created not only by experts but also by students. Description of features of these interactions is the subject of research (Patarakin & Shilova 2015, Kommers et.al, 2015).

New professional competences are required from education professionals in the new century. They should learn to solve professional problems through the electronic environment (Bridgstock, 2016). What are the generalised characteristics of new education practices based on social media? On the technical side, they include the use of Web 2.0 technologies and social media channels. On the pedagogical side, these are specially organised education interaction, stimulating activity of electronic media users. On the psychological side, such new practices are creating a unique atmosphere of cooperation, unity of purpose and objectives of joint activities. From a communicational point of view, it is important that online communities are bundles of interactions with students themselves being organisational centres, not just a teacher acting as an organiser of the process. However, all these features are external, formal and simply recognised. At the same time, certain underlying factors exhibit the novelty of pedagogical practices discussed here. These factors are associated with the formulation of new goals and objectives of education activities. Tasks that encourage students to go beyond the education standard, to find their own meanings and motives in the education activity. Finding these new meanings can radically change a course of action.

In general, comparing the new and traditional education practices, we can state the following. In the classroom education practices, the leading role belongs to a teacher, who sets out a content and organises activities of students. Thematic content meets the education standards; it is the same for everyone, and it is obligatory to assimilate for all students. The pedagogical technology of a classroom practice is built as a linear sequence of group activities, with the feedback, provided by the teacher, monitoring and evaluating all activities. All this stimulates the implementation of education standards in the tight time framework of classroom teaching for the whole group of students.

When using social media as a set of arrangements, interactions and practices that aim to create a learning environment based on the use of social services in order to provide users' activity, the situation is changing. Current users of the network are themselves the authors of the network and can add their content - articles, photos, audio and video, leave comments, shape design of their pages, etc. Using the potential of social media requires a different course of education practices that allow evolving initiative, increasing activity through the choice, self-awareness of own meanings in the performed activities. Therefore, the aim of the new education activity is not just the implementation of training on the orders of a teacher, but the exertion of activities and initiatives in learning. In a networked environment, interacting with others, being an avid user of personally learned knowledge, a student carries out an own search for new knowledge, development and competence, and achieves results in the jointly distributed activities. Emotions, motivations, meanings of learning are changing (Pfaff-Rüdiger & Riesmeyer

2016). All this makes it possible to achieve new results, under certain pedagogical conditions during interactions through social media tools.

Thus, through these new education practices, the emergence of learning autonomy can be stimulated. According to such strategy, a learner builds his/her own knowledge independently in a specially created and maintained by a teacher e-learning environment. In this environment, learners are able to transfer their knowledge and skills in the practice of life - to teach others, help them to develop their knowledge, participate in various projects, creative activities. Therefore, in these practices moving beyond the standard of education activities and self-realization is stimulated.

2. MATERIALS AND METHODS

The modern teacher needs competences, allowing them to prepare children and youth to interact with a wide variety of social media environment. This complex problem can be solved on the basis of the use of social media themselves, involving young people in the education interaction, allowing them to realise new opportunities and risks of this medium.

Obviously, the new practices discussed in this paper do not replace the traditional ones but provide a chance for a new way to organise the education process. Therefore, it is advisable to build learning interactions both based on classroom education activity and electronic environment activity.

The Institute of Computer Science and Technology Education of Herzen University (Russia) has been implemented for three years jointly with the UNESCO Institute for Information Technologies in Education a course “Social Media and New Education Practices”. The course is addressed to master degree students, majoring in pedagogical education. The main goal of the course is to form competencies of teaching and solving educational problems in the modern media environment.

The relevance of the course is determined by several reasons:

- extensive use of social media in solving problems of education practice;
- high motivation of young people to use social services;
- renewed education standards demand a revision of education practices.

The course content includes the following issues:

- a new socio-psychological phenomenon in the global electronic environment;
- social media: concept, social significance and pedagogical potential;
- media education problems;

- the role of social media in the education environment: design of media environment to address specific education objectives;
- Internet services of social media and virtual education methodology are based on the interactions based on social media.

In the process of studying each module of the course, students develop their pedagogical projects of an e-learning environment, through which, using the tools of social media, they are preparing for the decision of professional tasks related to the theme of the master thesis.

In February and March 2016 master degree students from the Institute of Pedagogy and Psychology, Institute of Childhood, Faculty of Correctional Pedagogy joined the study of the course. A general outline of the course is presented in Figure 1.

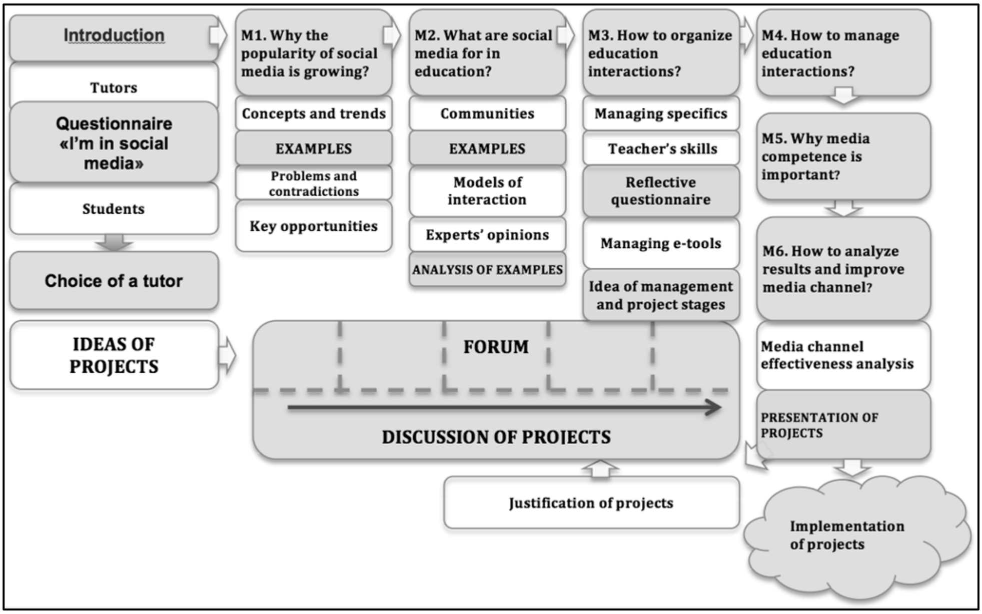

Figure 1. Social Media and New Education Practices. General course outline.

Source: Own work

On entering the course, prospective participants were questioned about the main reasons that prompted them to enrol and study it. Answers to this question were formulated, "the course was recommended by scientific adviser", "it is interesting to explore something new, and then put into practice in real life", "the desire to gain practical experience", "the motivation to apply new knowledge in professional activity already being implemented".

How were interactions of academic teachers and students undertaking the course organised? The course has been implemented in a blended model – both face to face and distance forms, with the use of LMS Moodle. It is necessary to underline the fact that students were to be acquainted with the course materials, perform tasks, as well as describe the conceptual idea of their project in a very short period of time - a month and a half. Participants coped with this challenge. There were of great importance not merely methods of material presentation (problematic issues, case studies, presentations with narration, etc.), but also methods of interaction with academic teachers. All problematic issues were discussed in the course forum, many tasks required mutual commenting and peer assessment. The academic teachers who supervised the course were mostly in the role of tutors and facilitators, guiding the activity of participants. A teacher consultant was appointed for each student. Of course, students have to link their projects with the directions of their master studies and it can be claimed that the results of the course were created innovative education practices.

What was the main idea of the course? All the materials and tasks were organised in a way to help students reflect on their professional involvement into social media, both actual and prospective. There were six modules of the course; each was to be fulfilled on one week:

- Module 1 “Why is the popularity of social media growing”?
- Module 2 “What are social media for in education”?
- Module 3 “How to organise educational interactions in social media”?
- Module 4 “How to manage educational interactions in social media”?
- Module 5 “Why is media competence important for teachers and learners”?
- Module 6. “How to analyse results and improve a media channel”?

Each module necessarily supposed discussions of some controversial issues on the course forum. For example, in Module 1 were discussed several questions. What is characteristic of modern youth you agree with most and why – “digital natives”, “homo virtualis”, “net generation”, “the millennials? Why are young people active in the social media environment? Make a hierarchy of motives for the use of social media and give specific examples (prestigious, fashionable, comfortable, socially significant, different data formats, different styles of communication and behaviour). In addition, in Module 4 were discussed two main question. What is the specificity of the interaction management in a networked community of educational purpose? Why does a teacher who uses social media in education, need special skills? Which skills do you consider the most important? Together with thematic discussions, students talked about their projects to receive feedback from both peers and tutoring teachers.

One more important point interesting to emphasise in this paper is a wide list of examples on social media use that were not only presented to students, but also they took part in expanding the range of examples. All examples were categorised according to the models of education interactions. For example, joint collection of resources (blogs of teachers and experts, wikis), discourses of problem discussions (conference communities), projects (Letopisi.ru – a well-known Russian education project, Big History project on Twitter), PR (Twitter accounts of schools, universities, ministries and public persons), professional experience exchange (professional communities of teachers), role and developing games (multiplayer educational games for children), social projects (projects for the virtual reconstruction of historical monuments).

3. EXAMPLES OF STUDENTS' PROJECTS

Of particular interest is the result of the innovative transformation of the observed education practices patterns with the use of social media. In education, the practice has become popular such a model, implemented on the basis of social media, which takes place parallel in – in a classroom and an e-learning environment. In social networks, examples that implement educational activities based on social media are available. For example, the use of blogs to address specific learning tasks, the use of network services, bookmarking, wiki services for project activities of students, etc. (Noskova et.al, 2015). For example, students' communicative competence development based on the use of educational blogs proved its effectiveness (Noskova et.al, 2014).

However, master degree students who studied the course "Social Media and New Education Practices" were able to reach a higher level - to design such education practices that evolve in a network environment with the interactions unfolding in electronic formats. Such types of models are characteristic of international educational Internet projects such as Wikipedia and virtual chorus presented on YouTube. They are widely used in the interactions of innovative teachers for the exchange and dissemination of best practices, for uniting all, wishing to work together and achieve results.

Many projects developed by students had a social orientation. Projects can be divided into two groups - projects aimed at changing the corporate university environment (support for student initiatives, social projects at the university auspices) as well as projects designed to changing the general socio-cultural environment (development of the professional activity of social pedagogues, inclusive non-formal and informal education, the creation of communities, sharing positive experience).

For example, a student of the Faculty of correctional pedagogy presented the project "Where happiness lives!" The main idea of the project is developing a media resource for children with intellectual disabilities and their parents. The purpose of the project is the organisation of environmental cooperation of parents, children, correctional pedagogues and psychologists.

A student of the Institute of Pedagogy and Psychology presented the project "Community of a happy family". It aims to organise community network based on the social network VKontakte. VKontakte (vk.com) one of the most popular social network in Russia. The author of the project plans to create network self-help groups as a form of social work, which will focus on the exchange of experiences, positive examples of family relations, ways to overcome various difficulties and challenges of life.

One more student of the Institute of Pedagogy and Psychology presented the project “#This is Herzen - freshmen!” The main idea of the project is the creation of a site for informing the 1st year students about the opportunities offered them to our university in additional education and extracurricular activities. The author suggests to use the potential of social media - an exchange of views, reviews, photo and video reports, demonstration of achievements, learning - to engage in joint content of this site students and supervisors, as well as to attract students and to create an attractive image of the university and to develop students’ community.

A student of the Institute of Computer Science and Technology Education presented the idea of creating a website, a virtual creative space, a platform for the implementation of creative ideas for the participants of The Herzen University Fashion Theatre. The focus of the media is discussing topical issues, news, perspective directions of development of the Fashion Theatre community. For example, participants who have already had the experience of creating a collection of clothes will be able to share existing knowledge with the new participants and to give advice. At the same time, the media will provide the current achievements of Fashion Theatre: photos from fashion shows, collections of different years, and the gallery of graphic design. It will also contribute to the growth of the Institute's rating, and to the attraction of new members from students. It is important that the Fashion Theatre as a creative association has existed for quite a long period, and the establishment of a virtual platform will allow the association to enter the current level of self-presentation and interaction.

The results of the course show that learners are able to transfer their knowledge and skills in the practice of life: to teach others and to participate in various projects and creative activities. Learners are active and their self-realization is stimulated. The course helped students to become aware that teachers need understanding not only the capabilities of social media, but also limitations and dangers, and, moreover, methods and ways of achieving new results that will not merely duplicate face-to-face educational interactions.

4. RESULTS AND DISCUSSION

For the dissemination of results, it is important that researchers from European universities took part in the discussion of students’ project – the representatives of the University of Potsdam, as well as the members of the international research project IRNet from the University of Silesia (Poland), University of Constantine the Philosopher in Nitra (Slovak Republics), the University of Extremadura (Spain). It is planned to expand the access to the course for the Herzen University master degree students of different faculties, as well as for teachers within the system of professional training through the extensive use of distance learning technologies. The international IRNet project shows the need to expand the geography of the course and allows determining the near-term objective – to translate the materials into English and to upgrade this course for the international students.

CONCLUSION

New education practices implemented based on social media is not just the expansion and enrichment of the traditional educational activities in the auditorium. They can be considered the prototype of the future when students themselves will demonstrate conscious educational initiative in finding solutions and adopting the goals and objectives of the educational activities for building competencies. In search and acquisition of electronic educational resources, they will start looking for network partners to work together, provide mutual support and share knowledge. Sharing knowledge helps to achieve the intended results better and to correct actions. They will seek the assistance of teachers for the evaluation and correction of their knowledge and skills, building up a more optimal education path. These network communities of practice will stimulate the productive activity of students, their initiative based on the generated motivations to use acquired knowledge, to carry them into practice, exchanging them with other users, discuss, create, and act together.

Essential competences will be formed in such organisation of education interactions of students - not only professional but also social competences. The most significant educational activity is personally meaningful; it has the true sense and strengthened motivation. All this is necessary to the further education path, to the aspiration for lifelong learning in a dynamic knowledge society.

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REFERENCES

Benson, V., Morgan, S., 2016: *Social university challenge: Constructing pragmatic graduate competencies for social networking*. British Journal of Educational Technology, 47 (3), 465-473. doi:10.1111/bjet.12448.

Bridgstock, R., 2016: *Educating for digital futures: what the learning strategies of digital media professionals can teach higher education*. Innovations in

Education and Teaching International, 53 (3), 306-315. doi: 10.1080/14703297.2014.956779

Chmura, M., Malach J., Kostolányová, K., 2015: *Social media as a means of university study support*. In ed. Katerina Kostolanyova and Jana Kapounova ICTE-2015 (p. 41-53). University of Ostrava: Roznov pod Radhostem. ISBN 978-80-7464-763-5.

Khatri, C., Chapman, S.J., Glasbey, J., Kelly, M., Nepogodiev, D., Bhangu, A., Fitzgerald, J.E., 2015: *Social media and Internet driven study recruitment: Evaluating a new model for promoting collaborator engagement and participation*. PLoS One, 10 (3). doi:10.1371/journal.pone.0118899.

Kommers, P., Isaias, P., Issa, T., 2015: *Perspectives on social media: A Yearbook*. Routledge. ISBN-10: 0415854164, ISBN-13: 978-041585416.

Lai, Y.C., Wong, T.W., 2015: *Using social media and cloud services to facilitate teaching and learning in teacher education courses*. Ubiquitous Learning, 6 (4), 7-24. ISSN: 1835-9795.

Lamanauskas, V., Pribeanu, C., 2016: *Facebook use by University Students: From Intense use to addictive behavior*. In DIVAI 2016 – The 11th international scientific conference on Distance Learning in Applied Informatics (p. 331-340). ISSN: 2464-7470.

Noor, Al-Deen H.S., Allen, Hendricks J.A., 2013: *Social Media: Usage and Impact.* Plymouth: Lexington books. ISBN: 978-0-7391-8009-9.

Noskova, T., Pavlova, T., Yakovleva, O, Smyrnova-Trybulska, E., Švec, P., Drlík, M., Tomanová, J., Cápay, M., 2015: *Network Learning Community of Students - Knowledge-Sharing Opportunities for Professional Development*. In ed. Katerina Kostolanyova and Jana Kapounova ICTE-2015 (p. 169-182) University of Ostrava: Roznov pod Radhostem. ISBN: 978-80-7464-763-5.

Noskova, T., Pavlova, T., Yakovleva, O., Sharova, N., 2014: *Communicative competence development for future teachers*. The New Educational Review, 38(14), 189-199. ISSN: 1732-6729.

Noskova, T., Yakovleva, O., Pavlova, T., Smyrnova-Trybulska, E., 2015: *Students in the information environment: a study of educational and extracurricular activities*. Int. J. Continuing Engineering Education and Life-Long Learning, 25 (4), 394-410. ISSN: 1560-4624.

Palaiokrassas, G., Voulodimos, A., Konstanteli, K., Vretos, N., Osborne, D.S., Chatzi, E., Daras, P., Varvarigou, T., 2016: *Social Media Interaction and Analytics for Enhanced Educational Experiences*. IEEE Multimedia, 23 (1), 26-35. ISSN: 1070-986X.

Patarakin, Y., Shilova, O., 2015: *Concept of Learning Design for Collaborative Network Activity*. Procedia - Social and Behavioral Sciences 214, 1083 – 1090. ISSN: 1877-0428.

Pfaff-Rüdiger, S. Riesmeyer, C., 2016: *Moved into action. Media literacy as social process*. Journal of Children and Media, 10 (2), 164-172. ISSN: 1748-2798.

Ricoy, M.-C., Feliz, T., 2016: *Twitter as a learning community in higher education*. Educational Technology and Society, 19 (1), 237-248. ISSN: 1176-3647.

DISTANCE EDUCATION
RESEARCH FIELDS AND METHODS

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Abstract: *The research fields and methodology of distance education as academic discipline include multidimensional object which consists of the educational process, tools used, characteristics of participants (teacher and students), organizational culture, cultural as well as economic aspects. Olaf Zawacki-Richter and Terry Anderson (ed. 2014) divided them into three levels: macro (systems / models and cultural aspects), meso (organization, management, technology, costs, innovations, professional development, ways of learner's support, quality assurance), micro (design, interaction and communication patterns, characteristics of teacher and learners, dropouts). Research field include humanities and social sciences, computer sciences, educational technology.*

Keywords: *distance education* (*DE*), *research field, research discipline, research area, methodology.*

INTRODUCTION: INTERDISCIPLINARITY OF THE RESEARCH ON DE

In this study distance education (DE) is defined as a set of educational activities without direct contact between the student and the tutor. It includes preparation and conducting of: correspondence education, educational websites, online forums, blogs, chat rooms, classes in augmented reality (for example „Second Life"), profiles on social networks and complementary teaching i.e. blended learning in addition to activities traditionally carried out in the class rooms, as well as designing and delivery of a fully DE online courses. Study of those is complicated by technological variability of the test subject, its many aspects and its cultural characteristics.

Andrew Pickering rightly noted that nowadays these are not the scientific revolutions but rather technological ones which change history of research, because technological progress is ahead of the research, and the practice is ahead of theory (Pickering 1994: 418). Current research methods are not sufficient to conceptualise the new areas of knowledge. These observations also apply to DE research, because it is conditioned by the development of technology.

1. SCIENTIFIC DISCIPLINE, TITLE AND PROFESSION MISSING IN POLAND

DE courses which are prepared in higher education centers vary in quality. This contributes sometimes to promotion of wrong patterns among students and poor quality of DE. In this situation, studies on DE in Poland seem to be necessary. It requires extensive competence.

The importance of DE is growing. Most probably, therefore, in the near future there will also be increased demand for professionals in this field in Poland – not only for specialists in the field of *Informational Technology in Education*, but also for so called *instructional designers*. According to David Merrill [t]*he purpose of instructional design is to develop experiences and environments which facilitate the student's acquisition of* (...) *knowledge and skill* (Merrill et al. 1966: 2). However, such academic specializations do not exist in Poland, although in the classification of occupations listed eg.: *distance education methods specialist*, *examiner on-line*, *media educator*, *multimedia education methods specialist*, *on-line teacher* (Ministry of Family, Labour and Social Policy 2014).

Clarifying the field of research and research methods related to DE could become a basis for recognition of *Information Technology in Education* as a field of knowledge in Poland, as well as a basis for granting degrees in this field similarly as it is the case in Western Europe, where it is possible to obtain a title of *Professor of Information Technology in Education* („King's College London".

Despite the growing social demand for DE and investing public funds for buying necessary equipment by educational and academic institutions, those responsible for delivery of DE do not always receive necessary organizational and technical support. This results in the formation of harmful myths about education supported by computer (Morbitzer 2002; Mischke 2005) and discouragement of those who undertook tutoring in DE. Though the fact that DE requires high and diverse qualifications, usage of sophisticated technologies and performance of time-consuming tasks it is looked down at in Polish higher education institutions, when compared to traditional teaching activities in the form of delivering lectures and tutorials in classrooms. DE as didactic activity is not taken into consideration (or scored) in the procedure of assessment of the employee's job performance and ignored during evaluation of their academic achievements (Mischke 2006). This state of affairs results in decrease in interest in distant forms of education and in publications on this topic.

Currently, some Polish universities employ IT specialists, graphic designers, educators and other specialists to assist academic tutors in preparing and delivering DE. Their work is not considered academic work similarily as designing and conducting DE courses by academics even at universities which do not employ persons to support DE activities. Academics, therefore, deliver DE without additional remuneration and without technical support. There is a similar situation in Polish primary, junior secondary and secondary schools (Chomczynski 2015).

2. RESEARCH OF DISTANCE EDUCATION IN POLAND

Research on DE in Poland is needed especially because of the complicated cultural context of the Polish media. In a post-communist country with *newly emerging public broadcasters* (Jakubowicz, 2005: 9-10) there is lack of models of autonomy. Main newspapers, magazines, Internet portals, television and radio stations are usually owned by foreign companies. In this situation, if e-courses' materials are not selected with due criticism, especially by students, other media penetrate DE with consumer syndrome elements and patterns dominating in pop-culture. In the era of media convergence, it impacts the shape of DE, especially in humanities and social sciences, because the availability and popularity of the resources shape distant discourse and didactic process.

Every technology – thus also DE – after a phase of a rapid evolution goes into recession and then stabilizes its development. In order to stabilize growth one needs to draw conclusions from past experiences, that is to examine the current development of DE, especially its weaknesses, myths and threats.

It seems that in Poland the period of expectations regarding reducing costs of education, personalizing the educational contents and dissemination of education with DE has passed. Quickly it turned out that extramural education requires organizational and legal regulations, large financial investment in hardware, software and system support (Mischke 1997). Tutors turned out to be even more necessary as guides among the vast amount of information when compared with traditional teaching forms (Lubina 2004).

DE did not contribute to the spread of education, and only the most motivated participants complete DE courses (Meger 2008 a). To many, who are insufficiently motivated (especially young people below 18 years of age), *anyplace, anywhere, anytime and any device* means procrastination of learning till later date and becomes *nowhere, never and no device.*

3. PURPOSE, METHOD AND RESEARCH MATERIAL

This study proposes listing of the fields of research related to DE and selection of appropriate testing methods. The purpose of this analysis is to attempt to establish a research field for *Information Technology in Education* adequate to Polish reality, and at the same time to inspire researchers, teachers, trainers, administrators and students to navigate wider areas and to recognize the complexity of DE.

Proposal of DE research presented below is associated with practice:

A. Delivering online courses (2012-2016, preparation and delivery of dozens of editions of 34 DE courses, including 7 completely distance ones and two university-wide lectures).

B. Training courses for students and staff of the Pedagogical University in Cracow.

C. Activities in the Rector's Committee for Distance Education (Rektorska Komisja ds. Zdalnych Form Kształcenia), which approves courses for distance delivery.

D. Participating in conferences, online discussions and meetings of the Cracow local group of the Association of Academic E-learning (krakowska Grupa Lokalna Stowarzyszenia E-learningu Akademickiego).

E. Literature review to investigate and qualify examples of research fields and methods contained within DE.

Fields and disciplines of sciences and arts have been developed on the basis of the the analysis of the following documents:

A. *Załącznik do rozporządzenia Ministra Nauki i Szkolnictwa Wyższego w sprawie obszarów wiedzy, dziedzin nauki i sztuki oraz dyscyplin naukowych i artystycznych* [*Annex to the Regulation of the Minister of Science and Higher Education in the areas of knowledge, fields of science and art, and scientific and artistic disciplines*], 8 August 2011.

B. *UNESCO nomenclature for fields of science and technology* (1974 with amendmends).

C. OECD (Organisation for Economic Co-operation and Development) *Revised field of science and technology (FOS) classification in the "Frascati manual"* (2007).

D. *List of categories, areas, disciplines and research fields* published on the site of *Japan Society for the Promotion of Science* (2012).

Due to the extent of the problems associated with DE, research fields were divided ito levels: macro, meso and micro according to the proposition of Zawacki-Richter and Anderson.

4. RESEARCH FIELDS OF DE

Research fields of DE contain for example to such disciplines and research approaches, as:

1. anthropology (cultural anthropology: ethnography, ethnology, ethno-linguistics, myths; social anthropology: chiefdom),

2. business administration (commerce),
3. cognitive science (neuroscience, psychology of mind),
4. computer sciences (artificial intelligence, automated quality control systems, data banks, informatics: software, computer system, network, database, intelligent informatics),
5. cultural property science,
6. cultural studies,
7. demographics (age distribution, biological characteristics, general demographic structures, sex, socio-economic characteristics),
8. economics (applied economics, economic statistics, economic policy),
9. education (adult education, education on school subjects and activities, sociology of education, special needs education),
10. educational technology (educational theory and methods),
11. electrical and electronic engineering (communication, network engineering),
12. ethics (classical ethics, ethics of individuals, ethics of science, group ethics),
13. geography (human geography),
14. history (historical studies in general, history of science and technology, history of Poland, Europe and America),
15. informatology,
16. law (fundamental law, public law, social law, civil law, new fields of law),
17. library and information science,
18. linguistics (applied linguistics: automated documentation, computational linguistics, documentation, language and literature, bilingualism),
19. media studies,
20. pedagogy (educational theory and methods, learning disabilities, organization and planning education, career and status of teachers, teacher training and employment),
21. philosophy (philosophical anthropology: aesthetics, philosophy of action, philosophy of imagination, philosophy of intersubjectivity, philosophy of will, knowledge and science),
22. political science (cultural policy, educational policy, information policy, science and technology policy, social policy),

23. politics (politics, international relations, public opinion),
24. psychology (educational psychology, experimental psychology: brain functions, development psychology, occupational and personnel psychology, school psychology, social psychology, mental retardation),
25. safety system science (social system engineering),
26. science of arts and letters (cinematography, fine arts theory, analysis and criticism, photographic and cinematographic equipment),
27. science of cognition and social communication,
28. science education, educational technology,
29. sociology (occupational sociology, sociology of education, sociology of science),
30. statistical science,
31. technological sciences (telecommunications technology, audio-electronics, broadcasting, sound and television),
32. new multidisciplinary fields (area studies, gender).

The study of DE includes research into the educational process, tools used, characteristics of participants (teachers and students), organisational culture, regulations of cultural as well as economic aspects. Therefore, DE is a multidimensional phenomenon and not just the electronic equivalent of a spoken dialogue of a teacher with their students. Researchers come from different academic backgrounds and work on different topics focusing on research themes of interest to them. As a result, researchers present only selected aspects of DE.

5. TEST METHODS IN THE FIELD OF DE

Researchers of DE cross different disciplines in order to take advantage of theories and tools. The test methods of DE refer to large quantities of information (for example *cohort studies, content analysis*), current events (*action research*), they characterize educational policy (*case studies*), and even relate to predicting the future (*trend studies*). Research on DE, hence, requires a number of competencies and the application of sophisticated research tools, as it is in the case of *cognitive science* and *cultural studies*. Because the subject of the study is vast and susceptible to change, thus the researchers create a *performance model of knowledge* (Munévar 1981). Selection of the best solutions becomes the tool of educational change. This is a difficult challenge, therefore publications incorporating different aspects of DE are scarce (Kubiak 2000; Juszczyk, 2002; Siemieniecki, 2005; Zawacki-Richter and Anderson 2014).

Research of DE may be conducted for example in the form of: action research, analyses, biographical method, case studies, cohort studies, comparative analyses, content analyses, correlational studies, critical discourse analysis, critical incidents (Tripp 1993), diagnostic survey, document analysis, educational experiment, exploration, interview (and projective techniques), journaling, literature reviews, methodological considerations, observation, overview, report on implementation, sociometric techniques, statements, trend studies. Quantitative, qualitative and mixed methods can be used.

Due to strong links with technology there is lack of research carried out by humanists, hence e.g. linguistic methods such as critical discourse analysis are practically non-existent (Wodak, Meyer 2009). Moreover, researchers all across the globe represent a variety of academic disciplines, which results in a wide range of reasearch tools they use.

6. LEVELS OF SUBJECT OF INVESTIGATION

6.1. Macro level

6.1.1. Macro research problems, disciplines and fields

Problems researched on macro level include:

A. **History** of DE related to technologies and their applications in different regions.

B. **Systems** of DE including problems of access, equity, digital devices, role of institutions in the process of developing DE courses.

C. **Theories** of learning: modeling the action of the senses and the brain, knowledge construction, social constructivism, connectivism (Siemens 2004).

D. **Models** of DE connected with formal and informal teaching and training, including social media, mobile learning, immersive learning environments, *Massive Open Online Course*s (MOOCs), educational clouds, portable and wearable devices (as watches, helmets) and subcutaneous chips.

E. **Cultural** aspects related to cultural policy, role of language, visual communication, cultural context, cultural differences, cross-cultural aspects, globalization of education.

6.1.2. Macro research questions

Research questions to be asked on macro level include:

A. **History** of DE.

1. What are the differences between the earlier and contemporary forms of DE in various regions?

2. What are the similalities between correspondence education and DE delivered with the use of the Internet?
3. What methods were to be used for researching DE?

B. **Systems** of DE.
1. What methods are to be used for researching the internet activity of teachers?
2. In what way do resources used in DE contribute to construction of social reality?
3. How does DE transform traditional teaching and the role of institutions dealing with it?
4. What social issues and relationships are revealed and reinforced during DE?
5. What is the role of institutional partnership in transnational cooperation in the area of DE?
6. What is the role of higher education institutions and professional associations in transnational cooperation in improving practice?
7. How does a student's behaviour correlate with behaviour of other users of a DE course?
8. What is the globalization of DE? What is the development of global educational market?
9. What are characteristics of teaching in mediated environment?
10. What are characteristics of education in multicultural environment?

C. **Theories** of learning
1. How are the senses and the brain modelled during DE?
2. What are the directions of knowledge transfer in DE?
3. What structure of knowledge is promoted by DE?
4. How does DE affect the didactics and interdisciplinary integration?

D. Models
1. How DE is connected with formal and informal teaching and training?
2. How and for what purpose in DE are used: social media, mobile learning, immersive learning environments, *Massive Open Online Courses* (MOOCs), educational clouds, portable and wereable devices (as watches, helmets) and subcutaneous chips?

E. Cultural aspects**.**

1. How do users of commercial educational portals perceive a particular academic discipline?
2. What are the myths contained in resources of a DE course / internet site?
3. What are the roles of DE resources and infrastructure in developing countries?
4. What abilities and competencies should a person who prepares and runs DE have?
5. How does DE influence perception of the role of teachers? How does it change the teacher's role? (Lubina 2004)
6. What ethical challenges arise in connection with DE? (Hruby 2014)
7. How does DE contribute to formation / devastation of the axiological capital?
8. What should be the role of the state and the local authorities in the promotion of DE? (Sysło 2009)
9. Does the quality of DE correlate with the level of development of individual countries? If so, how?
10. What is the impact of DE on legal issues, especially on copyright?
11. What activities are available to students and pupils? How do they vary in different cultural backgrounds?
12. What linguistic image of education is contained in names of educational websites?
13. What is communicated to the users via visual images? How is it communicated?
14. What image of education is contained in the logos of educational sites and distance courses?
15. What linguistic image of the user is contained in the names of educational sites?
16. What is the mechanism of gaining leadership in educational discussions on internet forums and on social networks?
17. To what extent does the content of DE reflect public opinion?

6.1.3. Summary table relating to macro level

In the table below, examples of research disciplines and research methods developed by John W. Creswell (2012) and other authors were assigned to examples of research topics on macro level.

Table 1.

Themes, research fields and test methods for DE on macro level

Research themes	Research disciplines	Examples of research methods
History of DE	*Anthropology, history, human geography*	*Analysis of documents, case study, content analysis (archival research), literature review, report on implementation*
Systems of DE	*Informatics, safety system science, science education*	*Case study, comparative analysis, correlatio-nal studies, focus group, questionnaire*
Theories	*Educational technology, history of science and technology, pedagogy, philosophy*	*Case study, content analysis (comparative research), interview, questionnaire*
Models	*Informatics, politics, science of cognition and social communication, sociology*	*Case study, comparative analysis, methodological considerations, overview*
Cultural aspects	*Anthropology, cultural studies, electrical and electronic engineering, linquistics, politics, political science, sociology, psychology, sociology of education*	*Action research, analysis of documents, case study (ethnographic research), cohort studies, content analysis, critical discourse analysis methods, interview, narrative research, observation, questionnaire, trend studies*

Source: Own work

It follows that the macro level includes a large database, therefore may be used quantitative research.

6.2. Meso level

6.2.1. Meso research problems, disciplines and fields

Problems researched on meso level include:

A. **Organization**: administration, infrastructure, costs, benefits, professional development.

B. **Management**: ways of learner support, quality assurance, staff workloads and tenure.

C. **Technology**: programs, innovations.

D. Traditional and new **education methods** and techniques – for example: flipped classroom, WebQuest, e-portfolios, visual learning analytics (Conde et al. 2015).

E. **Quality assurance**: methods of control, method of appointment quality assurance authorities, linguistic forms of quality assessment.

6.2.2. Meso research questions

Research questions on meso-level include:

A. How does **organization** of work affect the quality of DE?

1. What is the role of online tutors, instructional designers, counselors, and support staff?
2. How does delivering of DE correlate with university, school and teacher reputation?
3. Does the organization of the course foster interaction, discussion, reflection and collaboration?
4. What are benefits of providing online education? What are benefits of participation in online education?
5. What is the impact of DE, MOOCs, educational resources with free access and Information and Communications Technology (ICT) on increasing or decreasing the digital divide?
6. What is the quality of educational resources with unlimited access created by commercial entities as content marketing?
7. What is the value of open online universities, freely accessible course materials, open textbooks and research publications?
8. What is the value of non-institutional knowledge resources such as „Wikipedia”, „Google Books”?
9. What kind of support is required by participants of DE, the teacher and provider of DE?

B. How does **management** affect the quality of DE?

1. What is the role of associations, teacher training centers and higher education institutions (especially pedagogical) in developing of new organizational arrangements and teaching methods in the field of DE? (Dudek 2012).
2. How do institutions promote DE? How do they hinder its delivery? (Dudek 2012).
3. How do higher education institutions encourage / discourage employees to conduct DE?

4. What kind of hardware and software is provided by higher education institutions / schools? Are these sufficient to deliver DE?
5. When are the principles: *bring your own Personal Computer (BYOPC), bring your own device (BYOD), bring your own technology (BYOT)* forced upon those who prepare and deliver DE?
6. Is overtime, expenditure on equipment and software and inceased availability of teaching staff in DE rewarded? If yes, how?
7. What kind of competences are required from an online teacher? What kind of competences are required from an online student?
8. How much does it cost an employee to prepare and deliver DE? How much does it cost an institution?
9. What are the costs and burdens associated with preparation and delivery of DE?
10. What are the workloads and tenure (employment status) of people delivering DE?
11. What business models characterize DE when it comes to the return of investment?
12. Who prepares Massive Open Online Courses? Who utilise them?
13. What is the cost of effective support for learners?
14. What characteristics should a well prepared DE course have? [Association of Academic E-learning (Stowarzyszenie E-learningu Akademickiego)]

C. How does **technology** affect the qualitFgey of DE?

1. What kind of infrastructure is provided to DE by commercial institutions, and what by higher education institutions?
2. What actions can students perform in DE?
3. To what extent does DE utilise technologies 2.0 and 3.0, synchronous and asynchronous media and mobile applications?
4. Is there a provision on the use of resources by persons with disabilities and special needs?

D. What **education methods** are used in delivery of DE courses?

1. What is the relationship between DE, continuing education and lifelong learning?
2. To what extent are Open Educational Resources used in DE?
3. What is the relationship between DE teaching content and content implemented during blended learning and traditional learning?

4. What is the relationship between DE content and course program?
5. Does DE support the planned delivery of classes and examinations and access to the results of assessment? If yes, how?
6. Does DE assist with minimizing curriculum discrepancies? If yes, how?
7. What is the role of motivation in DE? (Meger 2008 a)
8. What motivational strategies can be used in DE? (Meger 2008)
9. What theories and teaching methods apply to DE?
10. What should be the didactics of e-learning? (Bednarek, Lubina 2008).
11. What is the attitude of students enrolled in teaching degrees towards DE?
12. How do students enrolled in teaching degrees utilise DE during their placements?

D. What are the DE **quality assurance** measures?

1. What methods should be used to study DE quality assurance?
2. Who controls the quality of DE? Why?
3. What are the criteria of DE quality assurance?
4. What is represented by linguistic forms of DE quality assurance?

6.2.3. Summary table relating to meso level

In the table below examples of research disciplines and examples of research methods were assigned to examples of research topics on meso-level.

Table 2.

Themes, research fields and test methods for DE on meso level

Research themes	Research disciplines	Examples of research methods
Organization	*Business administration, economics, ethics, law*	*Action research, analysis of documents, case study, observation, sociometric techniques*
Management	*Business administration, economics, ethics, political science*	*Action research, case study, interview, observation, questionnaire, statement*
Technology	*Informatics*	*Analysis of documents, case study, trend studies*
Learning	*Education, educational*	*Case study, content analysis,*

methods	*technology, linguistics, psychology, science education*	*critical discourse analysis methods*
Quality assurance	*Business administration, economics, education, educational technology, electrical and electronic engineering, ethics, law, linguistics. psychology, science education*	*Action research, analysis of documents, case study, cohort studies, content analysis, correlational studies, critical discourse analysis methods, interview, longitudinal survey, narrative research, questionnaire*

Source: Own work

It follows that the meso level often involves only few phenomena, and therefore here may be used comparative research.

6.3. Micro level

6.3.1. Micro research problems, disciplines and fields

Problems addressed in the research on the micro level are:

A. **Resources**: origin, relationship to other communications media, quality, order, usefulness.

B. **Teaching**: interactions teacher – users and communication patterns, teacher's characteristics including language, behaviour and actions.

C. **Learning**: learner's characteristics, their actions, understanding of knowledge, interactions and communication patterns, language behaviour, dropout.

D. Instructional **design**: construction of learning content and communication.

Zawacki-Richter and Anderson, basing of a large-scale content analysis of five major journals publishing articles on DE, stated: [t]*he micro-perspective (teaching and learning in distance education) is highly overrepresented* (2014: 5), because it occurred that the most frequently researched topics included: user interactions, instructional design and learner characteristics. Most neglected were economic aspects, innovations, management and cross-cultural issues. However, these neglected topics from macro and meso levels are crucial in the current realities.

6.3.2. Micro research questions

Micro level research questions include:

A. What is the origin of the **resources** used in DE?

1. What institutions or bodies produced resources used in online courses?
2. What is the relevance and quality of the resources used in the DE?
3. What is the relationship of the course / site resources to communications of other media?

4. What is the quality of information design / architecture on DE site / DE course?
5. Which of the current scientific theories important to a given discipline are included in the resources of the DE course?
6. To what extent DE may be useful for vocational training?

B. What is the methodical and technical preparation of the teacher to **teaching**?

1. What linguistic forms used by the teacher reflect their relationship with the students?
2. What are the social and professional competences of DE teacher?
3. In what way do high / insufficient competences of DE teachers impact on the work, behaviour and relations of the students?
4. What is the teacher‘s age and gender?
5. What is the teacher‘s culture and scientific discipline?
6. What is the teacher‘s level of media literacy?
7. What is the tutor’s perception of reality?
8. What are the assessment practices? Do students have possibility of self-evaluation?
9. How do students perceive knowledge? How do they obtain it?

C. What kind of collaboration opportunities are provided for **learning** to students?

1. Was creation of online communities made possible? Were they created?
2. What are the characteristics of interactions between DE students?
3. How users address one another and the tutor?
4. How linguistic forms reflect emotions and DE participants relations?
5. How do users of DE present themselves in autoprofiles and on general forums?
6. What is the participants‘ age and gender? What is their cultural background?
7. How are cultural and gender differences manifested?
8. What social and economic backgrounds do DE students have?
9. How often do individual participants of DE access DE sites? How much time do they spend on DE resources?
10. What are the media competences of students participating in DE?

11. What approaches to learning are presented by the students and by the teacher?
12. What is the student‘s level of media literacy?
13. Why do students undertake DE?
14. What is the correlation between the use of online abstracts and understanding of the school compulsory reading materials?
15. What is the correlation between the use of simulations and understanding of processes and activities shown in them?
16. What special needs do students have? Are these needs met?
17. Does DE allow for participation of persons with visual or hearing impairment?
18. What learner‘s behaviour patterns and learning styles do students present?
19. What information is shared by participants of DE?
20. What is DE participants‘ perception of reality?
21. Do students utilise video lectures, podcasts, chats, forums, interactive visualisations?
22. What are learning styles of students participating in DE?
23. How do automatic feedback answers incorporated in quizzes relate to mistakes made by students?
24. Are students referred to supplementary material?
25. Are criteria of assessments followed? Does every student have an access to their marking results?
26. What kind of support do students undertaking DE courses require?
27. What is the scale of educational failure and dropouts in DE? (Słomczyński and Sidor 2012) What is the scale of educational failure and dropouts in similar / comparative forms of traditional teaching?

D. How does the **design,** construction of learning content and communication correlate with the age, gender, social and cultural background of users?
   1. What is the impact of the aesthetics of the course / course site?
   2. Do the tasks performed capture the imagination of users? If yes, how?
   3. What meaning do users ascribe to the available educational content?
   4. What motivates students undertaking DE? What influences their motivations?
   5. Is the course coherent?t

6. Is design / architecture of the information deliberately planned and effective?
7. What image of academic disciplines is contained in the iconography of a DE course / educational site?

6.3.3. Summary table relating to micro level

In the below table, examples of research disciplines and examples of research methods were assigned to examples of research topics on the micro level.

Table 3.

Themes, research fields and test methods for DE on micro level

Research themes	Research disciplines	Examples of research methods
Resources	*Business administration, economics, ethics, informatics, informatology, media studies*	*Analysis of documents, case study, comparative analysis, content analysis*
Teaching	*Educational technology, ethics, linguistics, science education*	*Action research, analysis of documents, case study, content analysis, critical discourse analysis methods, exploration, interview, journaling, observation, narrative research, questionnaire*
Learning	*Computer science, education, ethics, linguistics, psychology, science education*	*Action research, biographical method, case study, cohort studies, critical discourse analysis methods, critical incidents, diagnostic survey, document analysis, educational experiment, focus group, interview, narrative research, observation, questionnaire, trend studies*
Instructional design	*Electrical and electronic engineering , informatics, science education, educational technology, education, psychology*	*Case study (ethnographic research), content analysis, document analysis, observation*

Source: Own work

It follows that the micro level includes often a single phenomenon, therefore here may be used qualitative research.

CONCLUSION: THE NEED OF NEW THEORIES ON THE BASIS OF EXISTING KNOWLEDGE

Using existing western theories confirms what we already know (Domańska 2010 a: 51) and hinders build native theory. However, in the field of humanities Polish researchers are reluctant to construct new theories associated with ideologies, because until recently in post-communist Poland research directives were rooted in Marxist ideology as a way of confirming its ongoing existence (Domańska 2010 b: 65, 74).

The research on DE derived from interpretative, not positivist and objective tradition, is in similar situation as the reaserch of humanities which *needs methodology resulting from in-depth analysis of the research material* (Domańska 2010 a: 50). *Action research* and the *grounded theory* (Glaser and Strauss, 1967) which proposes building theories adequate to the research material seems to be the tools useful for the reasearching and understanding DE.

In order to study DE in Poland, however, new theories created on the basis of *case studies, comparative analysis, content analysis* conducted on the basis of existing knowledge are needed. Such studies bring the theory closer to practice, take into account the specificity of the researched subject and give the opportunity to develop theories adequate to the current cultural context.

REFERENCES

Bednarek J., E. Lubina, 2008: *Kształcenie na odległość. Podstawy dydaktyki* [*Distance learning. Basics of didactics*], Wydawnictwo Naukowe PWN SA, Warszawa, ISBN 978-83-01-15471-4

Conde, M.Á., F.J., Garcia-Peñealvo, D.A., Gómez-Aguillar, R., Therón, 2015: *Exploring software engineering subjects by using visual learning analytics techniques*. IEEE Revista Iberamericana de Tecnologias del Aprendizaje, Vol. 10 (4), p. 242-252, ISSN 1932-8540

Creswell, J.W., 2012: *Planning, conducting, and ewaluating quantitative and qualitative research*. Pearson, Boston, ISBN-13: 978-0-13-136739-5

Domańska, E., 2010 a: *Co zrobił z nami Foucault* [*What did of us Foucault*]. In: *French theory w Polsce* [*French theory in Poland*], ed. by E. Domańska, Ł. Musiał, M. Ratajczak, K. Szadkowski, A. Żychliński, Wydawnictwo Poznańskie: Poznań, p. 61-79, ISBN 978-83-7177-622-9

Domańska, E., 2010 b: *What sort of methodology do the humanities of today actually need?*. Teksty Drugie, vol. 1-2, p.45-55, ISSN 0867-0633

Dudek, E., Łysak, K., Trawka, A., Wołowiec, J., 2012: *Czy nauczyciele polubili komputery?* [*Do teachers liked computeres?*], Wydawnictwo Ośrodek

Rozwoju Edukacji, Warszawa, ISSN 2299-1786 [online] at http://www.bc.ore.edu.pl/dlibra/doccontent?id=399 (accessed 3 August 2016)

Glaser, B.G and A.L. Strauss, 1999: *The discovery of grounded theory*. Aldine Transaction, New Brunswick, ISBN 978-0-202-36337-0

Hruby, M., 2014: *Information ethics and contemporary education*. In: *E-learning and intercultural competences development in different countries*, ed. by E.Smyrnova-Trybulska, University of Silesia in Katowice, Katowice-Cieszyn, p. 403-410, ISBN 978-83-60071-76-2

Chomczyński, P., 2015: *Problemy nauczycieli zaangażowanych w kształcenie na odległość – wyniki terenowych badań jakościowych* [*Problems of teachers involved in distance education – the results of the qualitative field studies*]. „E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie", nr 3, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/60/id/1185 (accessed 3 August 2016)

Japan Society for the Promotion of Science *List of categories, areas, disciplines and research fields* [online] at https://www.jsps.go.jp/j-grantsinaid/03_keikaku/data/h24/download/e/06_e.pdf (accessed 6 August 2016)

Juszczyk, S., 2002: *Edukacja na odległość. Kodyfikacja pojęć, reguł i procesów* [*Distance education. The codification of of terms, rules and processes*]. Wydawnictwo Adam Marszałek, Warszawa, ISBN 83-7322-291-X

„King's College London" *Academic staff* [online] at http://www.kcl.ac.uk/sspp/departments/education/people/academic/coxm.aspx (accessed 15 August 2016)

Kubiak M., 2000: *Wirtualna edukacja*. Mikom: Warszawa, ISBN 83-7279-032-9

Lubina, E., 2004: *Zmiany funkcji nauczyciela w nauczaniu na odległość* [*Changes of the function of the teacher in distance learning*]. E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie, Vol. 4, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/6/id/80 (accessed 3 August 2016)

Meger, Z., 2008 a: *Motywacja w nauczaniu zdalnym* [*Motivation in distance learning*]. E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie, Vol. 4, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/26/id/572 (accessed 3 August 2016)

Meger, Z., 2008 b: *Strategie motywacyjno-wolitywne w edukacji zdalnej* [*Motivating and volitional strategies in distance learning*]. E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie, Vol. 5, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/27/id/595 (accessed 3 August 2016)

Meger, Z., 2008: *Czynniki afektywne w edukacji zdalnej* [*Affective factors in distance learning*]. E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie, Vol. 3, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/25/id/552 (accessed 3 August 2016)

Merrill, D.M. et al., 1996: *Reclaiming Instructional Design*. Educational Technology, Vol. 36 (5), 5-7.

Methods of Critical Discourse Analysis, ed. by R. Wodak, M. Meyer, 2009. Sage, Los Angeles, ISBN 978-1-84787-454-2

Ministry of Family, Labour and Social Policy (Ministerstwo Rodziny, Pracy i Polityki Społecznej), 2014: *Klasyfikacja zawodów i specjalności na potrzeby rynku pracy*, ISBN 978-8364309-49-6, Warszawa 2014 [online] at http://psz.praca.gov.pl/documents/10240/54723/Klasyfikacja%20zawod%C3%B3w%20i%20specjalno%C5%9Bci%20na%20potrzeby%20rynku%20pracy%20-%202014.pdf/bca1e08c-6a33-494a-a75b-e2d7258ce796?t=1421667227000 (accessed 10 September 2016)

Mischke, J.M., 1997: *Centra ODL i perspektywy rozwoju w Polsce kształcenia na odległość* [*ODL centres and development prospects distance education in Poland* [online] at http://home.agh.edu.pl/~mischke/upload/File/artykoly/centra_ODL.pdf (accessed 13 September 2013)

Mischke, J.M., 2005: *12. mitów na temat e-learningu* [*12 myths about e-learning*] [online] at http://home.agh.edu.pl/~mischke/upload/File/artykoly/12_mitow_na_temat_e-learningu.pdf (accessed 13 September 2016)

Mischke, J.M., 2006: *O problemie oceny nauczyciela akademickiego kilka spostrzeżeń* [*A few observations about the problem of evaluation of academic teacher*] [online] at http://home.agh.edu.pl/~mischke/upload/File/artykoly/o_problemie_oceny_nauczyciela_akademickiego.pdf (accessed 13 September 2016)

Morbitzer, J., 2002: *O niektórych mitach edukacji wspieranej komputerowo* [*On some myths computer-assisted education*]. Konspekt Online. Pismo Uniwersytetu Pedagogicznego w Krakowie, Vol. 13, pp. 30-35, ISSN 1509-6726 [online] at http://www.up.krakow.pl/konspekt/13/morbit13.html (accessed 3 August 2016)

Munévar, G., 1981: *Radical knowledge. A philosophical inquiry into the nature and limits of science*. Hackett Publishing Company, Indianapolis

OECD (Organisation for Economic Co-operation and Development) *Revised field of science and technology (FOS) classification in the "Frascati manual"* [online] at https://www.oecd.org/science/inno/38235147.pdf (accessed 13 September 2016)

Online distance education. Towards a Research Agenda, ed. by Olaf Zawacki-Richter, Terry Anderson, 2014. Au Press, Athabasca University, Edmonton, 507 p., ISBN 978-1-927356-62-0 [online] at http://www.aupress.ca/ index.php/books/120233 (accessed 3 August 2016)

Pickering A., 1994: *After representation. Science studies in the performative idiom*. „PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association" vol. 2, p. 413-419, ISSN 0270-8647.

Siemens, G., 2004. *Connectivism: a learning theory for digital age* [online] at http://www.elearnspace.org/Articles/connectivism.htm (22 Juni 2015)

Siemieniecki B., 2005: *Kształcenie na odległość w świetle badań i analiz* [*Distance learning in the light of research and analysis*]. Wydawnictwo Adam Marszałek, Toruń, ISBN 83-7441-183-X

Słomczyński, M., D., Sidor, 2012: *Niepowodzenia edukacyjne w kształceniu zdalnym* [*Educational failures in distance education*]. E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie, Vol. 5, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/47/id/970 (accessed 3 August 2016)

Stowarzyszenie E-learningu Akademickiego, *Kryteria oceny kursu internetowego* [*Criteria for evaluation of the online course*] [online] at http://www.sea.edu.pl/kryteria/?page=obszary (accessed 3 August 2016)

Sysło, M., 2009: *E-learning w szkole* [*E-learning in the school*]. „E-mentor. Dwumiesięcznik Szkoły Głównej Handlowej w Warszawie", Vol. 1, ISSN 1731-7428 [online] at http://www.e-mentor.edu.pl/artykul/index/numer/28/id/611 (accessed 3 August 2016)

Tripp, D., 1993: *Critical incidents in teaching. Developing professional judgment*. RoutledgeFalmer, London, ISBN 0-415-09542-5

UNESCO, Division of Science Policy and Statistics for Science and Technology, 1974: *Nomenclature for fields of science and technology* adopted by the Scientific Advisory Committee [online] at http://skos.um.es/unesco6 (accessed 6 August 2016)

„Wikipedia" *Hype cycle* [online] at https://en.wikipedia.org/wiki/Hype_cycle (accessed 3 August 2016)

Załącznik do rozporządzenia Ministra Nauki i Szkolnictwa Wyższego w sprawie obszarów wiedzy, dziedzin nauki i sztuki oraz dyscyplin naukowych i artystycznych [*Annex to the Regulation of the Minister of Science and Higher Education in the areas of knowledge, fields of science and art, and scientific and artistic disciplines*], 8 August 2011 [online] at http://isip.sejm.gov.pl/DetailsServlet?id=WDU20111791065 (accessed 15 August 2016)

MANAGEMENT OF STUDENTS' INDIVIDUAL WORK UNDER THE DISTANCE LEARNING CONDITIONS

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Abstract: *The quick development of information and communication technologies opens prospects in the field of education for the management of students' individual work, including also extramural education. The article shows importance of students' individual work from the perspective of transformation to European educational standards, necessity for modernization of such most important part of lifelong learning as traditional extramural education in Ukraine, problems with management of students' individual work under the conditions of extramural education and solving them by transformation to distance learning; the individual management work model under the distance learning conditions implemented in National Pedagogical Dragomanov University.*

Keywords: extramural education, organization of distance learning, management of individual work of students, information and communication technologies.

INTRODUCTION

The fast changing high-tech society needs graduates who are prepared for lifelong self-education and organization of their own learning, in particular with the use of time management and management of resources for learning. Alumni are expected to determine problems on their own and solve these problems by means of critical and flexible thinking.

The concept of lifelong learning recommended by the European Parliament and the Council of the European Union (Recommendation of the European Parliament 2006) provides for all specialists formation of 8 key competencies, among which is "learning to learn". Bucharest Communiqué of the Conference of European Ministers Responsible for Higher Education (2012) ststes that higher education must be an open process and students should develop their own knowledge-based independence, form self-confidence and ability to assess the situation at that time critically giving reasons for own activities.

Results of sociological research of the international project TUNING ("Tuning Educational Structures in Europe") also confirm the fact of importance of individual work of students. According to this, one of the most significant competencies (in the opinion of graduates, employers and professors) is "ability to learn" (rank 2, 1 and 3 respectively). The group of graduates and employers has also regarded such competencies as "ability to perform individual work" and "ability to organize and plan" which can be really important for individual work (Gonzales, Wagenaar 2003).

Therefore, attention is being increasingly focused on the activity of universities related to creation of conditions for management of students' individual work, because it is this work what encourages development of independence and ability to pursue creative self-development and self-education (by forming the competence "ability to learn").

However, implementation of pedagogical innovations of student-centered educational surrounding should be with the use of modern information and communication technologies, because pedagogical innovations need to be one of the priorities of education development in the nearest future (Communiqué Yerevan 2015).

Thus, modern education should be aimed at the development of flexibility, individual cognitive activity, service extension and high technological effectiveness. All this characterizes distance learning process. Research related to investigating the effectiveness of new forms, methods, technologies and distance learning methodologies has become more up-to-date and valid. Use of the distance learning helps to solve problems with students' learning activities, organization of the learning process, and application of didactic potential of information and communication technologies for the organization of the teaching and learning process.

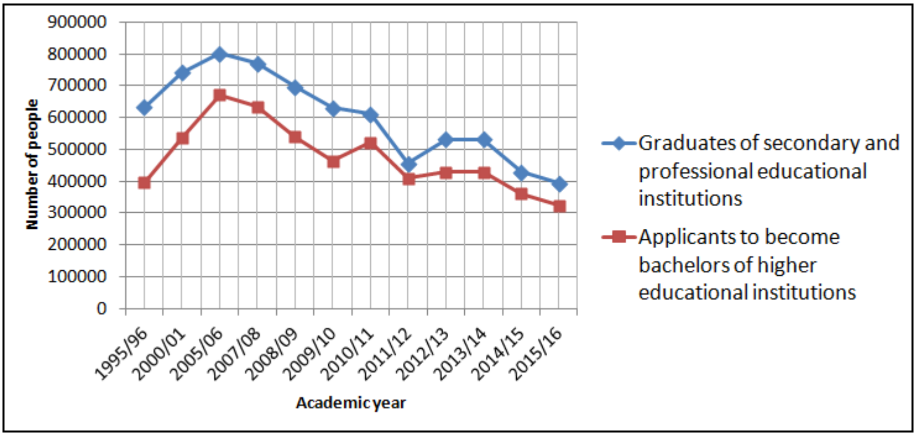
Priority areas of research in the field of distance education scientists note such as: instructional and communications technology; role of distance education in national development; student support services; evaluation; equity and access; design and development of study materials; interactive multimedia. There is a shift from technology-centered research to areas that focus on management and change in distance education institutions. The emergence of online distance learning highlights a pressing need for educational institutions to embrace innovation and change. It can be concluded that all aspects related to educational management are growing in importance (Zawacki-Richter 2009).

On the other hand, distance learning technologies open wide access to different educational services for a great number of people who cannot get education due to the use of traditional methods. Absence of "age limit" is also one of the most important facts about the use of distance learning technologies, because sometimes such an "age limit" can be a real problem for retraining people with the professional experience. Also access to this education is a big plus for disabled people.

1. STATISTICS RELATED TO GETTING HIGHER EDUCATION BY STUDENTS IN UKRAINE

Until now most students in Ukraine have preferred full-time education. This shows established social values and a place of higher education in professional and personal human development, and assessment of the impact of its quality on career prospects. Generally, the dynamics of changes of the contingent of university students in Ukraine correlates with the demographic situation. There has been a decrease in the total number of students over the last 20 years (Figure 1a).

a)



b)

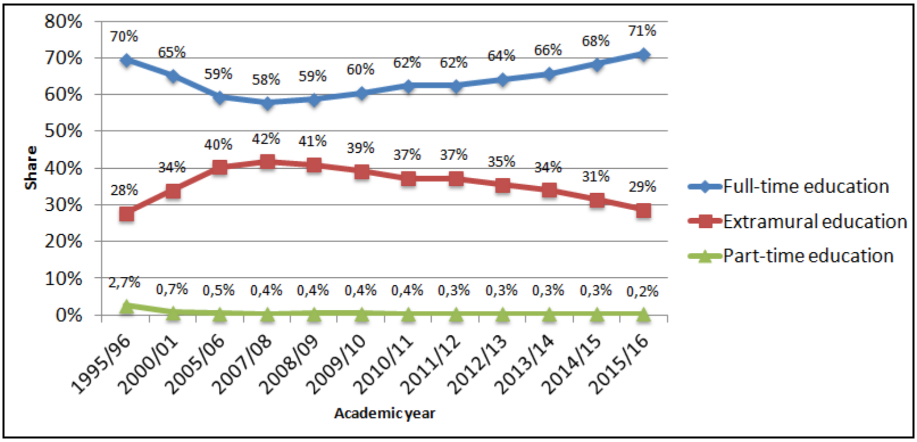


Figure 1. a) The change in the number of applicants to become bachelors and graduates of secondary schools in Ukraine; b) The distribution of the share of students of different education forms depending on the academic year

Analysis of full-time, extramural and part-time education in Ukraine allows for making the following conclusion. Extramural education is getting smaller than its full-time type. In addition to this, part-time education is practically “disappearing” as a result of non-standard working hours dominating among young employees. Figure 1b with the data of State Statistics Service of Ukraine (Publication of State Statistics Service of Ukraine 2011-2016) shows that there have been two opposite trends concerning the dynamics of the number of students getting extramural education during the last 20 years. Initially (till 2007/2008) there was a faster growth from 427414 to 1175782 (+175%), and then a sharp continuing decrease to 46015 (–61%). The dynamics of changes in the number of students getting extramural education in both of these periods was considerably higher than the similar indicator for full-time education (the increase of 52% and then the decrease of -30%) in general. The first trend was caused by transformation to mass higher education and the desire of people (who have graduated school 5-20 years ago) to get high education and compete in the labor market. The second trend can coincide with the significant increase in the proportion of people with higher education in the age group 20-40 years, consequences of the demographic and economic crisis, and also the implementation of external independent testing (from 2008 – obligatory for people, except for those who received secondary education in 2007 and earlier, from 2015 – obligatory for almost all categories of people) which that could complicate preparation of young employees for admission to universities (Finikov, Sharov 2014).

Besides, a rather high ratio of expelling (for such reasons as academic failure, failure of contracts, necessity to interrupt education because of giving birth to a child, family circumstances, being called up for military service, long business trips, temporary unemployment, disease and so on) is characteristic of students getting extramural education. In addition to this, graduation of extramural students often exceeds the volume of enrolment at this form of education because of the migration of full-time students. However, preparation of extramural students in Ukraine is characterized by a rather low level.

Now the problem related to increasing the quality of such an important part of lifelong learning as extramural education is especially urgent and indicates the need for modernization, which involves the use of new pedagogical, information and communication technologies and distance learning. Such improvements may have a positive impact on the availability of this type of education as well as the employability and competitiveness of its graduates according to their specialty.

2. PECULARITIES OF EXTRAMURAL EDUCATION

The extramural form of education has been recognized in all countries throughout the world as one of the most significant directions of integrating education with manufacturing. It becomes the most important component of the lifelong education system (Callender, Little 2015). The structure of extramural education includes guiding session, intersessional stage of unmanageable individual work and educational examination session during which it is rather difficult to control and teach because of the lack of time. Besides that individual work of students is the main form of work in extramural education (85% of the time for a particular educational discipline).

Thus, the essential element of extramural education in universities is a focus on individual work with students. In addition to this, individual work should have specific characteristics. This work needs to be controlled and assessed, but it is difficult to do this, especially under conditions of territorial remoteness of extramural education process participants.

We distinguish the following peculiarities of extramural education:

1. Minimum of contacts with the teacher (no more than 2 times per year)
2. Individual character of educational activity
3. Combination with work
4. Territorial remoteness of the educational process participants

Taking into account the peculiarities of extramural education, it is possible to determine the problems and contradictions in the process of management of individual work of students:

1. Modularity and crediting of training material, which is one of ECTS principles. Credits are placed per all educational components of the training program (such as modules, courses, etc.) and reflect the quantity of working hours required for each component to achieve certain goals. Extramural students, as a rule, are studying only during educational examination sessions, when it is difficult to objectively check the received knowledge of modules or credits and apply the rating scale (ECTS (A-FX)).
2. Individual work of extramural students is the main form of educational process organization. In order to estimate the quality level of the individual work, systematical control of teachers is needed, but it is difficulty to do under the conditions of territorial remoteness of educational process participants.
3. It is assumed that educational discipline in the intersessional stage should have a systematic character, but very often it does not happen in reality. Current and final works are performed at the last moment. This can be because of such different reasons as lack of willingness to time management and lack of permanent control. It means that an extramural student has some freedom of choice in respect of time for learning, but he (or she) is not always able to properly distribute this time due to their work or family.
4. Lack of systematical contact with the teacher in the intersessinal stage does not allow for students' gaining knowledge necessary in the field of study and performing individual work. Students very often have questions not at the stage

of the guiding session, but just in the process of working on their assignments and preparing for fnal tests. Lack of feedback control in the intersessional stage does not allow for effective educational management. Extramural students note that it could be better to meet with the teacher, because of difficulties in getting certain educational discipline knowledge due to the lack of individual activity experience.

Therefore, the problems mentioned above relate to the management of extramural individual work of students. These problems make it impossible to form a proper competence level of future specialists and provide education access to a different contingent of students.

3. MANAGEMENT OF INDIVIDUAL WORK OF STUDENTS UNDER THE DISTANCE LEARNING CONDITIONS

The quick development of information and communication technologies opens prospects in the field of education for the management of students' individual work, including also extramural education.

Some universities (with extramural education form) implement modern achievements in information and communication technologies in order to make individual work of students really possible. This trend is also observed in postgraduate education. Thus, the intersessional period for extramural students practically relates to distance management of individual work of students.

The management technology is a set of methods, tools and techniques used to perform the management cycle, i.e., for the purpose of managing certain processes, including cognitive activity lasting from establishing management goals to achieving them. In the context of educational administration, the management cycle is a sequence of actions aimed at solving specific educational issues and provides their consistent performance until the management process goal is reached.

In order to solve problems with effective management of individual work of students, it is necessary to use innovative pedagogical technologies and all stages of the educational management cycle (Figure 2): planning, motivation, organization, control, regulation, using distance learning technologies at all stages. This will allow students to have access to the learning environment, communications, control and self-control at any time and in any place where there is possibility of connecting to the Internet (Vakulenko 2016). Indeed, the efficiency of educational management will increase only if all functions in the management cycle system integratedly operate. The management process assumes that the results of one activity should be considered in the implementation of other management functions and the management cycle in general.

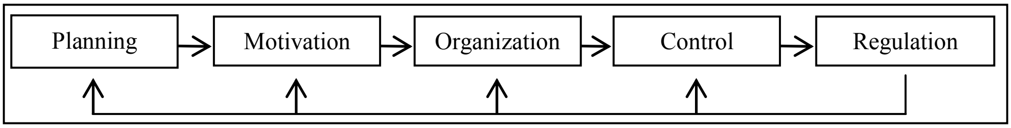


Figure 2. Functions of pedagogical management of individual work of students

Generally, more than 130 universities in Ukraine to some extent implement elements of distance learning technologies for extramural students. Now it is possible to get higher education by distance learning only in 7-10 Ukrainian universities which have the permit of the Ministry of Education and Science of Ukraine for pedagogical experiments in distance learning. Among these universities, there is National Pedagogical Dragomanov University (Kyiv, Ukraine, hereafter – M. Dragomanov NPU), which provides distance learning educational services (Andruschenko 2011).

3.1. Planning of students' individual work

The Ukrainian legal area does not have appropriate regulative basis for practical innovation technologies implementation. Due to this, the M.Dragomnov NPU was develeloping its own practice during 2004-2009. The practice was properly approved according to the Ukrainian legislation (see Table 1) (Andruschenko 2011). The e-learning form has undergone an additional development (since 2013) after the approval of "Regulation on distance learning" (25.04.2013) by the Ministry of Education and Science of Ukraine. This has considerably liberalized its implementation and organization.

Table 1.

Regulatory Basis

Document	Content
"Concept of distance learning development in the M.Dragomnov NPU"	Main trends in the implementation of distance learning technologies in the university activity
"Regulation on distance learning in the M.Dragomnov NPU"	Principles of organization of distance learning in the university
"Regulation on recognizing distance learning resources and their elements as educational and methodological works"	Determining of information distance learning resources, mechanism of expertise conduction, order of equating to educational and methodological works
"Regulation on the local distance learning center"	Functions and management of local distance learning centers
"Regulation on preparation of educational and methodological materials for distance learning"	Mechanism of preparation, payments and responsibility

Document	Content
“Regulation on the use of distance learning technologies for extramural and distance education in the **M.Dragomnov NPU”**	Structure, functions and responsibilities of all parties of educational process, time and accounting standards

The introduction of distance learning technologies in the educational process requires creating of an effective high-tech infrastructure. The infrastructure of distance education includes a wide variety of different elements. Besides that, the central element is a distance learning system, which helps solve the main problems arising from the using distance learning technologies.

The distance learning system “Celsi” (Center of E-learning System Implementation) in the M.Dragomnov NPU consists of three modules (Figure 3): education management system LMS “Moodle” (Modular Object Oriented Distance Learning Environment), electronic document flow system “Deanery” and message exchange system “E-mail” (http://celsi.npu.edu.ua). The modules such as “Deanery” and “E-mail” are made on the basis of Microsoft software (Windows SharePoint Services and Outlook Web App respectively).

Figure 3. Distance learning system of the M.Dragomnov NPU

On the basis of educational plans the M.Dragomnov NPU develops plans which take into account the specificity of distance learning in compliance with the credit-transferring system. The number of credits and the number of module tests are included to the structure of the plans with indicating of the implementation schedule (once a month). Educational disciplines that need the examination control and the disciplines with laboratory classes (without support of virtual laboratory practices) are concentrated mainly in the even semesters. It is possible to optimize distance learning activities of teachers and students. So, the presence of the student in the local distance learning center (which is located near the residence of the student) at least once a month is required, but this may vary.

In order to support the educational process with using of distance learning technologies, the M.Dragomnov NPU has created full educational and methodological provision (200 distance learning courses) for two bachelor programmes ("Biology" and "Elementary Education") and master programmes ("High Educational Institutions Management" and "Administrative Management"). Now, there are three opened local centers for distance learning (Lubny in Poltava region, Dobromyl in Lviv region, Yevpatoriya in the Crimea). For the first time in 2010, the university implemented a set of students for extramural-distance learning. The certification of distance learning teachers (for conducting courses with the use of distance learning technologies) has been realized (Analytical Report of the M.Dragomnov NPU 2016).

The roles of tutors, ie, roles of pedagogical, managerial, social and technical work (classification made by L. Berge) with students in the learning process carried by methodists. The teaching staff was preparing educational materials for creating e-learning courses, preparing and conducting virtual classes, counseling, determining current and final evaluations. A teacher in distance education called distance learning teachers or online teacher. This is done to emphasize reliance of the new features associated with the use of network technology training on distance education teacher and also to not to be confused with the methodist teacher (assistant in distance learning, tutor). Thus, remote teacher and tutor depending on distance learning educational model can be a continuation of the traditional figures of the education system as a teacher and methodist (Kudin, Vakulenko 2009).

Online tutors do play an important role in supporting e-learning delivery. This is especially important for part-time students that apparently rently don't get sufficient support from traditional learning. Only well-trained tutors will be able to satisfy student expectation about the quantity, frequency and quality of learning supporting activities (Sulčič 2007).

The use of distance learning technologies allows providing of the educational disciplines modularity assumed by working programmes, including organization of a large volume of individual work, clear structuring of educational material, full methodological support of educational disciplines, and the appropriate system (ECTS rating scale).

3.2. Organization of students' individual work

The clear structuring of distance learning courses assumed by educational plans and the number of module controls allow for planning of the convenient material learning, namely creating a training path, similar to the schedule, which is a kind of weekly online organizer or navigation of the student activity in each semester. Figure 4 shows a fragment of the schedule, where the possible number of points is indicated. These points can be obtained by timely completion of all the learning tasks. It develops the students' ability to use their time more rationally; especially it is good for students who have insufficient skills of the individual planning and organizing of their training. In fact, all distance courses are developed by step-by-step learning instructions. Achievement of the goals is formulated in their description. Of course, the student can choose an individual and convenient learning way.

All activities noted in the schedule (except for examinations, certifying examination and some laboratory classes) are performed with the use of the distance learning system of the M.Dragomnov NPU.

Week	Date	Histology and principles of embryology		Pedology		...	Coursework	
		M.M. Grusha, *Senior prof., Ph.D. (Biology)*	Points	***I.B.Chomyj,*** *Associate prof., Ph.D. (Biology)*	Points	...	A.Y.Diduch, O.V.Yeropudova, S.A.Mirosznychenko, O.O.Romanovskyj, O.M.Czyzhevska, M.H.Szevtsov	Points
1	07.02.15 - 13.02.15	Theoretical material Test #1	3	Theoretical material		...		
2	14.02.15 - 20.02.15	Individual work #1 Theoretical material Test #2	3	Theoretical material Test #1	5	...	Writing of the plan and introduction	10
...	...	...	...	...	...	...	...	...
5	07.03.15 - 13.03.15	Theoretical material Lab #1 **Module test #1**	5 10	Theoretical material Lab №2	15	...		
6	14.03.15 - 20.03.15	theoretical material Test #7 Consultation lecture #3	3	Theoretical material Test #3	5		Writing of Section I	15
...	...	...	...	...	...	...	...	...
10	11.04.15 - 17.04.15	**Module test #2**	10	Theoretical material Test #5 **Module test #1**	5 20			
...	...	...	...	...	...	...	...	...
16	23.05.15 - 29.05.15	Test #15 Consultation lecture #6	3	Consultation lecture #4	2		Writing of conclusions	10
17	30.05.15 - 05.06.15	**Module test #3**	10	**Module test #2** consultation №5	15 2		Writing of references	5
18	06.06.15 - 12.06.15	**TEST WEEK**						
Number of points of current control			70		100			70
19	13.06.15 - 19.06.15	**SESSION**						
		Lab #4 **EXAMINATION**	15 15	**FINAL TEST**	100	...	**THESIS DEFENSE**	30
Number of points of final control		Number of points of current control for VI semester + number of examination points	100	Number of points of current control for VI semester	100	...	Number of points of current control for the semester + number of points of thesis defense	100
20-30	20.06.15 - 31.08.15	**VACATION**						

Figure 4. Fragment of the schedule of students for extramural-distance learning of the M.Dragomnov NPU

Figure 5 shows the scheme of organization of extramural students' work at the M.Dragomnov NPU with the use of a distance learning system.

3.3. Motivation, control and regulation of individual work of students

Special attention in the system of management of individual work of students under the distance learning conditions is paid to the motivation mechanism which should be not only a progress indicator, but also one of the methods of meeting the increasing requirements in getting qualitatively new knowledge. It is especially related to assessment of the conformity of results obtained in the learning process with the goals.

The main motivational component is the combination of synchronous (chat and web-conference) and asynchronous (E-mail, forum and blog) modes and means of communication during consultations, allowing to enrich the learning process, while retaining the flexibility and convenience by expanding the quality and efficiency of both modes (Vakulenko 2010).

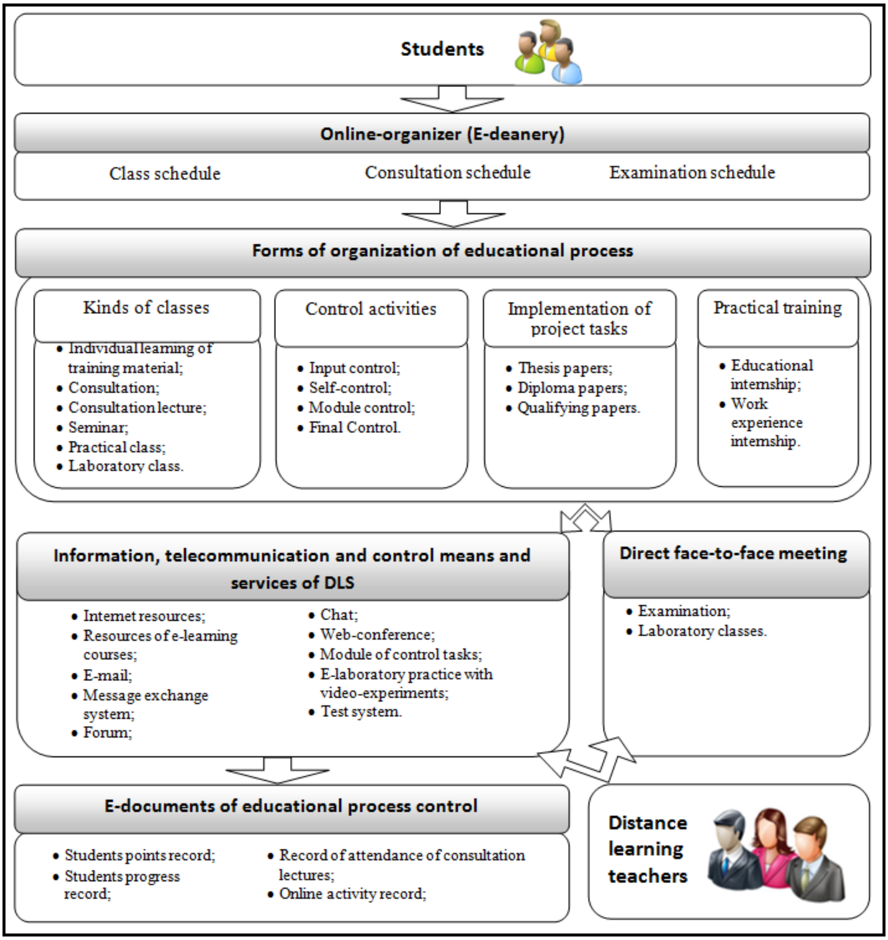


Figure 5. Scheme of organization of students' work for extramural-distance learning in the M.Dragomnov NPU

Owing to systematic feedback of students with teachers through information, telecommunication and control services and means of distance learning system, it is possible to systematically control the level of obtaining training material and make easier learning activity assessment under the conditions of the significant volume of the individual work, individualize and differentiate the learning process. The distance teacher (depending on the success of the student) may apply flexible, individual training technique, and offer units of training materials (additional and more targeted to the specific student), links to information resources that allows for providing the possibility of qualitative students' training. Also, there is an option of monitoring of students' online activity, and with the help of this, analyze the reasons for its decreasing and eliminate them.

In order to perform control functions and implement the learning process, the web-application "E-document flow system Dean's-Point" (included in the module "Deanery") has been developed. One of its functions is to work with databases of SQL Server 2005 system Moodle and generating (in the convenient form for distance teachers and trainers of e-records). Among these records, there are *students points record* (with the results of current and final control for each educational discipline, see Figure 6), *students progress record* (an analog of a matriculation book), *record of attendance of consultation lectures (*with dates, time and duration of consultation classes, the teachers' name and surname), and *online activity record*.

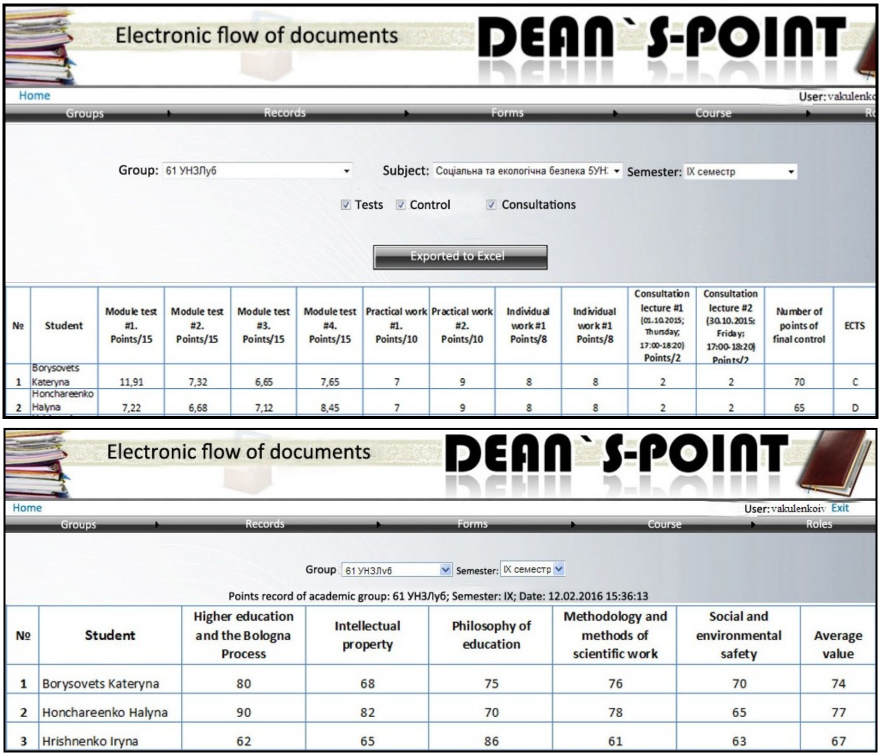


Figure 6. a) Students' points record of academic group for the certain educational discipline; b) Students progress record

The results of the analysis of using traditional and distance learning technologies for extramural education (under the conditions of territorial remoteness and employment of students, lack of the regular teachers' contact and controllability) are presented in the comparative table (see Table 2). Basing on the table, it can be concluded that all stages of educational management cycle with the use of distance learning technologies should be used for solving problems with effective management of individual work of students.

Table 2.

Problems with the management of students' individual work under the conditions of extramural education and their solving by transformation of extramural education to distance one

#	Extramural education	Distance education
1.	Modularity and crediting of training material	
	Extramural students, as a rule, are studying only during examinations (2-3 weeks per semester), when it is very difficult to objectively check obtaining of the discipline modules or credits.	It allows for dividing the disciplines into logical units (modules) including learning new material and control measures to check its obtaining throughout the whole semester (16-20 weeks).
2.	The use of the ECTS rating scale	
	Because of the irregularity and unsystematicity of contact hours with the teacher, the minimum number of control forms and their sameness, lack of systematic work during the semester (not from session to session), and low level of students' activity, it is impossible to objectively check the level of students' knowledge and use ECTS rating scale.	Distance education is convenient for the transformation to the modular scheme of the learning process, because it allows for visually structuring of the training material and using of different forms and methods of individual work, knowledge control. And the results of this are transparently recorded electronically. It makes it possible to successfully introduce ECTS rating scale into distance learning. Knowledge assessment system (e-tests) is objective, because it does not depend on the teacher.
3.	Organization of extramural individual work of students focused on credit-transferring system	
3.1.	Manageability and individualization	
	Manageability is mainly impossible under the conditions of territorial remoteness, employment (work, family, etc.), and lack of regular contact with the teacher in the intersessional stage. Individualization can be achieved by giving individual tasks during sessions.	There is systematic feedback. There is a possibility of individualizing and differentiating the learning process through interactive communication. The teacher (depending on the success of the student) may apply a flexible, individual training technique, offer units of the training material (more targeted to the specific student), links to information resources that can ensure qualitative training of students for passing tests and examinations. Thus, it is possible in this way to manage the learning process. Geographic boundaries do not matter in this case.

<table>
<tr><th>#</th><th>Extramural education</th><th>Distance education</th></tr>
<tr><td></td><td>

Frequency of student-teacher interaction</td><td>

Frequency of student-distance teacher interaction</td></tr>
<tr><td>3.2.</td><td colspan="2">Controllability</td></tr>
<tr><td></td><td>There is often the lack of controllability in the intersession stage.</td><td>There is a possibility of systematically checking the tasks with the help of different methods (tests, discussions, etc.). Also it makes it easier to control how the material has been learnt.</td></tr>
<tr><td>3.3.</td><td colspan="2">Conformity to plan</td></tr>
<tr><td></td><td>The lack of willingness to time management and the lack of the permanent control are one of characteristics of extramural education. It means that extramural students have certain freedom in choosing time for learning, but not always they can properly distribute this time.</td><td>It is possible to structure and plan learning of the material. Thus, training trajectory can be created as a class schedule (Figure 1), which is a kind of weekly online organizer or student navigation. Therefore, the students develop skills of individual work, self-discipline, and improve their time management. This is very important for students for whom it is difficult to plan and organize their learning.</td></tr>
</table>

CONCLUSION

The management of extramural students' individual work with the use of traditional technologies is faced with lots of problems. They can be solved by a complex use of distance learning technologies for all stages the of educational management cycle, i.e. planning, motivation, organization, and regulation. The optimal conditions for organization of the qualitative management of extramural students' individual work are possible only in the case of distance education.

Distance learning becomes not so innovative in the course of time. It develops into one of the full-value educational forms and makes national borders are absolutely transparent for educational programmes under the ECTS conditions. Thus, since 2012 the M.Dragomnov NPU is characterized by conducting distance education of the Ukrainian language for the Brazilian citizens with the Ukrainian origin (local distance learning centers in such cities as Prudentopolis, Irati, Unio de Vitoria, Curitiba-Poltava, and Curitiba-Subras) and admitting foreign citizens to distance learning in the field of "Philology (Ukrainian language and literature)", and conducting education (since 2015) through local distance learning center in Prague (Czech Republic) for bachelors of "Jurisprudence" and "Management" (Analytical Report of the M.Dragomnov NPU 2016). The implementation of the distance learning form and credit-transferring system is a factor of the internationalization of Ukrainian higher education.

Many institutions are moving into the global education market to reach new target groups using online learning to 'export' their knowledge. Therefore, globalization of education, cross-cultural aspects, and access, equity, and ethics are research areas that should receive more attention. This is supported by the fact that the whole first section in the new International Handbook of Distance Education is devoted to "Diversity in Distance Education" (Evans, Haughey, Murphy 2008).

REFERENSES

Analitychnyj zvit "*Vykorystannja informacijno-komunikacijnykh tekhnologhij ta komp'juternoji tekhniky v navchaljnomu procesi v NPU imeni M. P. Draghomanova*" [Analytical Report "*The use of information, communication and computer technologies in the educational process of the M.Dragomnov NPU*"], 2016, [online] at http://www.npu.edu.ua/images/file/conf/fajly/Analit_zvit.pdf, (accessed 6 July 2016) [In Ukrainian]

Andruschenko, V.P., Kudin, A.P., Padalka, O.S., Vakulenko, I.V., Zhabyeyev, G.V., 2011: *Zahal□nouniversytets□kyj proekt "Elektronna pedahohika": tretij etap [University-wide project "E-pedagogy": third stage]*. Informacijni tekhnologhiji i zasoby navchannja [Information Technologies and Learning Tools], vol. 21, № 1, 2011, ISSN 2076-8184, [online] at http://journal.iitta.gov.ua/index.php/itlt/ article/viewFile/414/370, (accessed 6 July 2016) [In Ukrainian]

Callender, C., Little B., 2015: *The hidden benefits of part -time higher education study to working practices: is there a case for making them more visible?* Journal of Education and Work, vol.28, № 3, 2015, p. 250-273, ISSN: 1363-9080 [online] at http://www.tandfonline.com/doi/abs/10.1080/13639080.2014.894635 (accessed 6 July 2016)

Communiqué of the Conference of European Ministers Responsible for Higher Education, Yerevan, 14-15 May 2015, [online] at http://www.ehea.info/Uploads/SubmitedFiles/5_2015/112705.pdf, (accessed 6 July 2016)

Communiqué of the Conference of European Ministers Responsible for Higher Education, Bucharest, 26-27 April 2012 [online] at http://www.ehea.info/Uploads/(1)/Bucharest%20Communique%202012(2).pdf, (accessed 6 July 2016)

Evans, T., Haughey, M., Murphy, D., 2008: *International handbook of distance education*. Emerald Publishing, Bingley, United Kingdom, 2008, p. 912, ISBN: 978-0080447179

Finikov, T., Sharov, O., 2014: *Monitoring the integration of Ukrainian higher education system into the European higher education and research area: monitoring study: analytical report.* "Taxon", Kyiv, Ukraine, 2014, p. 136, ISBN: 978-966-7128-89-0, [online] at http://www.edupolicy.org.ua/_dx/assets/images/Analit2en_web.pdf, (accessed 6 July 2016)

Gonzales, J., Wagenaar, R., 2003: Tuning Educational Structures in Europe Final Report Phase One. University of Deusto, Bilbao, Spain, 2003, p. 317, ISBN: 978-84-9830-641-5, [online] at http://tuningacademy.org/wp-content/uploads/2014/02/TuningEUI_Final-Report_EN.pdf, (accessed 6 July 2016)

Kudin, A.P., Vakulenko, I.V., 2009: *Teoretychni zasady pidghotovky vykladacha dystancijnogho navchannja [The theoretical basis of preparation of the teacher of distance learning].* Naukovyj chasopys NPU im. M. P. Draghomanova. Serija № 5. Pedaghoghichni nauky: realiji ta perspektyvy [The scientific periodical of the M.Dragomnov NPU. Series №5. Pedagogical science: reality and prospects], iss. 18, 2009, p. 125-131, ISSN 2311-5491 [In Ukrainian]

Publikacija dokumentiv Derzhavnoji Sluzhby Statystyky Ukrajiny. Statystychnyj bjuletenj "Osnovni pokaznyky dijaljnosti vyshhykh navchaljnykh zakladiv Ukrajiny" [Publication of State Statistics Service of Ukraine. The statistical bulletin "Main indicators of the activity of the Ukrainian higher educational institutions"], https://ukrstat.org/uk/druk/publicat/Arhiv_u/15/Arch_vnz_bl.htm, (accessed 6 July 2016) [In Ukrainian]

Recommendation of the European Parliament and Council of the European Union 18 December 2006 on key competences for lifelong learning, 2006, Official Journal of the European Union, vol. 49, 30 December 2006 – p. 10-15, ISSN 1725-2555, [online] at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006H0962, (accessed 6 July 2016)

Sulčič, V., Sulčič, A., 2007: *Can Online Tutors Improve the Quality of E-Learning?* Issues in Informing Science and Information Technology, vol. 4, 2007, p. 201-210. ISSN: 1547-9684 [online] at https://books.google.com.ua/books?id=2t9INNWbB_QC&printsec=frontcover&hl=uk&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false, (accessed 6 July 2016)

Vakulenko, I.V., 2010: *Konsuljtacija jak vyd navchaljnogho zanjattja pry dystancijnomu navchanni u vyshhykh navchaljnykh zakladakh* [*The consultation as a kind of educational classes in distance learning in higher education]*. Naukovyj chasopys NPU im. M. P. Draghomanova. Serija № 5. Pedaghoghichni nauky: realiji ta perspektyvy [The scientific periodical of the

M.Dragomnov NPU. Series №5. Pedagogical science: reality and prospects], iss. 21, 2010, p. 29-36, ISSN 2311-5491 [In Ukrainian]

Vakulenko, I.V., 2016: *Upravlinnja samostijnoju robotoju studentiv z vykorystannjam IKT* [*Management of students' independent work using information and communication technologies]*. Naukovyj chasopys NPU imeni M.P. Draghomanova. Serija #2. Komp'juterno-orijentovani systemy navchannja [The scientific periodical of the M.Dragomnov NPU. Series № 2. Computer-oriented education system], iss. 18 (25), 2016, p. 50-64, ISSN 2411-8869 [In Ukrainian]

Zawacki-Richter, O., 2009: *Research Areas in Distance Education: A Delphi Study.* The International Review of Research in Open and Distributed Learning, vol. 10, № 3, 2009, ISSN: 1492-3831, [online] at http://files.eric.ed.gov/fulltext/EJ847754.pdf, (accessed 6 July 2016)

E-PORTFOLIO: OPEN EDUCATIONAL RESOURCES FOR A NEW LEARNING CULTURE

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Abstract: *The e-portfolio is an educational resource that has been increasingly implemented in the new learning culture. In order to improve this tool and observe its advantages and disadvantages together with the competences required to develop it, a qualitative study has been designed. This research has been conducted under the work package 4 "Selecting and testing IT tools" in the frame of the International IRNet project (Marie Curie Actions of the European Union's Seventh Framework Programme FP7/2007-2013). From a qualitative approach, an open questionnaire was planned and validated to inquire students about the implementation of e-portfolios using wiki tools during the development of a class throughout their university studies at the University of Extremadura, Spain. Six dimensions related to the usefulness, difficulties, competences, assessment and potential improvements of e-portfolios emerged from the study. In this sense, this research determines the convenience of the tool with respect to applying knowledge to practice, promoting reflection and also managing information. However, it is indispensable to preclude difficulties regarding the lack of information together with potential technical problems that come up when first used. Finally, it has been detected that assessing e-portfolios with continuous and positive feedback not only motivates students but also makes them expand their skills..*

Keywords: E-learning, Computer Mediated Communication; Communications Networks; Communications tools; Educational Media, e-portfolios, reflection, assessment..

INTRODUCTION

The University of Extremadura is highly committed to the development of the ICT as a teaching and learning resource. This paper is part of research conducted under the work package 4 “Selecting and testing IT tools” of the IRNet project (Marie Curie Actions of the European Union’s Seventh Framework Programme FP7/2007-2013). In this sense, the University of Extremadura is using the platform “Moodle v. 2.9” to support and improve the face-to-face learning. In order to analyse its execution, the tool has been implemented in a class in the field of Social Education. In this context, students were required to develop an e-portfolio, which displays and covers their learning progress. To design and generate the e-portfolio, a workshop on around “Moodle and the development of wikis and e-portfolios” was held. In this workshop, the objectives and elements of the e-portfolio were clarified. In this sense, the main objective of this study consisted in observing the constructive aspects and complications of implementing an e-portfolio, which were the necessary skills for its development and its possibilities in the assessment process.

This study aims to explore the utilization of e-portfolio as an educational learning/teaching tool by analyzing the difficulties that can emerge when using it as well as determining the required skills to develop it and its influence on ongoing assessment. According to Gutiérrez-Esteban & Mikiewicz (2012), who analysed the views of a sample of European youth about online learning, the benefits are given to studying formal education on this way. In addition, “the ideal pattern of online education offered by these participants includes formal and informal learning (official and non-official discourse, tools and methods, but they –both-work)” (p. 73). At the same time these new learning approaches (as for instance Personal Learning Environments) *“can be considered as a promising pedagogical approach for the deliberate or intentional integration of formal and informal learning spaces”* (Dabbagh & Kitsantas 2012, p. 4).

An e-portfolio is a purposeful collection of a student’s work that is made available on the World Wide Web, the cloud or an electronic storage device. It is similar to the traditional portfolio that consists of papers and folders; however, the medium this portfolio uses is different. In other words, it employs a combination of electronic media such as hypermedia programs, databases, spreadsheets, and word-processing software, as well as wikis or blogs. The electronic portfolio can be print-based, saved on an electronic device or cloud services, or a combination of the above. The information can take the shape of text, graphics, videos, sounds, images, or any other multimedia format. Following Banks (2004), an e-portfolio is an electronic format for learners to record their work, their achievements and their goals, to reflect on their learning and to share and be supported on this. It enables learners to represent the information in different presentations and brings such data with them as they move between institutions. It represents several concepts which have a particular resonance at the moment, for example: reflective journals; Weblogs or “Blogs” - and the shared version – Wikis; learning logs; personal development planning; learning centred on the individual learner and action planning for learning. Hence, an electronic portfolio is a collection of authentic and diverse evidence, drawn from a larger archive representing what a person or organization has learned over time on which the person or institution has reflected and designed to represent one or more audiences for a particular rhetorical purpose (National Learning Infrastructure Initiative, 2003). As Keller (2013) states, an e-portfolio is an organized collection of professional work (artefacts), selected and reflected upon by the author that represents a person's best efforts. Over time, an e-portfolio will reflect professional changes and growth.

Since the early 1990s portfolio has renovated the educational world. Two tendencies in contemporary education underlie this phenomenon. The first is the rise of constructivism, a pedagogical school of thought that emphasizes learning by experience and self-discovery. Portfolio is a tool that is particularly well suited to these forms of learning. A second factor is the escalation of information and communication technology (ICT). Through ICT, assembling a collection or, in computer terms, the ‘creation’ of a database acquires possibilities, which until very recently were unimaginable (Meeus 2006). Pearl and Paulson (1994) outlined the differences between positivist portfolios and constructivist portfolios, but the two paradigms produce portfolio activities that are entirely different. The positivist approach places a premium on the selection of items that reflect outside standards and interests. Meanwhile, the constructivist approach places a premium on the selection of items that reflect learning from the student’s perspective.

There are a few useful aspects, in the form of recommendations (Alonso & Blázquez, 2012) that should consider before developing a valuable e-portfolio. In this term, developing an e-portfolio: depends on the essence of the course (either an e-learning course or a blended learning one, type of contents to be included, different uses of the portfolio -assessment, reflection, accreditation, research, etc.); depends on the audience (their skills dealing with technology tools, their expectations and motivations, time they are supposed to spend creating their e-portfolio, etc.); also depends on the teacher (teaching their students of how to use this tool, his/her expectations and motivations, his/her own skills dealing with computers and e-portfolios, the feedback the give to their students, etc.) and finally depends on the software. Kahtani (1999) suggests that an e-portfolio should include: Students’ work, peer response forms, teachers’ comments and feedback, reading journals and miscellaneous. Agra, Gewerc & Montero (2002) emphasize that e-portfolios are a resource for the student and not for teachers, this should offer a meaningful structure and a reflective thread with different elements as: personal diary, objectives, reflections, questions related to the course development; attached documents, as exercises produced during the study of the subject, created by the students’ initiative or by teachers’ suggestions; reproductions of some material regarded as significant for the course, for example links and e-mails or chats that help students to reflect about the subject.

When students are required to develop their own e-portfolio, they face the challenge of achieving some skills. Such skills may vary depending on the type of e-portfolio they aim to create , but, overall, they include skills related to the e-portfolio itself, and some other associated to the portfolio´s specific subject. When

Meeus (2004) studied the significance of portfolios in teachers' training, he highlighted that they serve teachers as an evaluation tool for assessment of the students' learning competence. Hence, the course tutor can determine from the learning portfolio if a student is able to: recognize educational competences that he/she lacks or has not sufficiently mastered; draw up an effective personal learning plan to bring these competences up to standard; carry out effectively; reflect independently and in sufficient depth on his/her educational practice; visualize his/her learning process in a creative way.

Constructing digital portfolios involves teacher's skills in the use of information and communication technologies (Kankaanranta, 2001). One of those skills are associated to communication skills by means of ICT, where it can be found at the following miscellaneous stages: being uncertain; developing competence; learning behaviour; becoming a more competent user; describing daily life at schools; discussing the content. Barrett (2006) emphasize that the skills connected to e-portfolios development are those that allow interaction between teachers and students around learning activities and products, so students can create, store artefacts and reflections and organize their work, preferably with hyperlinks, and teachers can review the work and provide feedback in narrative form (based on a rubric, if available).

Many are the useful utilities of an e-portfolio, but if one has to be selected, that could be its reflective capacity. Of course, depending on the structure designed for the e-portfolio, its reflective capacity can fluctuate. If a student wishes to use portfolio to show his/her competence, he/she must provide with an account of the activities in which this competence is demonstrated. In an educational context this means that the student draws up a personal learning plan (PLP) containing a series of activities with which the proposed competence can be practiced. In theory, each activity stimulates reflection. Here, the fundamental idea is that students need to learn to reflect on their functioning, so after completing the course they can continue to work on their own development in a conscious manner (Van Looy et al, 2000). These considerations reveal how the student perceives the difference between the actual and the desired situation. He or she can then adjust activities accordingly.

Brown (2004) has analyzed a course where e-portfolios were implemented. For him, an important concept built within the course was self-regulated learning using reflective writings for each artifact. Self-regulation as a method for achieving learning goals leads to an increase in motivation, self-monitoring, attention control, application of learning strategies, and other metacognitive thinking processes (Ormrod 1999). Following Barrett and Wilkerson (2004), the literature on traditional paper-based portfolios involves these portfolio development processes: Collecting, Selecting, Reflecting, Projecting and Celebrating. The infusion of technology into the process adds the following dimensions to this process: Archiving, Linking/Thinking, Storytelling, Planning and Publishing. To effectively use portfolios for assessment, a learning organization needs to establish a culture of evidence. Evidence in an electronic portfolio is not only the artefacts that a learner places there; to be considered evidence of learning, the artefacts need to be accompanied by the learner's rationale, or their argument as to why these artefacts constitute evidence of achieving specific goals, outcomes or standards. Furthermore, just because a learner makes the claim that their artefacts are evidence of achievement, in "high stakes" environments, the evidence needs to be validated by a trained evaluator, using a well-developed rubric with identifiable and specific criteria. In this sense, Jones, Downs & Jenkisn (2013) even state that e-portfolios are useful tools to make students aware of the effects of transparency on the e-portfolio creation process.

In the case of Chan, Lian, Shu & Tsai (2015) the key successful factors (called KSFs) of knowledge management for university students using e-portfolio were established in this study based on the Fuzzy Delphi method (FDM) and Fuzzy Analytic Hierarchy Process (FAHP) according to a group of experts' valuations. Hence, the KSFs of Knowledge Management using e-portfolio founded were Knowledge Sharing, Innovation, Acquisition, Application, and Accumulation. But also, other detailed sub-KSFs were developed based on the activities of the e-portfolios that covered Reflection, Work Revision, Self-assessment on works, Arrangement of learning content, Teacher Feedback, Modeling, Communication and Discussion. The most valued sub-KSFs (the highest weight granted by scholars) were Reflection underline by these authors to have the greatest impact on Knowledge Management.

As confirmed by Mohamad, Embi & Nordin (2015) -based on their findings- the learner's readiness in e-portfolios involved Technology Accessibility, Online Skills and Relationship, Motivation, Internet Discussion and Importance to Success. Nevertheless, they also conclude the necessity of precise skills when using the e-portfolio such as Collecting, Managing, Grading, Recalling and Reflecting. Additionally, the benefits offered, mainly regarding the increase of investment, are responsibility and engagement of students in their own learning process and the trend to show "a better holistic picture of student´s understanding" (p. 272).

In the same way, McKenna, Baxter & Hainey (2016) designed criteria for evaluating learning tools in e-learning, specifically to assess the usability of LMS e-portfolios in Higher Education. Their study was developed on the basis of a systematic search of academic literature review and the LMSEC questionnaire (Learning Management System Evaluation Criteria) created to assess the quality of LMS e-portfolios, which includes some categories as indicated below: General information given to learners prior to commencement of course, Accessibility of course material, Course organization, Language, Layout, Course goals and objectives, Course content, Learning Strategies for Opportunities for Practice and Transfer, Learning Resources and Assessment.

Matar (2015) identified six different e-portfolio systems suitable for educational purposes. Additionally, he set the criteria for distinctions that will introduce the most appropriate e-portfolio system within an educational context. These criteria are Curriculum related features, Career Opportunities, Assessment, Publish/Share, Analysis Tool, Access, Customization, Technical Information, Staffing requirements and Costs.

Regarding the teaching portfolio, Bozu & Imbernón (2012) believe this instrument has a training flank helpful to enhance teacher´s professional development. It is considered a "valuable tool" (p. 238) as well as a resource that favors reflection on individual teaching and methodology. In this sense, this tool provides users with some other compensation:

- Teaching/learning instrument
- Reflective tool on teaching methods
- Tool to enhance quality teaching
- Informative device that collects data on university teaching
- Professional growth tool
- Professional career
- Tool that helps to appreciate teaching professionals

At the same time, San Jose (2015), conducted a study about the use of e-portfolio in e-learning platforms for pre-service teachers' training. He emphasized two main components when analyzing pre-service teachers' answers: students' experiential feedback of the technology platforms being utilized in teacher education programs (component 1) and evaluate the technical features of the e-portfolio technological platforms (component 2). Moreover, according to Cortes Peña, Pinto Santos & Atrio (2015) university teaching staff values as positive the fact that e-portfolio covers some of the following topics: e-portfolio design and content, ICT standards development, students' achievements (self-evaluation) and self-pedagogical building. Besides, they conclude that students´ appreciation of the teaching tool possibilities is crucial; students that are aware of its implementation aims are familiar with evaluation criteria. Together with the management of the platform, they consider positive the advantages to develop critical analysis and the reflection on teaching practice.

METHODOLOGY

This study has been designed from a qualitative perspective. The instrument employed was an open questionnaire created ad hoc for this research. The different dimensions and questions included in the questionnaire emerged from a deep review of scientific literature of the field and the validation by five scholars who are experts in the areas of educational technology and evaluation.

- Usefulness of the e-portfolio

- Problems or difficulties found when using the portfolio
- Previous abilities and skills required to develop the e-portfolio
- Current abilities and skills useful to develop the e-portfolio
- E-portfolio as a resource to permanently assess students' work
- Potential improvement of the e-portfolio aimed at future courses

This questionnaire was distributed to all the students of the course through the online platform Moodle at the end of the course, once the assessment process had concluded. Finally, 33 students answered the open questionnaire.

ANALYSIS AND DISCUSSION

In order to provide this study with authority and accuracy, "content analysis techniques", standard research techniques used in Social Sciences for non-structured or little structured information data were designed. An open questionnaire is a research tool where multiple different and open answers are obtained; this eases the richness and quality of the answers but complicates the analysis of the data.

Qualitative software was used to analyse the information. Firstly, the answers of the questionnaire were organized, and then codified and re-codified, so finally the main categories emerged in order to discuss the results. Those categories, their definitions and the percentage of the students that maintained each category are shown in the table and figures bellow (Table 1 and Figures 1, 2).

Table 1.

Categories and subcategories emerged.

DIMENSION	CATEGORY	DEFINITION	%
Usefulness of e-portfolios	Useful	E-P is useful in the training process	91%
	Non useful	E-P is not useful in the training process	9%
	Skills	E-P is useful to develop abilities	27%
	Opinion	E-P is useful to express opinions	27%
	Knowledge	E-P is useful to demonstrate the knowledge acquired in the face-to-face classes	36%
	Implication	E-P is useful as it requires the implication of the students	36%
	Manage of the information	E-P is useful to manage the information of the subject	55%
	Reflection	E-P is useful to promote reflection	64%

Difficulties of the e-portfolio	Accessing difficulties	Difficulties for not having computers and the Internet at home	18%
	Previous Knowledge diff.	Difficulties for not having knowledge or previous training enough	36%
	Time diff.	Difficulties for the lack of time	45%
	Technical diff.	Difficulties for having technical problems	55%
Required competences for using an e-portfolio	Reflection skills	Capacity of reflection is required	9%
	Self-organization skills	Capacity of self-organization is required	27%
	Technical skills	Capacity manage the ICT is required	100%
Competences developed by the e-Portfolio	Management Comp.	Competence of self-organization is developed	27%
	Technical Comp.	Competence to manage ICTs is developed	27%
	Reflection Comp.	Competence of reflection is developed	55%
E-Portfolio as an assessment tool	Assess if computer	Positive assess if having disposition of computer and the Internet	27%
	Assess if shows effort	Positive assess when it shows the continuous effort of the students	36%
	Assess if feedback	Positive assess when there is feedback of the teachers	36%
	Assess evolution	Positive assess as it shows the evolution of the students	45%
	Assess positive	Element of positive assess if "if computer" and "if feedback" are achieved	91%
Potential improvements of E-Portfolios	Improve feedback	Propose to improve the feedback of the teachers	18%
	Improve technical	Propose to improve the difficulties for using ICTs	18%
	Improve practices	Propose to do more practices with E-P	27%
	Improve initial training	Propose to do more initial training	36%

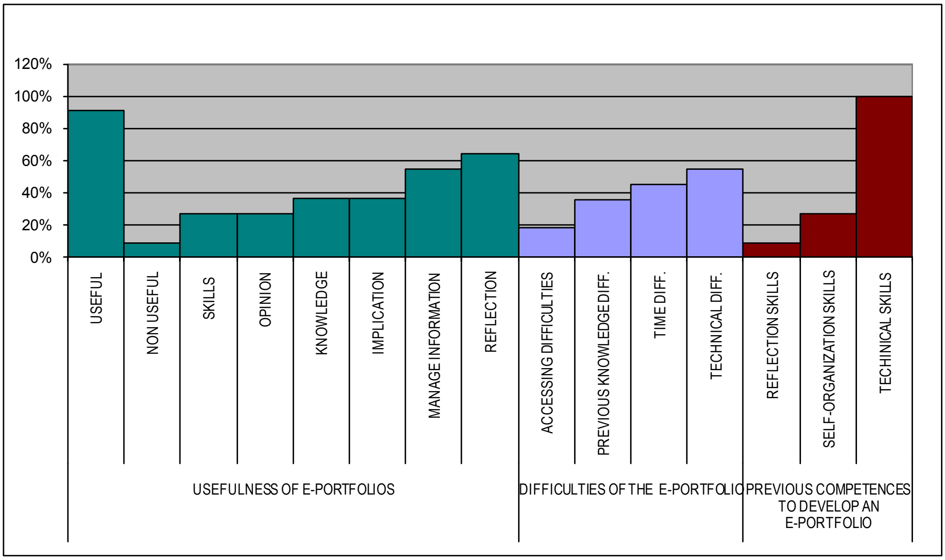

Figure 1. Results of the questionnaire. Dimensions 1,2 &3.

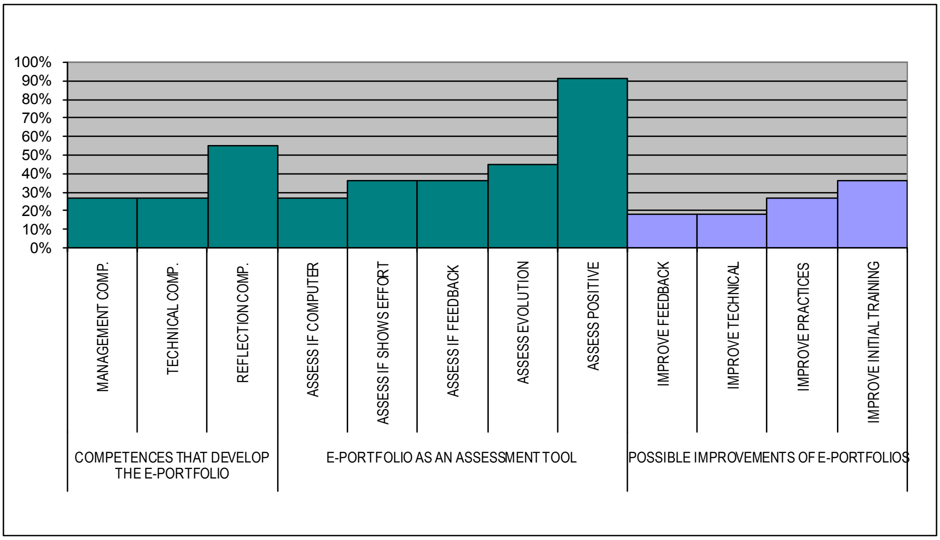

Figure 1. Results of the questionnaire. Dimensions 4, 5 & 6.

91% of the students maintained that the e-portfolio had been a useful tool for the learning process, nevertheless 9% of the students thought the opposite. Different reasons to consider this tool effective were given, i.e. its potential to generate reflection, sustained by the 64% of the subjects with comments like the following: “The e-portfolio has been useful because I have been able to reflect on the practice. This way of working helps me to think over; otherwise I wouldn´t have done it”. 55% of the students believed that the e-portfolio stimulated their ability to manage information though the learning process, as it implies not only to compile and elaborate material related to the subject, but also to organize their personal time to reflect online. In this way, a student expressed: "The e-portfolio helps me to revise and practice what I learnt in the face-to-face class, furthermore it's useful to access the information at any time". (Registration No. 6, Female, 20 years)

For the 36% of the interviewees, this is a resource that allows applying knowledge acquired in the face-to-face lessons, promoting a higher implication of the students in the subject. The utility of the e-portfolio as a personal expression tool and to develop specific skills was sustained by the 27% of the students.

The difficulties or problems that the students had to face to create the e-portfolio were, in the 55% of the surveys, technical problems related to the platform and "to download or upload attached files". Other kinds of difficulties that 45% of the interviewees found were the lack of time to elaborate the e-portfolio. One student said:

"For me the major problem was the lack of time due to the face-to-face lessons schedule, my personal circumstances and the extra tasks in other subjects, probably the sum of the all these". (Registration No. 19, Female, 21 years).

The absence of some necessary previous knowledge to manage this tool was considered by 36%, although a practical an informative session was previously offered, some students maintained that it had been scarce "causing some opposition to use it". Some others inquired about the possibility of accessing the computer lab more frequently , as they did not have Internet access at home. The overall of the interviewees highlighted that the competences or necessary skills required to develop an e-portfolio are technical, specifically "to manage computers and the Internet basically". Additional types of necessary skills (27%) are related to the ability to organize the personal learning process; in this sense, a student maintained that this tool had helped him to be "a more organized person".

The e-portfolios also facilitated students to develop some supplementary skills. 55% of the students remarked that their reflective capability had improved. Besides, this fact aided to increase their ability to utilize ICT, as well as the competence for personal organization in 27% of cases.

"It was necessary to organize and to plan the personal and the group work, the skill of analyzing and creating links with the items dealt in the face-to-face classes, with the previous knowledge and with the others' opinions". (Registration No. 27, Male, 20 years)

Assessing whether the e-portfolios is useful for the students' assessment, 90% of the interviewees recognized its efficacy when some conditions are kept; those are the continuous guidance of the teacher (requested by 36%) and the possibility to access computers with Internet. A student stated:

"an e-portfolio is a great tool when it is used in the right way and whenever everybody has the same opportunities to get access to the Internet; if the teacher reviews the e-portfolio just at the end of the course, it is very difficult to assess if

the work of the student has been continuous, as he or she will do it just before being assessed". (Registration No. 44, Female, 21 years)

To this light, e-portfolio is useful to show the learning evolution of the students (45%) and the effort and on-going work.

The final question was related to the improvement of a number of features of the e-portfolio for forthcoming courses. 36% of the students detailed that there should be higher initial training to manage the e-portfolio, i.e.

"Perhaps explaining more extensively which are the objectives and what are the students supposed to do with this resource". (Registration No. 69, male, 20 years)

27% prefer more face-to-face practice in order to "prevent technical problems that are a waste of time and stress a lot". 18% of the interviewees asked for a higher feedback of the teacher and technical improvements related to the upload of attached files.

The development of an e-portfolio in a face-to-face course might be highly effective in the teaching/learning process. To conclude, some principal remarks about the findings of this study are shown below.

CONCLUSIONS

The main aim of this work was to study the usage of E-portfolios as learning/teaching tools within educational contexts by means of delving into the difficulties that can derive from its implementation, analyzing the required tools to use it and finally determining its influence in the on-going evaluation process. In order to present the main conclusions, some issues related to the studied dimensions were analyzed: usefulness of e-portfolios, difficulties of the e-portfolio, required skills for using an e-portfolio, skills developed by the e-portfolio, e-portfolio as an assessment tool & potential improvements of e-portfolios

In relation to the required and developed skills, we point out that previous knowledge required for the creation of e-portfolios is associated to diverse technical skills and students' management abilities. By using e-portfolios, our students developed reflexive, technical and management personal competences. In addition, for Gorbunovs, Kapenieks & Kudina (2013) the collaborative use of e-portfolio to develop tasks contributes to "succeed better learning outcomes and higher competence levels" (p. 6) together with engaging learners into group-working, critical thinking and reflection.

All in all, the aforementioned works coincide in highlighting some of the positive values of the e-portfolio to enhance the learning process such as critical attitude, self-learning reflection, self-teaching practice reflection, better learning outcomes, higher competences acquisition, assessment and the importance of collaborative working groups.

Its significant influence on a successful on-going assessment by means of monitoring and revising student´s outcomes and allowing them to develop close approximations by modifying tasks that can be reoriented during the learning process has to be highlighted. To this end, wiki is a flexible resource since it can be easily edited by different people who are involved in the teaching/learning process despite the roles they have. In addition, this study has also established that it is a proper resource to assess and follow students' progress, whenever the teacher provides with constant feedback and the students manage tools to access Internet regularly. Hence, we agree with Mohamad, Embi & Nordin's (2015) thesis when stating that learning strategies and online instructional designs should face the challenge of increasing motivation and avoiding drop out and what is more significant, inactive students attitudes or low level activities are prevented when using e-portfolio (Gorbunovs, Kapenieks & Kudina 2013).

Finally, it can be concluded that e-portfolios are tools that can strengthen and enhance learning processes. However, their proper implementation requires highly engaged teachers that should get involved in the learning process and consider this tool a significant element for on-going assessment, accompaniment, guidance and facilitation of resources in order to achieve the established learning objectives. On the students' side, those able to enrich their learning by means of using it will additionally enhance their critical thinking, self-learning, autonomy and independence and reflection on their own educational learning process as well. They will be also able to create mechanisms to make their individual learning process more valuable.

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REFERENCES

Agra, M. J., Gewerc, A. & Montero, L., 2002: El portafolios como herramienta de análisis en experiencias de formación on line y presenciales. España: Universidad de Compostela.

Alonso, L. & Blázquez, F., 2012: *Guía básica del docente de educación virtual*. Madrid: Narcea.

Amaya, P., Agudo, J.E., Sánchez, H., Rico, M., & Hernández-Linares, R., 2013: Educational e-portfolios: Uses and Tools. *Procedia-Social and Behavioral Sciences 93*, 1169-1173.

Banks, B., 2004: *E-Portfolios: Their Use and Benefits. A White Paper of the FD Learning Tribal Technology Company*. Bristol: Tribal group.

Bhattacharya, M. & Hartnett, M., 2007: E-portfolio assessment in higher education. Paper presented to *Frontiers in education conference - global engineering: knowledge without borders, opportunities without passports*, 2007. Milwaukee.

Bozu, Z. & Imbernón Muñoz, F., 2012: El portafolio docente como estrategia formativa innovadora del profesorado novel universitario: un estudio de casos. *Revista de Educación*, 358, 238-257.

Brown, C., 2004: Design, Development, and Evaluation of Electronic Portfolios for Advanced Degree Programs in Technology and School. Washington, DC: Association for Educational Communications and Technology. (ERIC Document Reproduction Service Nº ED485119).

Chang, C.C., Liang, C., Shu, K.M., Tsai, C.W., 2015: Key successful factors of knowledge management for university students using e-portfolios: approach of fuzzy Delphi and fuzzy AHP. *Computer applications in Engineering Education*, 23 (5), 673- 681.

Cortés Peña, O.F., Pinto Santos, A. R. & Atrio, S. I., 2015: E-portfolio como herramienta construccionista del aprendizaje activo en tecnología educativa. *Revista Lasallista de Educación, 12* (2), 36-44.

Dabbagh, N. & Kitsantas, A., 2012: Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *Internet and Higher Education*, 15, 3-8.

Gorbunovs, A., Kapenieks, A. & Kudina, I., 2013: Advancement of e-portfolio system to improve competence levels. *Proceedings of the International Scientific Conference "Society, Integration, Education*", Rezekne, May 24th-25th, 2013, Vol.1, pp. 61-72.

Gutiérrez-Esteban, P. & Mikiewicz, P., 2013: How do I learn?. A case study of Lifelong Learning of European Young. In Smyrnova-Trybulska, E. (coord). *Theoretical and Practical Aspects of Distance Learning. E-learning and Lifelong Learning Conference*) (pp. 69-76). Studio Noa: Katowice.

Jones, S., Downs, E. & Jenkins, S., 2015: Transparency in the E-Portfolio Creation Process. *TechTrends: Linking Research and Practice to Improve Learning*, *59* (3), 64-70.

Keller, C., 2013: E-Portfolios for Reflective Practice, Advocacy, and Professional Growth. *School Library Monthly*, 29(6), 8-10.

Matar, N., 2015: Evaluating e-portfolio system use within educational context. *World of Computer Science and Information Technology Journal (WCSIT)*, 5 (3), 34-40.

McKenna, G.F., Baxter, G.J. & Hainey, T., 2016: Applying E-Portfolio Evaluation Criteria to the Blackboard LMS E-Portfolio. In Terry, K. & Cheney, A. (eds.). *Utilizing Virtual and Personal Learning Environments for Optimal Learning* (pp. 157-185). Hershey: Information Science Reference (IGI Global).

Meeus, W., 2006: Open source e-portfolio: development and implementation of an institution-wide electronic portfolio platform for students. *Educational Media International*, 43(2), 133–145.

Mohamad, S.N.A., Embi, M A. & Nordin, N. M., 2015: Are students ready to adopt e-portfolio? Social Science and Humanities Context. *Asian Social Science*, 11 (13), 269-275.

NLII - National Learning Infrastructure Initiative (2003). *Mission, Goals and Objectives, and Strategies*. Retrieved from http://www.cni.org/tfms/1999b.fall/handout/VSuter-NLII.pdf#search=%22National%20Learning%20Infrastructure%20Initiative%20%22

San Jose, D. L., 2014: Does technology matter? Students' and teacher's experiences of electronic portfolio (e-portfolio) systems in teacher education. In B. Hegarty, J. McDonald, & S.-K. Loke (Eds.), *Rhetoric and Reality: Critical perspectives on educational technology*. Proceedings ASCILITE Dunedin 2014 (pp. 584-588).

Van Looy, L., Goegebeur, W. & Vrijsen, M., 2000: *Zelfstandig, reflecterende leraren. Van opleiding naar beroep.* Brussels: VUBPRESS.

THE STUDY AND THE USE OF THE COMBINATION OF ICT TOOLS OF E-COMMUNICATION AT THE PEDAGOGICAL UNIVERSITY

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Abstract: *The paper presents preliminary results of the research regarding information needs and educational requests of young scientists as to ICT tools for their educational and research activities. The first part of the article includes a consideration of the notion of scientific and educational communication, inspection of the classifications of ICT tools of e-communication. The second part of the article describes the results of the research conducted at the Volodymyr Hnatiuk Ternopil National Pedagogical University, Ukraine. The research examined some categories of ICT tools of e-communication in the field of the higher pedagogical education, which are used at the stages of the research process and are studied during an electronic «ICT tools for teaching and research» course.*

Keywords: e-communication, ICT Tools, research process, electronic course, graduate students, Pedagogical University.

INTRODUCTION

The introduction of e-learning is a complex process that requires considerable resources and demands solving complex organizational, technological, methodological and other issues. One of the important principles of e-learning is the exposure of knowledge.

Nowadays knowledge is an important source of social development, and the main issue concerning building the knowledge society is not a process of informatization as such, but increasing access to information and reducing the digital inequality, especially in education and science.

The digital revolution is transforming research to become more open, interconnected, and global. Many of these changes are caused by new digital infrastructure.

Improvement of educational and scientific communication, as one of the components of e-learning is not only technical, but also a complex social issue. The advancement of electronic communication in teachers', students', researchers' and scientists' daily practice, the extension of international educational and scientific relations, the expansion of informal electronic communication need to be analysed taking into account the potential of ICT tools and the real world interaction of their participants.

1. ELECTRONIC EDUCATIONAL AND SCIENTIFIC COMMUNICATION — CURRENT POSSIBILITIES

Nowadays the educational and scientific communication is the main mechanism of functioning and development of education and science, one of the most important means of public relations, as well as a necessary condition for the formation and development of the individual researcher and scientist. The system of educational and scientific communication is an information space in which knowledge emerges and spreads. The basis of communication is a professional interaction of its participants.

Educational and scientific communication is understood as a series of processes of introduction, transmission and reception of educational and scientific information (Online space of scientific communication, http://cyberleninka.ru/article/n/onlaynovoe-prostranstvo-nauchnyh-kommunikatsiy). Structurally, educational and scientific communication includes:

- direct contacts — personal conversations, classroom training and scientific discussions, oral presentations;
- contacts mediated by technical means of information distribution — publications (books, scientific and abstract journals, collections of treaties, conference materials, research archives, blogs, social networks, etc.), preprints, unpublished materials (reports, experimental data, etc.);
- mixed contacts — seminars, conferences, symposia, exhibitions, etc.

Such tools of electronic scientific and educational communication are distinguished (Morze, Varchenko-Trotzenko 2014; Kolodziejczak, Roszak, Ren-Kurc, Kowalewski, Poljanowicz 2015): web-forums; online meetings; chat rooms; blogs; wiki; mental maps; white board; institutional repositories; e-libraries; Internet (video-, audio-) conferences; scientometric databases; social networks.

The use of basic possibilities of electronic communication includes especially e-mail and searching for information online. The main goals of the use of scientific and educational communication are searching for information, communication and coordination of projects. To a lesser extent, electronic communication is used for publications and simultaneous group work (Information technology and scientific communication: tools and model of implementation into the university environment, http://ifets.ieee.org/russian/depository/v17_i1/pdf/8.pdf).

New forms of communication give an opportunity to create an international network of academic groups of different time duration, improve the quality of research and publications, and establish new contacts between science, business and the public.

Many researchers (Morze, Makhachashvili, Smyrnova-Trybulska 2016; Shorley, Jubb 2013) consider Internet and a variety of e-communication as a new modern environment for scientific and educational research. The reason for this view point is that today it happens that on the Internet digital versions of traditional sources and their digital forms are created, stored and made available. This is reflected in the creation of modern digital tools for research, among which there are such groups (Digital tools for researchers, http://connectedresearchers.com/online-tools-for-researchers/):

Explore the literature

- Search engines and curators: ContentMine, Google Scholar, Microsoft Academic Search, MyScienceWork, BibSonomy etc;
- Article visualization tools: eLife Lens, Mendeley, ReadCube, Interactive Science Publishing;

Find and share data and code: Open Science Framework, DataHub, GitHub, SlideShare

Connect with others

- Connect with experts and researchers: Academia, AcademicJoy, LabRoots, Linkedin, Mendeley, SocialScienceSpace;
- Outreach: AcademicJoy, AcaWiki, DrawScience, I Am Scientist, SciVee, Useful Science;
- Citizen **science**: InnoCentive, SciStarter, Zooniverse.

Write

- Reference managers: Citavi, EndNote, Paperpile, Zotero, F1000 workspace,

- Collaborative **writing tools:** Atlas, Authorea, Quip, ShareLaTex.

Publish

- Open access platforms: eLife, F1000, ScienceOpen;
- Paper repositories: ArXiv, F1000 , Figshare , SlideShare;
- Support to publication: Google Charts, ORCID, Exec&Share.

Evaluate research

- Peer-review: Hypothes.is, Peerage of Science , ScienceOpen, The Winnower;
- Altmetrics: Altmetric, ImpactStory. PlumAnalytics, Profeza.

Some researchers (Kramer, Bosman 2016) examine the classification of e-communication in terms of the main stages of the research process: discovery, analysis, writing, publication, outreach, assessment. The paper (F1000 Research. Open for Science, http://f1000research.com/articles/5-692/v1) states the basic trends of using the scientific e-communication: social discovery tools, data driven & crowdsourced science, collaborative online, writing, open access and data, publication, scholarly social media article level (alt) metrics.

Authors present their projection of how innovations in ICT branch are changing scientific research processes, analyzing them from different points of view:

– **Expectations** — growing importance of data discovery, more online analysis tools, more integration with publication & assessment tools**,** more use of "publish first, judge later".

– **Uncertainties** — support for full-text search and text mining, willingness to share in analysis stage, acceptance of collaborative online writing, effect of journal/publisher status, requirements of funders & institutions.

– **Opportunities** — discovery based on aggregated OA full text, open labnotes, semantic tagging while writing/citing, reader-side paper formatting, using repositories for institutional visibility, using author-publication- and affiliation-IDs.

– **Challenges** — real semantic search (concepts & relations), reproducibility safety/privacy of online writing, globalization of publishing/access standards, making outreach a two-way discussion, quality of measuring tools.

– **Most important longterm development** — multidisciplinary & citation-enhanced databases, collaboration & data driven, online writing platforms, Open Access, more & better connected researcher profiles, importance of societal relevance & nonpublication contributions.

– **Potentially most disruptive development** — semantic/concept search & contextual/social recommendations, open science, collaborative writing &

integration with publishing, circumventing traditional publishers, public access to research findings, also for agenda setting, moving away from simple quantitative indicators.

Now science and education are in transition. Communication is very important for science and education due to their transition to an open format. Scientists distinguish different ICT tools of e-communication based on a typology of the workflows. We are of the opinion that a systematic approach to the study and the use of ICT tools of e-communication in groups, united depending on the stage of the research process is promising for young scientists of Pedagogical University to all practical purposes.

2. STUDY ON USING ICT TOOLS IN EDUCATIONAL AND SCIENTIFIC COMMUNICATION IN E-LEARNING

The methodology of e-learning implementation in the Ternopil National Pedagogical Hnatiuk University during the 2010-2016 years was based on the following tasks:

– development of the technological infrastructure of the university, mainly oriented on cloud technologies (Oleksiuk 2014) and Web 2.0 technologies (Balyk, Shmyger 2011);

– determination of organizational structure (Distance Learning Center), responsible for implementation of the e-learning system at university;

– organizational support and preparation of the participants of the educational process; training of e-learning users; creating a system of professional training for teachers to develop and use digital educational resources;

– effective integration of ICT in the educational process; development of new educational techniques, integrated with ICT; development of various digital educational resources, e-courses, which implement different types of e-communication.

In this regard, the use of ICT tools of e-communication in educational and research activities require additional training of graduate and postgraduate students.

The study of information needs and educational requests of young scientists as to ICT tools for their research activities, of regularities and forms of educational and scientific communication was conducted at the Department of computer science and teaching techniques during the period of 2014 – 2015 as part of «ICT tools for teaching and research» course majors for graduate and postgraduate students.

We also intended to clear a question of what innovations in ICT field would change research processes and promote better educational and scientific achievement. In addition, we aimed to define how graduate and postgraduate students form their workflow, which ICT tools they choose at every stage of the research to do their work more effective.

Peculiarities of teaching methodology of the «ICT tools for teaching and research» course include:

– blended learning is carried out, where e-learning technologies combine with traditional instruction, training in university classrooms and individual work, based on materials of the electronic «ICT tools for education and research» course located in the LMS Moodle;

– orientation on the development of 21st century skills (creativity and innovation, critical thinking and the ability to solve problems, communication and cooperation skills, ability to work with information, media and computer skills, life and career skills, social skills);

– orientation on practical tasks for the development of mini-projects of educational and research, social research and scientific focus based on the use of electronic environment.

2.1. Research methods

In order to examine a group of ICT tools graduate and postgraduate students choose at every stage of the educational and scientific research, the following methods were used: diagnostic survey; interview; qualitative analysis of the text (documents); observation; questionnaire.

The study was conducted via an online questionnaire created in Google-form. Certain questions are taken as a basis of the questionnaire. (Kramer, Bosman, 2016). We have adapted materials of the research to the working conditions of Ukrainian Pedagogical University.

The questionnaire included questions on sociology and questions about using various ICT tools during the six stages of the research process in different types of educational and scientific activities.

For each of the activities in the questionnaire five ICT tools were offered. In most cases, we included 2-3 best-known ICT tools, and two lesser-known, experimental tools to encourage respondents to examine them.

237 respondents took part in the survey, of which 215 — graduate students, 22 — postgraduate students. Among the respondents, 62% were female, 28% — male (Figure 1).

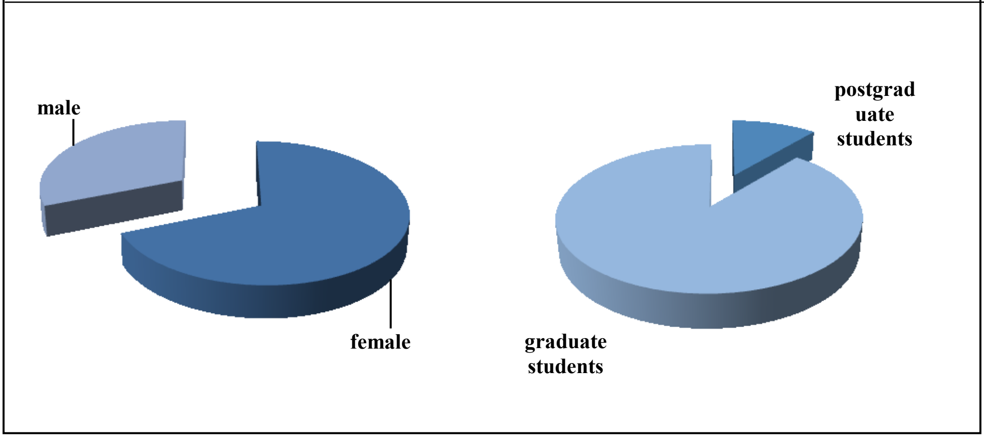

Figure 1. Sociological survey
Source: Own research

Another criterion that we took into account during the research is the area of expertise of young researchers (Figure 2).

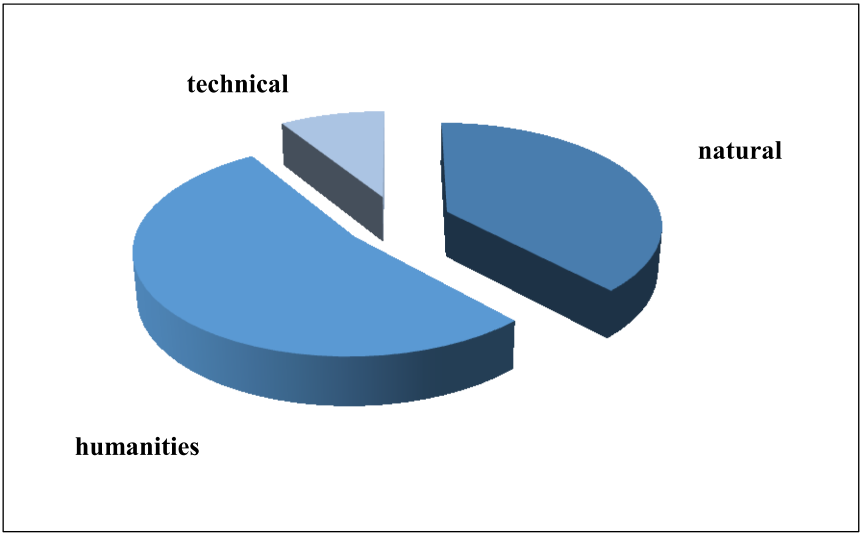

Figure 2. A survey on areas of expertise
Source: Own research

Most respondents at the Ternopil National Pedagogical University are humanitarians. At the first stage of the research — discovery, researchers, as a rule, search literature, read, annotate and tag during / after reading. In the course of a survey of graduate and postgraduate students of all majors, the following information regarding programs and websites that they use to read / annotate during the study the following data were received (Figure 3):

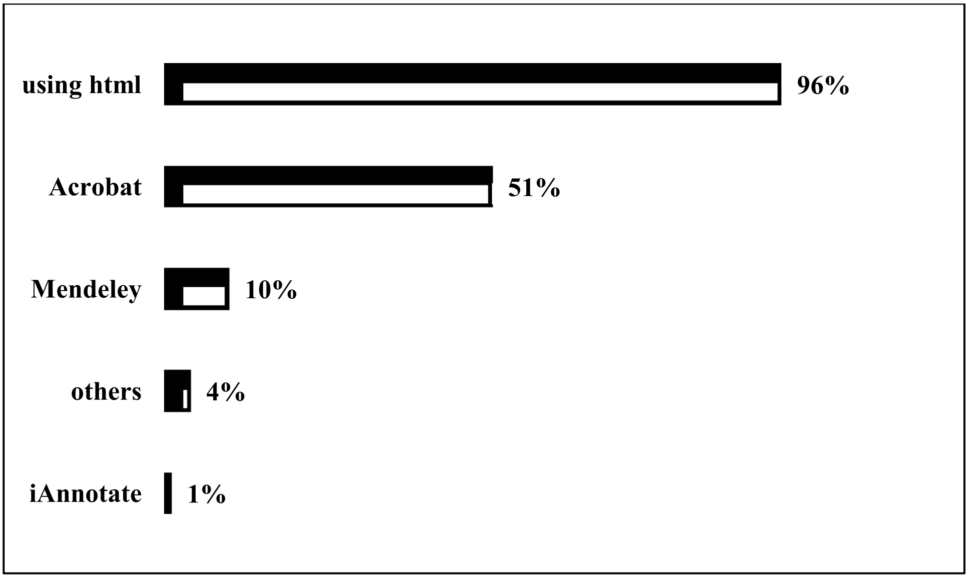

Figure 3. Discovery. Tools, sites for reading / annotation
Source: Own research

The survey results suggest that survey respondents most commonly use web browsers (96%) for reading necessary materials online. In addition, the vast majority of young scientists often use free software Adobe Acrobat Reader for viewing documents. About 1% of respondents said they use iAnnotate program. This shows that in general this program is little known.

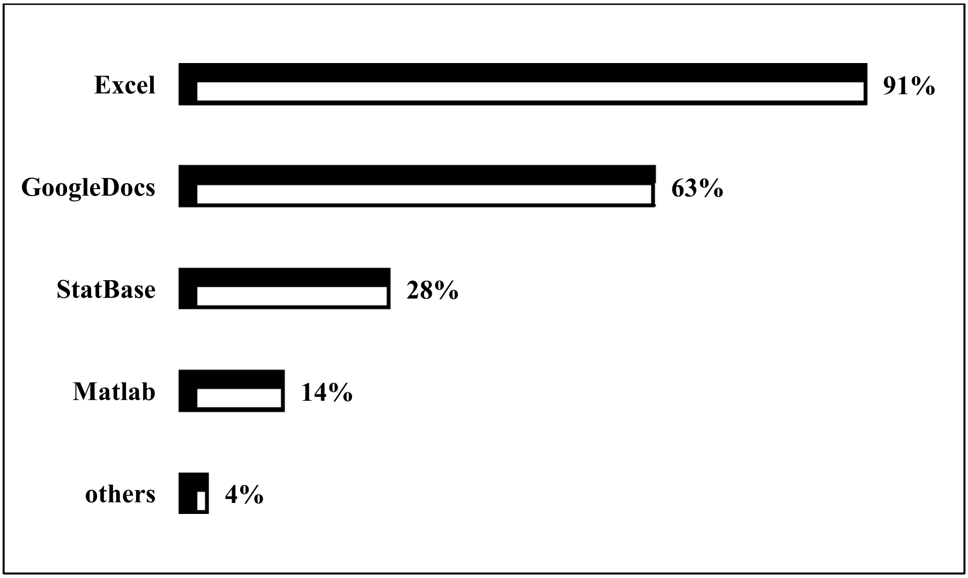

Figure 4. Analysis. ICT tools for data analysis
Source: Own research

The second stage of research is data analysis. In the course of a survey of graduate and postgraduate students of all majors, the following data about ICT tools that they use to analyse data during research were received (Figure 4, Figure 5):

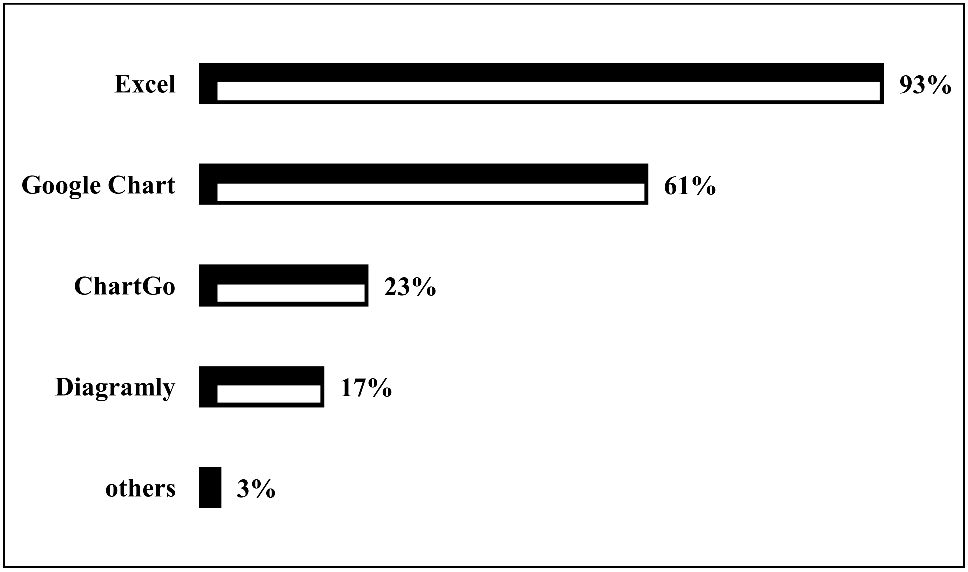

Figure 5. Analysis. ICT tools for graphical analysis and presentation of data
Source: Own research

At this stage, the most popular ICT tools for graphical analysis and data presentation are Excel (91%), GoogleDocs (63%), GoogleChart (61%).

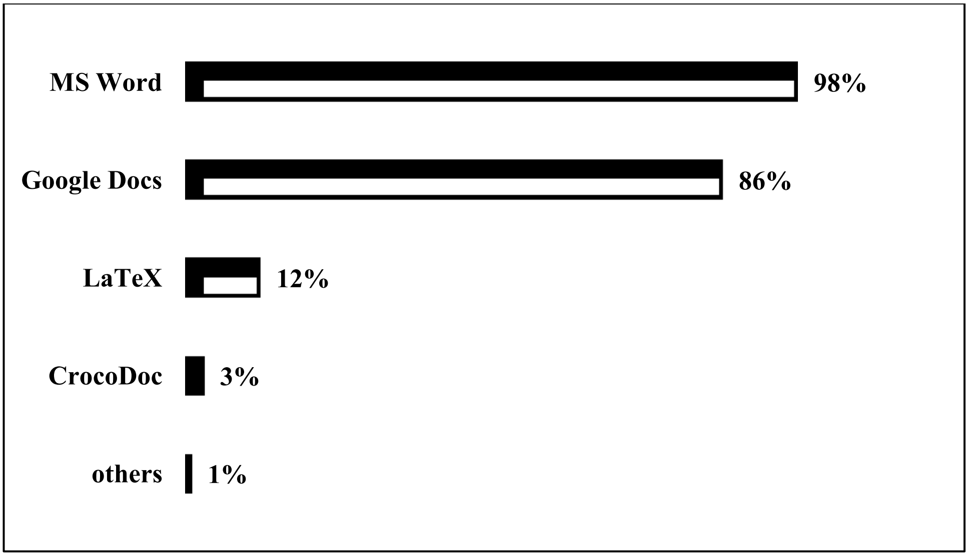

Figure 6. Writing. ICT tools for preparing and writing materials
Source: Own research

Writing is the third stage of research (Figure 6), during which the writing, translation and citation of materials are realized.

The analysis of the questionnaires shows that the vast majority of graduate and postgraduate students use MS Word (98%) and Google Docs (86%) for preparing and writing materials (Figure 6).

An important condition of the held research is its publication stage. At this stage, researchers usually: archive / share data; archive / share publication; archive / share posters; publish etc.

In particular, most respondents use Google Drive (72%) and institutional repository (54%) for data storing and sharing, Google Scholar (23%) (Figure 7). A high percentage of the use of institutional repository is caused by functioning of the advanced electronic environment in Volodymyr Hnatiuk Ternopil National Pedagogical University.

There is an eLearning environment at the university, in which institutional repository is integrated and organized on the basis of DSpace, with systems for educational purposes (LMS MOODLE, CMS Joomla!, UFD library) and support systems research (based on Microsoft Sharepoint). The integration of these tools is implemented at the level of content and unifying of access, which provides efficient use of DSpace in research work and the training of future scientists.

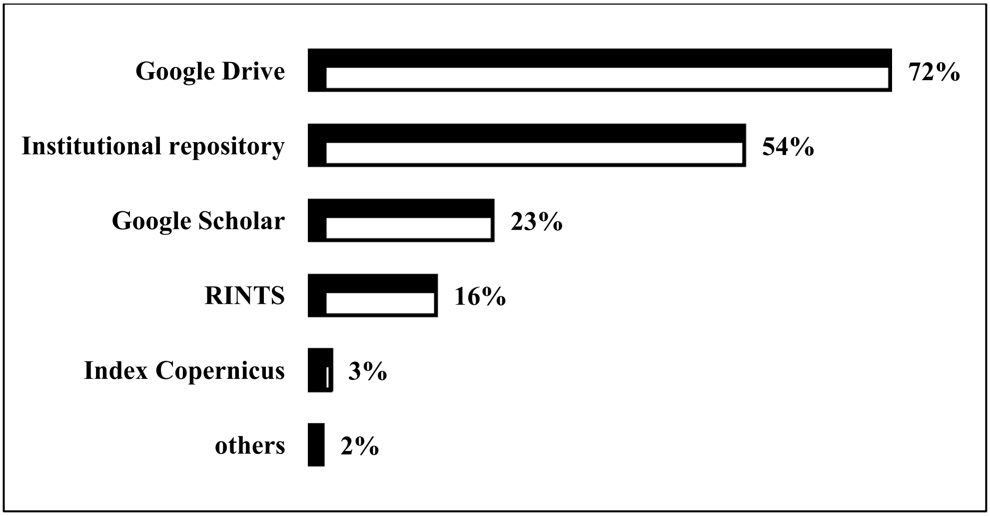

Figure 7. Publication. ICT tools for storing and publication
Source: Own research

Taking into account practical experience and observation, we may note that among the popular ICT tools young scientists use when posting study data, there are programs for creating knowledge maps and infographics (Figure 8, Figure 9).

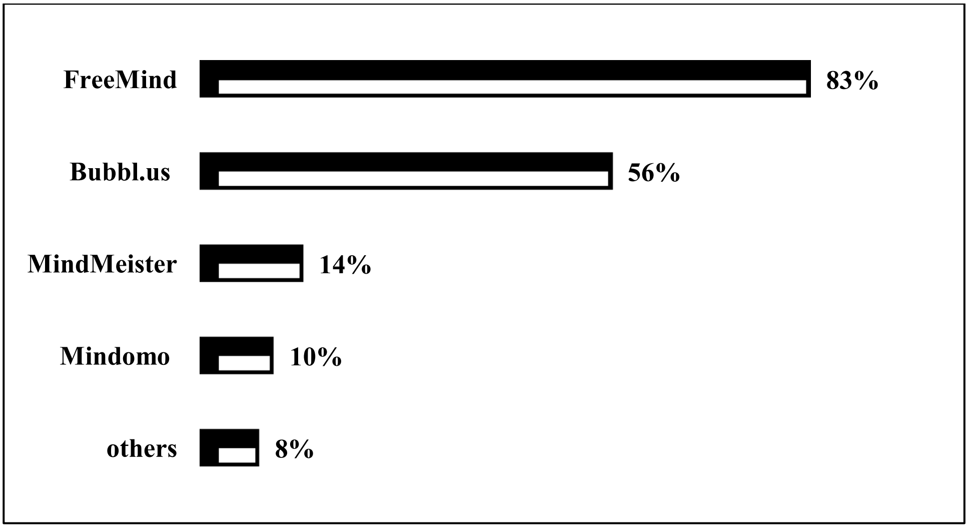

Figure 8. Publication. ICT Tools for graphical representation of data in the form of mental maps
Source: Own research

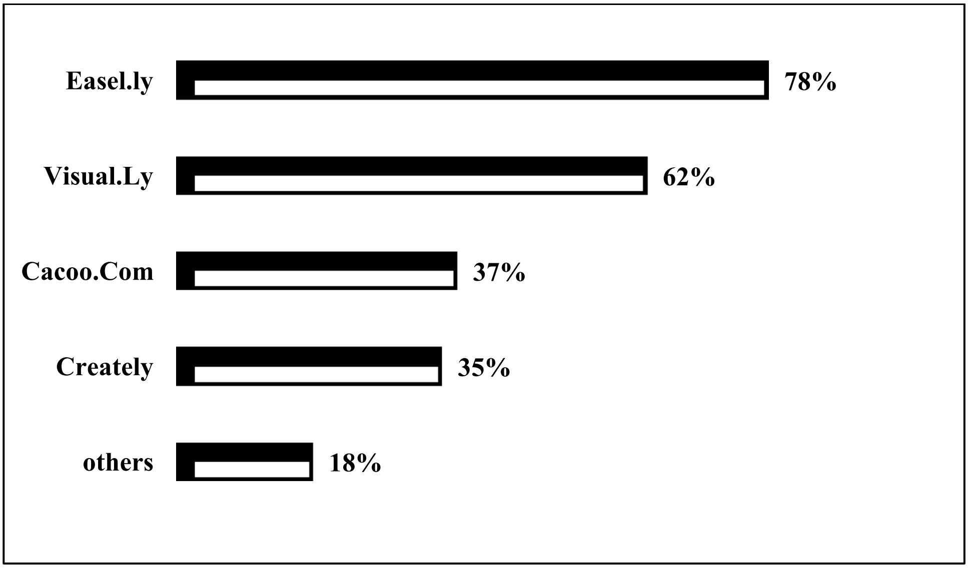

Figure 9. Publication. ICT tools for graphical representation of data as infographics
Source: Own research

Public information about the achievements, important results of scientific, technical and innovation activity of researchers, searching for new, sophisticated forms for maintaining and deepening ties between the university community and society takes place at the stage of outreach.

During the presentation of the results of our research, we pay particular attention to the ability to present them professionally using different ICT tools (Figure 10).

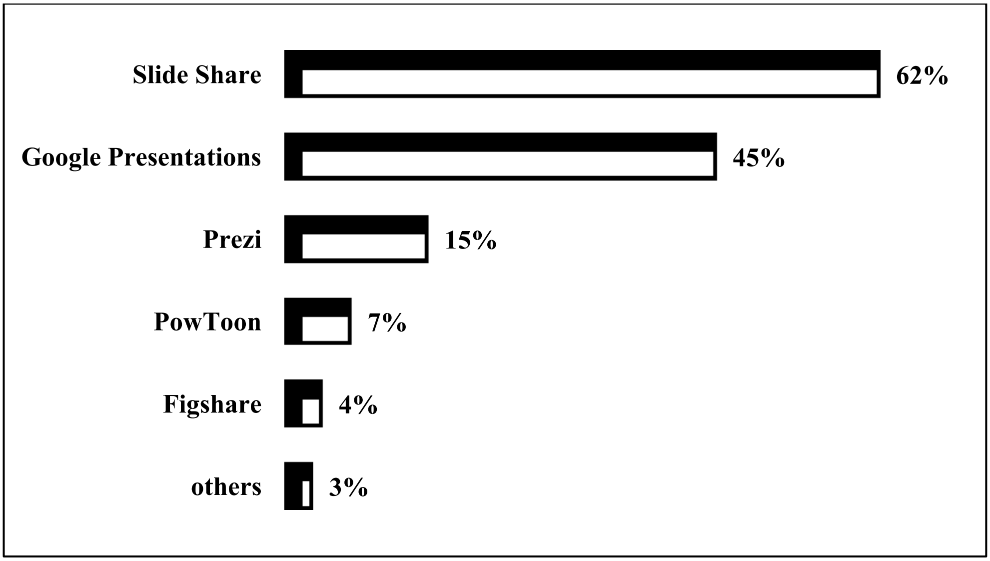

Figure 10. Outreach. ICT tools for archiving and sharing posters and presentations
Source: Own research

Popular ICT tools for creating presentations among young scholars are traditional, as well as innovative, like Slide Share, Google Slides, Prezi, Slides.

The last stage of any study is its evaluation. The basis of determining the effectiveness of research is a purpose of specific public interest, and evaluation criteria should be developed in accordance with this purpose. An important issue in this case is to ensure a professional evaluation.

Given the growing importance of producing knowledge for social development, valuation activities should be carried out collectively, including using ICT tools. Therefore, during the evaluation stage the attention has been focused on the ability of young scientists cooperate and evaluate each other (Figure 11).

In this study, during the evaluation stage we focused on ICT cooperation instruments. They enable carrying out the evaluation of educational and scientific projects due to high-tech information environment implemented in Ternopil National Pedagogical University.

For example, collections of digital electronic resources, joint projects, mandatory evaluations and comments from teachers and peers are the results of network cooperation of graduate and postgraduate students as part of the University's wiki portal.

In addition, young researchers place the materials of scientific and educational research on blogs (Google Blogger). This enables discussions, active sharing experience between colleagues to improve their own professional skills. Thus, we evaluate criteria such as organization of interactivity, feedback, the number of collaborators and blog readers, visiting statistics, citation, a reference to the original source, self-assessment and more.

To determine the scientific productivity, the number of citations of articles in academic literature young scientists create profiles in Google Scholar. In this context, Google Scholar Metrics tool is used to evaluate research results and to achieve greater openness of university education and science.

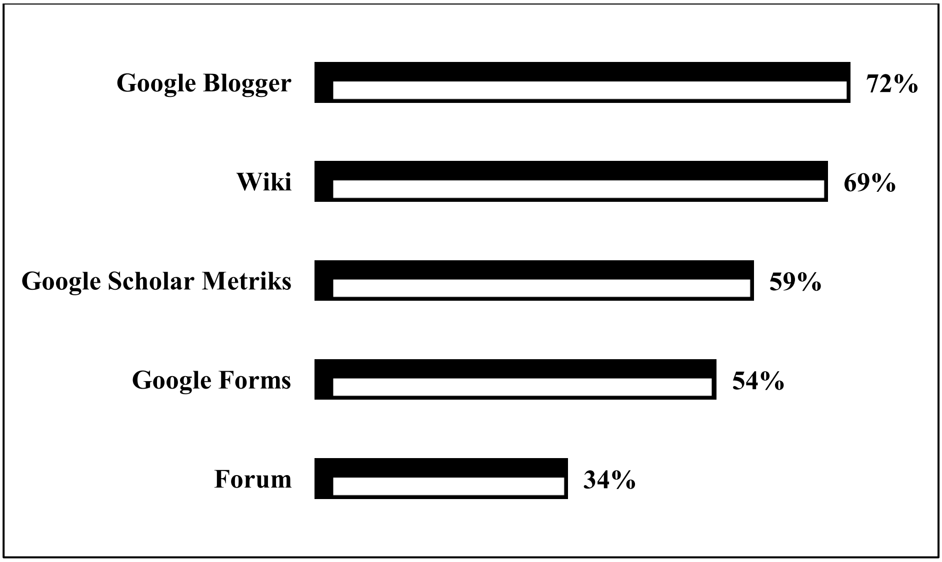

Figure 11. Assessment. ICT tools for collaboration
Source: Own research

The survey revealed that for collaboration and assessment most respondents use Web 2.0 technology, including blogs (72%) and Wiki (69%).

When analysing the survey results, it should be noted that, almost on all stages of the educational and scientific research young scientists of Volodymyr Hnatiuk Ternopil National Pedagogical University use Google services, because Google Apps cloud services are seamlessly integrated into the e-learning environment of the university (Figure 4 – Figure 7, Figure 10).

In terms of scientific communication at the University, the use of Google Apps helps to optimize performance of current tasks, such as preparing publications and projects. A group of researchers or graduate students can work together in Google Docs and observe changes in the real time, collaborate effectively, fulfilling collaborative work.

CONCLUSION

The use of ICT tools of e-communication in educational and research activities require additional training of graduate and postgraduate students. One way to achieve it is the development of special electronic «ICT tools for teaching and research» course. The content of the course was built according to the main stages of the research. Additionally, the results of the research regarding information needs and educational requests of young scientists of the University as to ICT tools for their research activities were taken into account.

A modern electronic informational and educational space is created at the Volodymyr Hnatiuk Ternopil National Pedagogical University, an important component of which is electronic tools of scientific and educational communications based on cloud technology and Web 2.0 technology. Google Apps Services are the universal tools for e-communication, covering all stages of the project or research in the pedagogical university.

The prospect for further research is emphasizing the criteria for selecting appropriate ICT tools for teaching and scientific communication, creating of practical recommendations for the effective use of innovative forms of e-communication within the information educational environment of the University. For this purpose, different levels of activity - from the individual strategies of communication of graduate and postgraduate students to implementation of educational and scientific policy of the university in general should be taken into account.

REFERENCES

Balyk, N., Shmyger, G., 2011: *Web 2.0 Technologies in Education. Study guide*. Educational Book Bogdan Publ., Ternopil, 2011, 128 p, ISBN: 978-966-10-1871-5.

Bosman, J., Kramer, B. *Global survey on research tool usage*, [online] at https://zenodo.org/record/49583#.V8RA1PmLSUk, (accessed 21 May 2016)

Digital tools for researchers, http://connectedresearchers.com/online-tools-for-researchers/ (accessed 15 May 2016)

F1000 Research. Open for Science, http://f1000research.com/articles/5-692/v1, (accessed 15 May 2016)

Information technology and scientific communication: tools and model of implementation into the university environment, [online] at http://ifets.ieee.org/russian/depository/v17_i1/pdf/8.pdf, (accessed 6 June 2016)

Kolodziejchak, B., Roszak, M., Ren-Kurc, A., Kowalewski, W., Poljanowicz, W., 2015: *Commucation tools on e-learning portals*. In: IT

Tools – Good Practice of Effective Use in Education, Monograph Sc. Editor Eugenia Smyrnova-Trybulska, University of Silesia, Studio-Noa, Katowice-Cieszyn, 2015, pp.63-80, 405 p., ISBN: 978-83-60071-82-3

Morze, N., Smyrnova-Trybulska, E., Makhachashvili, R., 2016: *Communication in Education: ICT Tools Assessment.* In: DIVAI 2016 11th International Scientific Conference on Distance Learning in Applied Informatics, Wolters Kluwer, Prague, 2016, pp. 351-365, 608 p., ISBN: 978-80-7552-249-8

Morze, N., Varchenko-Trotzenko, L., 2014: *Formation of students' cooperation skills by means of using Web 2.0 services.* Journal of Educational Technology and Society: an international journal / Eastern European subgroup, Russia (17-1), 2014, pp. 637-649, ISSN 1436-4522

Oleksiuk V., 2014: *The introduction of cloud computing technologies as components of IT infrastructure of the university*. Information technology and teaching techniques, V.3, 2014, pp. 256-266, ISSN: 2076-8184

Online space of scientific communication, [online] at http://cyberleninka.ru/article/n/onlaynovoe-prostranstvo-nauchnyh-kommunikatsiy, (accessed 21 May 2016)

Shorley, D., Jubb, M., 2013: *The Future of Scholarly Communication.* Facet Publishing, U.K., 2013, 224 pages, ISBN: 978-1-85604-817-0

E-LEARNING IN MEDICAL EDUCATION – IMPLEMENTATION

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***Abstract**: The aim of this paper is to analyse the implementation of e-learning in medical education, exemplified by classes in basic medical sciences, and to present the results of their evaluation provided by medicine students (n=478) during the academic year 2014/2015 (group 1) and 2015/2016 (group 2). During the two years of teaching the subject of pathophysiology, they used an open-source e-learning portal as well as e-courses, being identical in terms of contents, communication and organisation. The only differences concerned the format and structure of audiovisual materials introduced after the classes were assessed by group 1. The evaluation given by the students of the two groups was analysed in terms of suitability of the educational materials, work using the e-learning portal and the general way of conducting the classes. The results indicate that the proposed implementation of blended learning (b-learning) in teaching future physicians appeared to be a success and is worth continuing, which is also expected by students themselves. In the authors' opinion, the presented results and the process of e-learning will encourage other educational units to undertake* *similar innovative projects for education methods used at medical science or health science courses.*

Keywords: e-learning, blended learning, medical education, implementation, pathophysiology, educational materials, multimedia, acdemic education, distance education

MOTIVATION FOR IMPLEMENTING E-LEARNING

E-learning is a new method of working with the students, which becomes an important element of contemporary academic education. E-learning (distance education) may be a significant source of the university's competitive advantage and may influence the quality and effectiveness of educating the contemporary students (Gregorczyk, S., 2010).

In daily life, interpersonal face-to-face communication is fading and giving way to short graphical or text messages, as well as multimedia forms and podcasts (Hargis, J., 2008). Young people are particularly proficient in the use of digital technologies, including e-learning, which is applied both in formal and informal education (Cox, M.J., 2013).

Technological development inevitably leads to the implementation of new technologies in education, at the level of schools, universities and continuing education (Kowalewski, W., Kołodziejczak, B., Roszak, M., and Ren-Kurc, A., 2013; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., 2014; Półjanowicz, W., Roszak, M., Kołodziejczak, B. and Kowalewski, W., 2014). Especially, interactive e-learning courses are very well received by students, who may use them to perform better in terms of knowledge acquisition than using conventional methods (Wang, T.H., 2007; Roszak, M., Kołodziejczak, B., Ren-Kurc, A. and Kowalewski, W., 2013; Leszczyński, P., Gotlib, J., Kopański, Z., Wejnarski, A., Świeżewski, S., Gałązkowski, R., 2015).

Due to the numerous benefits of e-learning, students more and more often acquire knowledge from the internet sources rather than traditional handbooks (Gutmann, J., Kühbeck, F., Berberat, P.O., Fischer, M.R., Engelhardt, S., Sarikas, A., 2015; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., Bręborowicz, A., 2015; Morze, N., Spivak, S., Smyrnova-Trybulska, E., 2015). Therefore, it seems appropriate to implement the e-courses and streaming media which include reliable educational contents that replace conventional lectures. (Bridge, P., Jackson, M., Robinson, L., 2009; Roszak, M., Kołodziejczak, M., Kowalewski, W., Ren-Kurc, A., 2016).

E-LEARNING IN MEDICAL TRAINING

E-learning (distance education) is also commonly used in teaching medicine students, and the literature proves that its effectiveness compared to the traditional forms is similar, if not even better (Półjanowicz, W., Mrugacz, G., Szumiński, M., Latosiewicz, R., Bakunowicz-Łazarczyk, A., Bryl, A., Mrugacz, M., 2013; Półjanowicz, W., Roszak, M., Kołodziejczak, B., Bręborowicz, A., 2014; Greif, R., Lockey, A.S., Conaghan, P., Lippert, A., De Vries, W., Monsieurs, K.G., 2015). As results from the literature, most e-learning courses are intended for physicians (58%), nurses, pharmacists and dentists (Frehywot, S., Vovides, Y., Talib, Z., Mikhail, N., Ross, H., Wohltjen, H., Bedada, S., Korhumel, K., Koumare, A., Scott, J., 2013).

E-learning is not only a method applied in academic teaching but also in company courses and trainings, in which the medical students may (will) participate during their careers. The lack of ICT competence, useful in e-education upon graduation is a serious problem, as it is difficult for the graduates to obtain such qualifications (experience) outside the university (Ren-Kurc, A., Kowalewski, W., Roszak, M., Kołodziejczak, B., 2012; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., Bręborowicz, A., 2015).

Due to its specific nature, distance teaching in academic medical training is mainly carried out using blended learning (b-learning), e-learning courses being rather occasional. In practical subjects, most popular method is b-learning, which combines education in virtual environment with practical activities performed in real world under supervision of the teacher (Thomson, N.M., Campbell, D.E., O'Leary, F.M., 2011). This is the characteristic of most subjects taught when educating future physicians.

In the opinion of the authors, the organisation of the teaching process with the use of electronic contents in medicine training is not only a response to the demand of contemporary students, but most of all a proof of the high awareness of medicine teachers regarding the possibility of using technological solutions in education, which is not so obvious (Ren-Kurc, A., Kowalewski, W., Roszak, M., Kołodziejczak, B., 2012). At the same time, it may be an example of interdisciplinary cooperation of researchers and experts in e-learning technologies, with teachers.

The authors present the implementation of innovative teaching methods in pathophysiology classes, conducted for the 2nd year of medicine course at Poznan University of Medical Sciences. The presented e-learning experience in teaching the basic medicine may be a valuable model for other educational institutions which introduce remote methods at medical science or health science courses.

IMPLEMENTATION OF E-LEARNING IN MEDICAL TRAINING

Correct implementation of e-learning depends on several factors, which may be grouped into two categories: technology and human resources. The most important components include appropriate organisation of work (Roszak, M., Kołodziejczak, M., Kowalewski, W., Ren-Kurc, A., 2016), resource management tools (Roszak, M., Kołodziejczak, B., Półjanowicz, W., Bręborowicz, A., Ren-Kurc, A., Kowalewski, W., 2015), working (editing, publishing) on teaching materials, including the LCMS portal (Learning Content Management System), as well as ICT competence of the providers and recipients of knowledge, who take part in the education process (Ren-Kurc, A., Kowalewski, W., Roszak, M., Kołodziejczak, B., 2012; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., Bręborowicz, A., 2015). In order to implement and conduct distance education in an efficient way, we need an interdisciplinary team: experts in a given field and persons with high ICT competence and experience in distance education. Naturally, each distance course must contain reliable contents.

Thus, it is recommended to establish cooperation with an e-education entity, lab/centre of distance learning or computer science lab, which employs persons with high competence in distance education, both in terms of technology and methodology. Such institutions usually perform the following functions:

1) development of e-learning tools and their implementation in teaching;
2) research of new education technologies in the scope of the subjects being taught (analysis of current technical capabilities) and implementation of innovative methods in education.

As part of the mentioned activities, such an entity collaborates with other experts in the field, actively participates in professional projects and seminars, including the ones being interdisciplinary and carried out at various universities. It should arrange regular trainings for teachers, which will make the classes using the learning portal more efficient, and which will allow the knowledge providers to supplement their ICT competence and improve their techniques.

B-LEARNING IN PATHOPHYSIOLOGY COURSE

The department of pathophysiology has conducted classes using the e-learning portal OLAT (Online Learning And Training) for Polish-speaking medicine students since 2013. In one year of medicine, there are approximately 260 students. Simultaneously with the medicine classes conducted by the department, there are other classes attended in other courses, including Programs in English. The department has its own e-education lab.

Since 2014, medicine classes have been conducted with the use of the b-learning method**.** The subject includes practical training, carried out during 3 to 4 weeks, and lectures delivered for 10 weeks. Work on the e-learning portal is treated as supplementation of the classes conducted on a stationary basis. Below we present a description of the most important components of the e-courses, defined in three areas of use as: 1. materials (multimedia, interactivity, textual-graphical), 2. communication, 3. organisation. The elements include:

- educational films with the teacher's voice commentary, which are to prepare the students for all the 10 topics raised during classes (*1. audiovisual materials - multimedia*),
- possibility of communicating with the tutor of a given topic by asking direct questions, and the possibility of clarifying any doubts while studying (*2. communication*),
- individual monitoring of knowledge. A database of self-tests have been prepared for all the classes, including a self-test which introduces the students to pathophysiology, available a week before the classes begin. Self-tests play a substantial role in formative e-assessment by supporting the teaching and learning processes, as well as provide feedback to the student and teacher during the course (*1. interactive materials - interactivity*),
- lecture-related materials and the contents of clinical cases (analysed in classes) in the form of a static graphical presentation with the teacher's text commentary. A part of such materials is available for print in relevant folders, as pdf files. The lecture-related materials function as notes which the students use during the stationary lectures. The materials are uploaded several days before the lecture, after the teacher updates their contents (*1. textual-graphical materials*),
- the entire assessment process is electronic, conducted via the e-learning portal in the University's computer rooms (Kołodziejczak, B., Roszak, M., Ren-Kurc, A., Bręborowicz, A., Kowalewski, W., 2015). The students get the credit based on the aggregate of points obtained from three tests: physiology introductory test, the test taken after completing all the classes, and the test covering the lectures. If the student is not awarded the credit, they may still retake the test twice. Next, they take the exam in one of three proposed terms – two resits are possible (*3. organization*),
- evaluation of knowledge with a large number of students is a great organisational challenge, taking into account different dates of the tests, their number or diversity. The system requires electronic enrolment for the tests, which includes selection of the date, time and room – everything is carried out via the e-learning portal. The student may still change the date 24 hours prior to the test, provided there are still any places available. (*3. organization*),

- communication is maintained through discussion forums (for topics) and a general forum for the entire group. The general forum is used to provide current organisational information, and the Department staff responsible for teaching matters answer questions regarding the classes, e.g. about the possibility of changing the group, attending a stationary class on another day, etc. (*2. communication, 3.organization*),
- information materials related to the classes, such as: current schedule, class regulations, rules for receiving the credit, topics, recommended literature, etc. There is also a mechanism for the notification of any changes in the course, with the possibility of sending information to the student's e-mail address using the system of grouping the users on the e-learning portal (*2. communication, 3.organization*),
- at the end of the classes, the students are asked to fill an anonymous questionnaire concerning the subject, with particular focus on the assessment of work on the e-learning portal, the available electronic materials and their suitability during the learning process (*2. communication, 3.organization*).

The students are given 7-day/24-hour Internet access to the resources, throughout the course, until the exam session, which allows them to use materials adapted to their individual needs and enables studying at any place and time.

During the two years of teaching the subject, they have used an open-source e-learning portal as well as courses, being identical in terms of contents, communication and organisation. The only differences concerned the format and structure of the audiovisual materials introduced after the classes were assessed by group 1 students. Below we present the analysis and interpretation of the results.

STATISTICAL ANALYSIS

Analyzed data are presented as medians (Me), interquartile ranges (lower quartile - Q1, upper quartile - Q3) or percentage, as appropriate. For comparison of two groups Mann-Whitney U test was used. The relationship between variables was analyzed with the Spearman's rank correlation coefficient. All results were considered significant at $p<0.05$. Statistical analyses were performed with STATISTICA 10.0 PL (StatSoft. Inc).

RESULTS AND DISCUSSION

The analysis covered 478 questionnaires filled during two years of teaching. In the academic year 2014/2015, the questionnaire was filled by 246 students (group 1), which corresponds to 99% of attendees, and in the academic year 2015/2016 it was 232 students, corresponding to 91% of the total quantity (group 2).

Comparisons

The students assessed the suitability of the electronic educational materials available on the e-learning portal, which they used for the classes and during the preparation to the tests and the final exam. The grades (0-4) represent the following categories: *very useful – they improved my learning efficiency* (4), *useful* (3), *hard to say* (2), *not useful* (1), *absolutely not useful* (0). The analysis has revealed that the opinions in this matter were different ($p=0.035$, $p<0.05$), though the p-value is on the line of statistical significance ($\alpha=0.05$). The median of the results of both groups is 3, which means that the electronic materials have been evaluated as *useful, interquartile ranges:* Q1=3, Q3=4. Detailed results are presented in Figure 1.

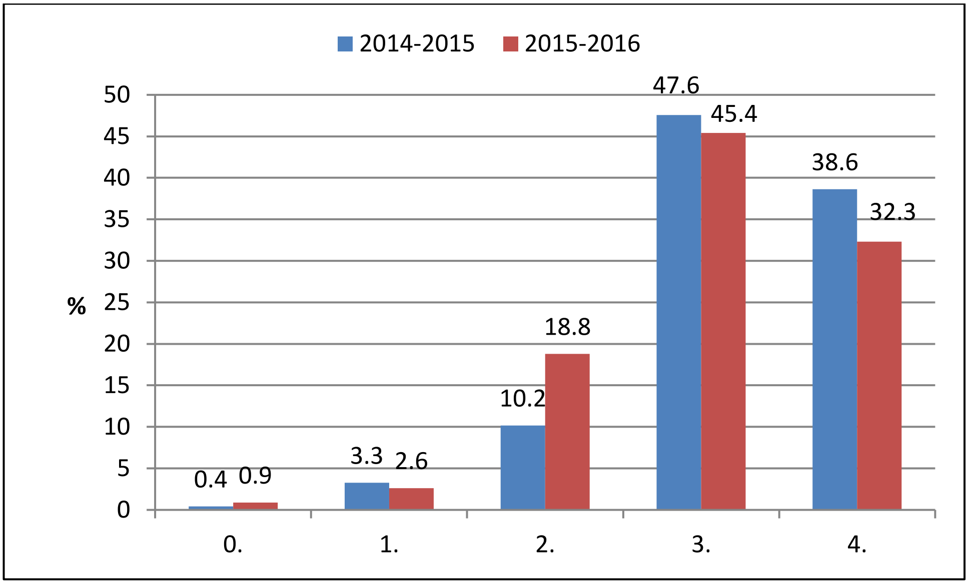

Figure 1. Suitability of the electronic educational materials (group 1: n=246, group 2: n=229)
Source: own elaboration

Therefore, the electronic learning materials prepared by the teachers have been assessed very high by both groups. Grade 4 (*very useful*) or 3 (*useful*) was awarded by 86.2% of students from group 1 and 77.7% of students from group 2. The results are also supported by other surveys (Bridge, P., Jackson, M., Robinson, L. 2009; Półjanowicz, W., Roszak, M., Kołodziejczak, B., Bręborowicz, A., 2014; Leszczyński, P., Gotlib, J., Kopański, Z., Wejnarski, A., Świeżewski, S., Gałązkowski, R., 2015) which prove that the students appreciate the interactive educational materials, which substitute the conventional form of classes. Of course if we assume they contain reliable information.

It must be added that the students from both groups did not have any classes conducted using distance methods – group 1 was the first year to study pathophysiology with the use of the e-learning portal in the form described above. Students who attended the classes in the year 2013/2014 used the learning portal which only contained the self-test database and selected elements of communication and organisation. Students of the year 2015/2016 (group 2), at the beginning of the course, were informed by their friends from the year 2014/2015 (group 1) that the Department of Pathophysiology conducted the education process with the use of b-learning, which could explain the significant differences between the groups regarding the assessment of materials. Unlike group 1, group 2 already expected such form of classes and the availability of audiovisual materials on the portal, which may explain the higher grades as compared to group 2. However, to confirm this conclusion, it is recommended to carry out the survey in the following years and to monitor the relations.

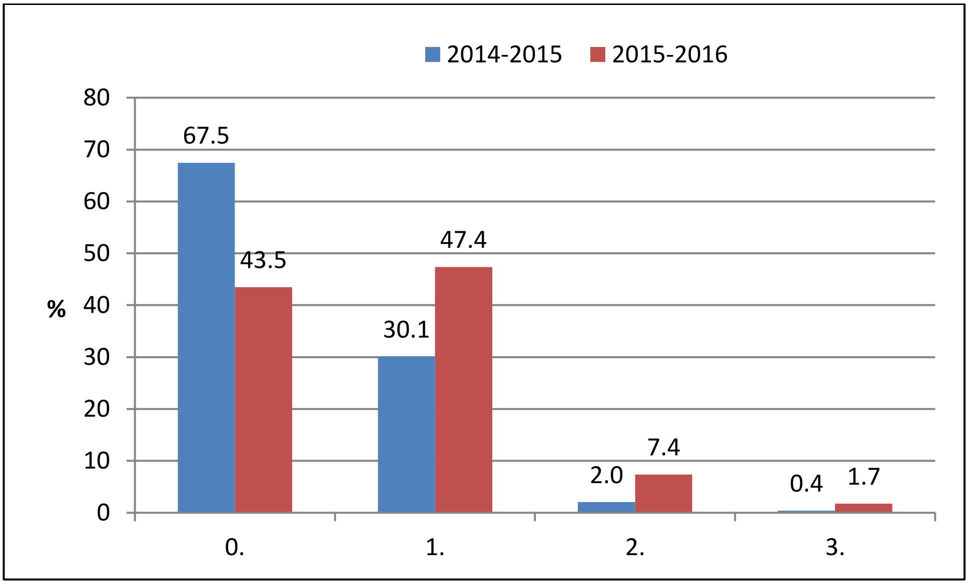

Figure 2. Technical aspect of the learning portal (group 1: n=246, group 2: n=230)

Source: own elaboration

The technical aspect of the learning portal has also been assessed. The participants have been asked if they experienced any technical issues during their work, e.g. problems with logging in, filling of the tests/self-tests, playing the audiovisual materials, etc. The grades (0-3) represent the following categories: *none* (0), *occasionally* (1), *frequently* (2), *very frequently* (3). The analysis has revealed that the grades given for this part are different ($p<0.001$, $p<0.05$). The median grade in group 1 is 0, which means that the students did not have any technical problems during their work on the portal, whereas in group 2 the grade is 1, which means that the students had some occasional technical problems. Interquartile ranges in both groups are the same: Q1=0; Q3=1. Detailed results are presented in Figure 2.

In the year 2014/2015, a speech synthesizer was used (male and female voice), though it was not accepted by the students (Roszak, M., Kołodziejczak, B., Ren-Kurc, A., Kowalewski, W., 2015), and therefore in 2015/2016 it was replaced by the original voices of the teachers. In the first year, the audiovisual materials were provided in the swf format, where the students (depending on the needs) could activate or deactivate the teacher's voice commentary in a particular fragment of the educational information. It was also possible to stop the sound at any moment (pause) or to listen to the whole commentary to a single slide without the possibility to reverse it to a chosen fragment. The latter issue was indicated by the group 1 students as inconvenience during learning (Roszak, M., Kołodziejczak, B., Ren-Kurc, A., Kowalewski, W., 2015). In the second year, the materials were played in the mp4 format, with the possibility of multiple, smooth sound playing, pausing, reversing or complete deactivation, depending on the preference. Changes in the format of the multimedia files appeared to be problematic for the students. The computer hardware on which the multimedia materials were to be played had to be equipped with later versions of software. Sometimes it was difficult to inform the students remotely on the required process of downloading and installing the software. The problem concerned the students with lower ICT skills (Ren-Kurc, A., Kowalewski, W., Roszak, M., Kołodziejczak, B., 2012; Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A., Bręborowicz, A., 2015). This explains the significant differences between group 1 and group 2 in the assessment of the technical part.

The students were also asked if they would like such an e-course on the learning portal (educational materials, self-tests, etc.) to be available also for other subjects. The grades (0-4) represent the following categories: *definitely yes* (4), *yes* (3), *no opinion* (2), *no* (1), *definitely no* (0). The analysis has revealed that the grades given for this part are similar ($p=0.542$, $p>0.05$). The median grade in both groups is 3, which means that the students would like to use such an e-course also in other subjects; interquartile ranges: Q1=3; Q3=4. Detailed results are presented in Figure 3.

Therefore, the students from both groups assess the e-learning course (b-learning method) very high and demand it also for other subjects. The answer *Definitely yes* (4) or *yes* (3) was given by 88.2% of students from group 1 and 85.5% of students from group 2. This result is also supported by other surveys that confirm the students appreciate e-learning (b-learning), which supports and supplements the conventional medical training.

In the questionnaires, the students were asked to summarise the entire subject, including the stationary classes, e-learning course, the use of learning portal for the classes and for the communication student-teacher, teacher-student and student-

student. The question *how do you evaluate the teaching process at the Department of Pathophysiology in the scale from 0 (very bad) to 10 (very good),* was answered similarly (p=0.335, p>0.05) by the students from both groups (2014/2015, 2015/2016). In both groups, the median was 8, and the interquartile ranges were: Q1=7, Q3=8. When analysing the results, we can say that the students have appreciated the several years of work, performed by the interdisciplinary team of teachers and e-learning specialists, to prepare and carry out the classes using distance techniques. Implementation of e-learning in the process of teaching the basic medical subjects may be considered reasonable, and the assessment provided by the students encourages for further development of this method of teaching at the medical university.

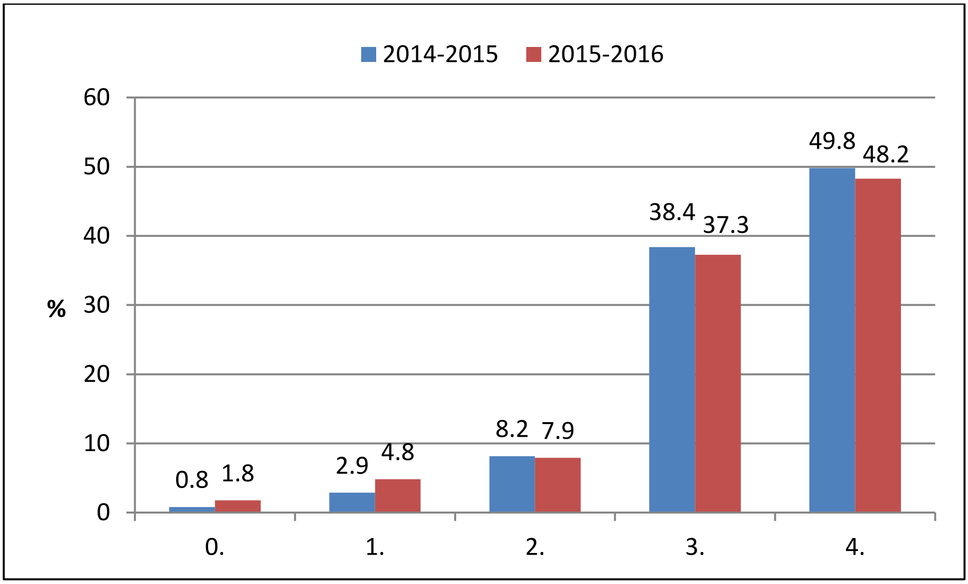

Figure 3. Implementation of an e-course in other subjects (group 1: n=245, group 2: n=228)
Source: own elaboration

In the questionnaire, the students were also asked to evaluate further steps to be taken by the team that will conduct the classes in the following years, which concerned in particular the classes including interactivity and the extension of the interactive educational materials. Due to the limitations of this article, the issue will be raised in the following publications.

Correlations

Another matter covered by the analysis was the relation between the answers to the aforesaid questions concerning the e-learning course, separately for group 1 and group 2. Detailed results are presented in Table 1.

Table 1.

The analysis of the relation between the answers to the aforesaid questions concerning the pathophysiology course

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Variables</th><th colspan="2">Correlation coefficient</th><th colspan="2">p-value</th></tr>
<tr><th>2014-2015
n=245</th><th>2015-2016
n=227</th><th colspan="2"></th></tr>
<tr><td>1</td><td>Suitability of educational materials and the implementation of e-learning course in other subjects</td><td>0.43</td><td>0.52</td><td colspan="2" rowspan="3"><0.001</td></tr>
<tr><td>2</td><td>Suitability of educational materials and general assessment of the classes</td><td>0.44</td><td>0.52</td></tr>
<tr><td>3</td><td>General assessment of the classes and the implementation of e-learning course in other subjects</td><td>0.31</td><td>0.44</td></tr>
<tr><td>4</td><td>Technical aspect of e-learning and general assessment of the classes</td><td>-0.17</td><td>Not significant</td><td>0.007</td><td>0.228</td></tr>
</table>

Source: Own elaboration

As it appears, both groups have shown certain positive relations ($p<0.05$) described in points 1, 2 and 3, Table 1. The higher grade given by the students to the educational materials, the more clear was the opinion that the e-learning course should be implemented in other subjects. As we can see, the assessment of suitability of the educational materials has a positive effect on the general assessment of the entire subject conducted using b-learning. The general assessment of the subject relates to the opinions on the implementation of e-learning courses in other subjects. The lack of technical problems during learning with the use of distance methods also ensures a high evaluation of the classes. To summarise: reliable contents, being well prepared and designed on the e-learning portal, and their effectiveness in the teaching process are the main components of successful classes, according to the students. The results mentioned above also confirm that the implementation of e-learning should be carried out by an interdisciplinary team, i.e. a team of experts cooperating with persons with high ICT skills and experience in e-learning.

CONCLUSION

In view of the authors' research, the efficiency and acceptance of e-learning in medical education are proved by the results of statistical analyses of the collected data. Despite the large workload and the need to adapt to the standards of publishing of the educational materials (multimedia and interactivity), acceptable by the students, it is the right direction of the development of e-learning materials in medical sciences. All the types of multiple-choice tests available in LCMS appear to be an important supplement to the multimedia information. Additionally, electronic testing considerably helps the teachers to master the process of knowledge evaluation in an acceptable time, when dealing with large groups of students.

New medicine students, who treat online resources as an obvious source of information, enforce teachers of subjects to use the innovative education methods and online education. The staff teaching the subject of pathophysiology and the team responsible for publishing electronic materials are now ready for further changes, which is proved by their common educational effects.

The described e-learning experience in teaching a subject included in the basic medical sciences may be a valuable guideline for other educational institutions as regards the direction and stages of e-learning implementation in medical education. This article presents a positive example of the use of innovative education methods, which should promote such implementations even among persons being sceptical to e-learning.

REFERENCES

Bridge, P., Jackson, M. and Robinson, L., 2009: *The Effectiveness of Streaming Video on Medical Student Learning: A Case Study*. Med Educ Online, 14, 11. doi: 10.3885/meo.2009.Res00311

Cox, M.J., 2013: *Formal to informal learning with IT: research challenges and issues for e-learning*. Journal of Computer Assisted Learning, 29, pp. 85-105, doi: 10.1111/j.1365-2729.2012.00483.x

Frehywot, S., Vovides, Y., Talib, Z., Mikhail, N., Ross, H., Wohltjen, H., Bedada, S., Korhumel, K., Koumare, A. and Scott, J., 2013: *E-learning in medical education in resource constrained low- and middle-income countries*. Hum Resour Health, 11, 4. doi: 10.1186/1478-4491-11-4

Gregorczyk, S., 2010: *E-learning versus a university's competitive advantage*, E-mentor, No. 5 (37), pp. 20-22. ISSN: 1731-6758 (Print), ISSN: 1731-7428 (Online) [In Polish]

Greif, R., Lockey, A.S., Conaghan, P., Lippert, A., De Vries, W. and Monsieurs, K.G., 2015: *on behalf of the Education and implementation of resuscitation section Collaborators, Collaborators, and others*. European Resuscitation Council Guidelines for Resuscitation 2015:

Section 10. Education and implementation of resuscitation. Resuscitation, 95, pp. 288-301. doi: 10.1016/j.resuscitation.2015.07.032

Gutmann, J., Kühbeck, F., Berberat, P.O., Fischer, M.R., Engelhardt, S. and Sarikas, A., 2015: *Use of learning media by undergraduate medical students in pharmacology: a prospective cohort study*. PLoS One, 10(4), e0122624. doi: 10.1371/journal.pone.0122624

Hargis, J., 2008: *A Second Life for Distance Learning*. Turkish Online Journal of Distance Education, 9(2), pp. 57-63

Kołodziejczak, B., Roszak, M., Kowalewski, W. and Ren-Kurc, A., 2014: *Educational multimedia materials in academic medical training*. Studies in Logic, Grammar and Rhetoric on Logical, Statistical and Computer Methods in Medicine, No.39(52), 2014, pp. 105-121, ISBN: 978-83-7431-428-2, ISSN: 0860-150X

Kołodziejczak, B., Roszak, M., Kowalewski, W., Ren-Kurc, A. and Bręborowicz, A., 2015: *Participants academic distance education - case study*, Technics, Technologies, Education, Management, Vol. 10, No. 2, pp. 242-249, ISSN: 1840-1503

Kołodziejczak, B., Roszak, M., Ren-Kurc, A., Bręborowicz, A. and Kowalewski, W., 2015: *Creating digital question databases. Use of self-tests in teaching medical subjects*. Studies in Logic, Grammar and Rhetoric on Logical, Statistical and Computer Methods in Medicine, No. 43 (56), pp. 211-227, ISSN: 0860-150X, ISBN: 978-83-7431-464-0

Kowalewski, W., Kołodziejczak, B., Roszak, M. and Ren-Kurc, A., 2013: *Gesture recognition technology in education*, In: Distance Learning, Simulation and Communication, Proceedings (Selected papers), Ed. Hruby, M., Brno, Czech Republic, ISBN: 978-80-7231-919-0

Leszczyński, P., Gotlib, J., Kopański, Z., Wejnarski, A., Świeżewski, S. and Gałązkowski, R., 2015: *Analysis of Web-Based Learning methods in emergency medicine: randomized controlled trial*. Arch Med Sci, pp. 1-8. doi: 10.5114/aoms.2015.56422

Morze, N., Spivak, S. and Smyrnova-Trybulska, E., 2015: *Designing a Modern Cloud-Oriented Virtual Personalized Educational Environment*, New Educational Review, Vol. 40. No. 2, pp. 140-154, ISSN: 1732-6729

Półjanowicz, W., Mrugacz, G., Szumiński, M., Latosiewicz, R., Bakunowicz-Łazarczyk, A., Bryl, A. and Mrugacz, M., 2013: *Assessment of the Effectiveness of Medical Education on the Moodle e-Learning Platform*. Studies in Logic, Grammar and Rhetoric on Logical, Statistical and Computer Methods in Medicine, No. 35(48), 2013, pp. 203-214, ISBN: 978-83-7431-392-6, ISSN: 0860-150X

Półjanowicz, W., Roszak, M., Kołodziejczak, B. and Bręborowicz, A., 2014: *An analysis of the effectiveness and quality of e-learning in medical education* In: E-learning and Intercultural Competences Development in Different Countries, Sc.ed. Smyrnova-Trybulska, E., Studio Noa, Katowice-Cieszyn, pp. 177-196, ISBN: 978-83-60071-76-2

Półjanowicz, W., Roszak, M., Kołodziejczak, B. and Kowalewski, W., 2014: *Using virtual learning environment as a key to the development of innovative medical education,* Studies in Logic, Grammar and Rhetoric on Logical, Statistical and Computer Methods in Medicine, No. 39(52), pp. 123-141, ISBN: 978-83-7431-428-2, ISSN: 0860-150X

Ren-Kurc, A., Kowalewski, W., Roszak, M. and Kołodziejczak, B., 2012: *Building Digital Content for E-Learning. Information and Communication Technologies (ICT) Competence* In: E-Learning for Societal Needs, Sc.ed. Smyrnova-Trybulska, E., Studio Noa, Katowice-Cieszyn, pp. 201-212, ISBN: 978-83-60071-59-5

Roszak, M., Kołodziejczak, B., Półjanowicz, W., Bręborowicz, A., Ren-Kurc, A. and Kowalewski, W., 2015: *E-learning portal tools for medical education*. Studies in Logic, Grammar and Rhetoric on Logical, Statistical and Computer Methods in Medicine, No. 43 (56), pp. 177-193, ISSN: 0860-150X, ISBN: 978-83-7431-464-0

Roszak, M., Kołodziejczak, B., Ren-Kurc, A. and Kowalewski, W., 2013: *Designing and building of interactive content for distance education* In: E-learning & Lifelong Learning, Sc.ed. Smyrnova-Trybulska E., Studio Noa, Katowice-Cieszyn, pp. 343-359, ISBN: 978-83-60071-66-3

Roszak, M., Kołodziejczak, B., Ren-Kurc, A. and Kowalewski, W., 2015: *Medical distance education - good practices* in: IT Tools - Good Practice of Effective Use in Education, Sc.ed. Smyrnova-Trybulska E., Studio Noa, Katowice-Cieszyn, pp. 235-246, ISBN: 978-83-60071-82-3

Roszak, M., Kołodziejczak, M., Kowalewski, W. and Ren-Kurc, A., 2016: *Implementation of e-learning portal for academic education and lifelong learning,* Int. J. Continuing Engineering Education and Life-Long Learning, Vol. 26, No. 2, pp.135-152

Thomson, N.M., Campbell, D.E. and O'Leary, F.M., 2011: *Teaching medical students to resuscitate children: an innovative two-part programme*. Emerg Med Australas, 23(6), pp. 741-747. doi: 10.1111/j.1742-6723.2011.01477.x

Wang, T.H., 2007: *What strategies are effective for formative assessment in an e-learning environment?* Journal of Computer Assisted Learning, Vol. 23(3), pp. 171-186. doi: 10.1111/j.1365-2729.2006.00211.x

PEER-ASSESSMENT IN HIGHER EDUCATION

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Abstract: *Nowadays education is undergoing an evolution by leaps and bounds in order to provide students with the fundamental professional skills. For that reason, the traditional evaluation model is complemented with other methodologies, such as peer-assessment, for improving the learning process. The present contribution describes the peer-assessment methodology applied to the ECTS students groups in the Information Security subject during the 2015-2016 academic year. From the results obtained, it is possible to conclude that although the traditional method is reliable, there are some parts to be enhanced.*

Keywords: Tutorial support session, peer-assessment, team working, transversal skills, engineering.

INTRODUCTION

Higher education is experiencing several changes not only from a structural perspective, such as length of studies and degrees (García-Suárez 2014), but also, and specially, from a methodological point of view (Esteve Mon 2011). This way, it is fundamental to go beyond the purely quantitative assessment, so that the formative evaluation should be considered in order to integrate all the components/actors that take place in the teaching learning process (Sánchez 2005). That means to consider learners as a critical basis of such process.

Regarding the evolution that our society has been undergoing in recent years, a similar change must be done in higher education. As a consequence of this need new methodologies have emerged, such as peer-assessment (Sluijsmans 1998) (Arribas 2012) that complements the traditional evaluation method. Within the peer-assessment methodology (Jaime 2012) the student moves from being a passive figure assessed only by the teacher to be an active one (Boud 1995), and along with the teacher evaluates the activities. Also by including this figure in the methodology it is possible to determine whether the evaluation criteria are reliable when the students' learning is assessed.

This experience has been conducted on the Information Security subject (Información 2016), which is taught in the third year of the Computer Engineering: Information Technology Degree and also in the fourth year of Telematics Engineering Degree, both from the University Centre of Mérida as part of the Extremadura University. This is an engineering subject with a specific distribution of 4,5 theoretical credits, 1,5 practical credits and 0,3 credits dedicated to follow-up activities, scheduled tutoring or ECTS (European Credit Transfer System) tutoring. These last ones correspond to 3 attendance hours for each working group. In the experiment, the size of the working group has varied from 2 to 5 students, being 3 the common proportion.

As occurs in the remaining subjects of both mentioned degrees, the Information Security subject is responsible for the study and acquisition of a series of competences, not only specific but also transversal competences. Specifically, the tasks assigned to every group from the ECTS activity pursue the following transversal competences:

- Communicate effectively in oral and written form (in terms of speaking and understanding), exposing knowledge, procedures, results and ideas related to ICT (Information and Communication Technology), with special emphasis on writing technical documentation.
- Have initiative and be decisive, providing effective solutions to resolve the problems set out even in situations of lack of information and/or with time and/or resources constraints.

1. OBJECTIVES

In this research the aim is to achieve an improvement in the acquisition of both specific and transversal competences by applying peer-assessment in higher education and, particularly, in the engineering field.

2. RESEARCH DESIGN

In order to join the transversal competences, within some of the specific skills of the Information Security subject a work plan is designed. This work plan has been carried out during the first four-month period of the 2015-2016 academic year. In that plan the attendance and non-attendance work time of each student is considered. The corresponding results are discussed in Section 3. The plan considers three sessions throughout the four-month period that it is described below.

2.1 First Session

The first session was performed during the third week from the corresponding four-month period.

Unlike the previous experience carried out in (Traver Becerra, Arias Masa, & Hidalgo Izquierdo 2015) in which the composition of the different groups was performed randomly, in this case learners chose their own groups. For that reason, there is a number of members that ranges from 2 to 5 students. Once the groups are created, the distribution of works activities is random, by using the same application mentioned in (Traver Becerra, Arias Masa, & Hidalgo Izquierdo 2015). The works offered were the following ones:

- History and types of viruses.
- Spanish security legislation.
- European security legislation.
- History of cryptography until the year 0.
- History of cryptography until the Catholic kings.
- History of cryptography from the Catholic kings to the last king of the Austria dynasty.
- History from the last king of the Austria dynasty to Isabel II.
- History of cryptography from Isabel II to the First World War.
- History of cryptography from the First World War to the Second World War.

The work entitled "European security legislation" remained with no group assigned, so finally, 8 working groups were composed. After that, an example of project notebook is provided to them as indicated in (Arias Masa & Martin Espada 2015) as well as a predictable working agenda.

2.2 Second Session

The second session was performed in a middle week of the corresponding four-month period.

Within this second session a review was made including the following considerations:

- Analysis of each working group performance. The teacher makes recommendations according to roles and competences, which are adapted to the challenges encountered.
- Work status exposition based on the planning done for every group. Each group exposes the work schedule that includes the progress of every task defined at the beginning, the challenges encountered and how they solve them. The teacher recommends some solutions to resolve current problems and provides bibliographical references for assisting their understanding. Concerning the risks identified that may delay the end date, both parts discuss the best way to avoid them.

- Advice for facing the oral presentation. Three points are addressed in order to facilitate the exposition during the third session: the presentation (slides), the audience, and the speaker (the different students involve).

Before the last session, every ECTS group should deliver the whole work following the rules specified in (Arias Masa & Arevalo Rosado 2013) in which at least the next elements must be included: presentation, final project notebook, and the documentation prepared by the group.

2.3 Third Session

This third session was performed before the last two weeks of class for avoiding overwhelming the students at that time.

The third session covers the oral exposition of final works. The general order of groups is determined in a random way as well as the order of exposition within a specific group (this information is revealed at the beginning of every oral presentation). The objective pursued with randomness is to assess the knowledge acquired after working together and the communication skills when some unforeseen circumstances occur. Usually, when the intervention order is previously fixed there is a risk of focusing only on that part assigned.

Finally, concerning the exposition time, each individual intervention lasts 5 minutes, which is established in the first session.

2.4 Peer-assessment

At the end of every oral presentation of an ECTS group, the remaining students perform the peer-assessment at real-time. For performing this peer-assessment a Google questionnaire has been used, in which they evaluate classmates by applying a "Likert Scale" form with values ranging from 1 to 10.

Figure 1. Likert Scale sample used to evaluate the contents shown by the group
Source: Own work

For every work group the next issues are evaluated:

- Level of presentation (slides) used by the group.
- Level of individual explanation of every group member.

- Level of contents exposed by the group.
- Average level of the group.

This peer-assessment has three distinguishing components. First of all, every learner should identify himself in the questionnaire. Secondly, the student should identify the learner to be peer-assessed, and finally, should specify the group to which the peer-assessed student belongs.

3. EXPERIMENTAL PHASE

The results obtained by applying peer-assessment have enabled the final assessment of students for the ECTS activities, corresponding to a 10% of the final mark of learners.

Figure 2 shows the comparison in terms of mean of the sections evaluated by students when performing the peer-assessment method with respect the evaluation conducted by the teacher.

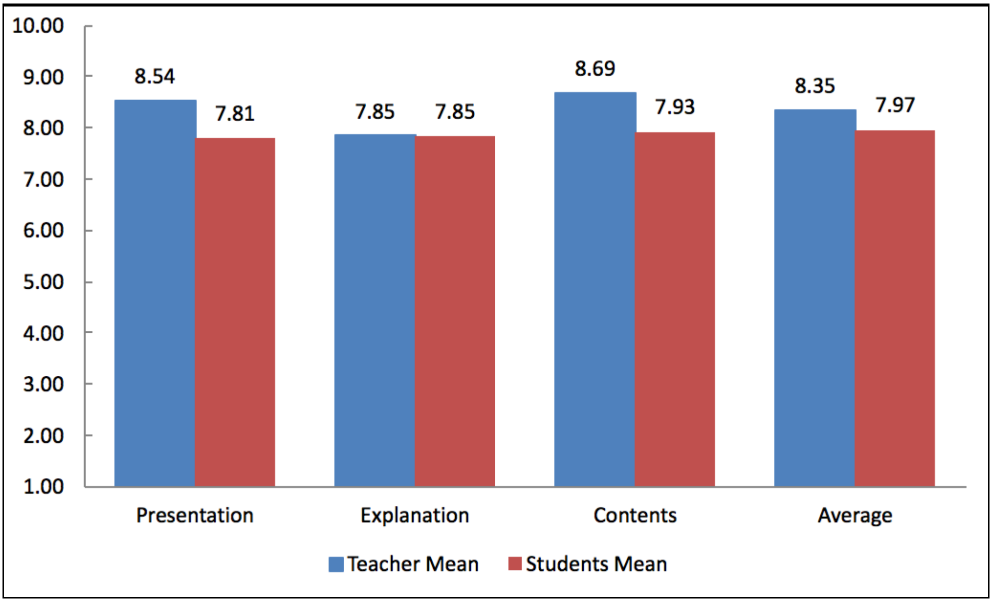

Figure 2. Global results when comparing both students' peer-assessment and teacher evaluation
Source: Own work

In this figure it is possible to observe the coincidence of mean when the section "Explanation" is evaluated by students and the teacher, specially when it is compared to the mean values resulting in the "Presentation" and "Contents" sections in which a difference exists.

For determining if there is a significant difference in these two evaluations, considering that it is a normal distribution and the population size (number of students) is small, the student's t-test is used. In this case the student's t-test is paired, since the population is the same and both students and the teacher evaluate it.

Figures 3 and 4 show the results obtained when applying the student's t-test for the evaluation performed by students and the teacher in the sections "Presentation" and "Contents", respectively. The results, for the two cases, with a significance level of $\propto$=0.05 obtain a p-value much lower than the significance value, so that, the null hypothesis is rejected. That is to say, the peer-assessment of students and the teacher in these two parts is significantly different. However, the differences between both assessments are less than 1.

```
        Paired t-test

data:  students_presentation and teacher_presentation
t = -4.2666, df = 25, p-value = 0.0002492
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1.0732570 -0.3744353
sample estimates:
mean of the differences
             -0.7238462
```

Figure 3. Results from the student's t-test of the "Presentation" mean
Source: Own work

```
        Paired t-test

data:  students_contents and teacher_contents
t = -5.8524, df = 25, p-value = 4.19e-06
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1.029536 -0.493541
sample estimates:
mean of the differences
             -0.7615385
```

Figure 4. Results from the student's t-test of the "Contents" mean
Source: Own work

It must be highlighted that students complete the evaluation based on the information exposed during the oral presentation and explanation, due to the fact that they do not have the knowledge of the topic described, whereas the teacher does. Even more, the mean obtained in the “Contents” section presents a greater difference between the teacher’s assessment and the students’ peer-assessment.

If the mean of the evaluations results for every section (“Presentation”, “Explanation”, and “Contents”) is performed, it is possible to observe that the difference between the students’ peer-assessment and the teacher evaluation with respect the “Average” is minimal, without exceeding a 0.11 in the student case, which is the worst case.

CONCLUSION

Concerning the results obtained during the ECTS activity, it is important to note that the peer-assessment methodology benefits both parts, students and teachers. Learners are more participative and involved with the subject, while enhancing the transversal competences. Moreover, the teacher gets a feedback about the learning process and the students evaluation, in order to identify whether the objectives fixed have been achieved and which parts are susceptible to improvement.

Regarding these results, it is possible to conclude that our initial goals, which imply the improvement of transversal competences as from the specific ones, have been attained. Future work will include a strengthening and review of the corresponding material to allow improving the learning and the acquisition of students’ transversal skills, through peer-assessment methodology in complement to traditional evaluation.

Finally, after analysing the obtained results, future work also will imply to carry out several tasks for acquiring knowledge of the topics to be exhibit for all groups with the aim of reducing the difference shown in the results of "Presentation" and "Content" sections between the student peer-assessment and the teacher evaluation.

REFERENCES

Arias Masa, J., & Arevalo Rosado, L., 2013: *Rubrica de contenido de tareas para el Grado de Ingeniería Telemática*. XXII Jornadas Universitarias de Tecnología Educativa. Madrid: ICONO14.

Arias Masa, J., & Martin Espada, R., 2015: *Problem-Based E-Learning (PBL) using Synchronous Virtual Teaching*. En C. U. Juan Valenzuela-Valdés and Pedro Pardo Fernández (Departamento de Ingeniería de Sistemas Informáticos y Telemáticos (Ed.), Project Based Learning on Engineering: Foundations, Applications and Challenges. New York, USA: Nova science publishers.

Arribas, J. M., 2012: *El rendimiento académico en función del sistema de evaluación empleado*. Relieve, 18(1), 3.

Boud, D., 1995: *Assessment and learning: contradictory or complementary*. Assessment for learning in higher education, 35-48.

Computadores, P. d., [online] at http://www.unex.es/conoce-la-uex/centros/cum/ titulaciones/info/asignaturas?id=1515, (accessed 14 July 2016)

Esteve Mon, F. M., 2011: *El nuevo paradigma de aprendizaje y nuevas tecnologías*. REDU. Revista de Docencia Universitaria, 9(3), 55-73.

García-Suárez, J. A., 2014: *Qué es el Espacio Europeo de Educación Superior? El reto de Bolonia. Preguntas y respuestas.* Barcelona, Barcelona, España: Univ. de Barcelona.

Información, P. d., [online] at http://www.unex.es/conoce-la-uex/centros/cum/ informacion-academica/programas-asignaturas/curso-2015-16/plan1515/501453.pdf , (accessed 16 July 2016)

Jaime, M. P., 2012: *Co-evaluación y asignación de roles, una experiencia de innovación docente universitaria*. Docencia e Investigación: revista de la Escuela Universitaria de Magisterio de Toledo, 27(22), 7-29.

Sánchez, R. B., 2005: *El portafolio, metodología de evaluación y aprendizaje de cara al nuevo Espacio Europeo de Educación Superior: una experiencia práctica en la Universidad de Sevilla*. RELATEC: Revista Latinoamericana de Tecnología Educativa, 4(1), 121-140.

Sluijsmans, D. D., 1998: *Creating a Learning Environment by Using Self-, Peer- and Co-Assessment*. Learning Environments Research, 293-319.

Traver Becerra, M., Arias Masa, J., & Hidalgo Izquierdo, V., 2015: *Co-evaluación de las "ECTS" en Ingeniería Telemática*. XXIII Jornadas Universitarias de Tecnología Educativa. Badajoz.

TEACHER-STUDENT COLLABORATION: CHALLENGES AND OPPORTUNITIES

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Abstract. *Collaborative learning is meant to benefit agents of education due to the fact that it could sharpen skills in collaboration (remote collaboration) as a process of cooperation to accomplish objectives by combining mutual efforts in the dialogue and interaction to eventually get results for all the participants of the process. The paper analyzes the essence of collaborative learning, theoretical perspectives on collaboration in educational process and CL benefits. The study examines collaborative learning classroom. The discussion focuses on challenges and opportunities in collaborative learning.*

Keywords: collaborative learning, remote collaboration, classroom instruction, teacher-student collaborative interaction.

INTRODUCTION

Collaborative learning is meant to benefit agents of education due to the fact that it could sharpen skills in collaboration (remote collaboration) as a process of cooperation to accomplish objectives by combining mutual efforts in the dialogue and interaction to eventually get results for all the participants of the process. Therefore, it is important to implement collaborative techniques for classroom (virtual classroom) instructions. Quality education is supposed to be promoted and facilitated by effective collaborative communication.

Collaboration is commonly defined as the act or process of working with another person or group of people to create or produce something; a piece of work produced by two or more people or groups of people working together (OD 2015), united labour, co-operation; especially in literary, artistic or scientific work." (OED 2015), "To work jointly with others or together especially in an intellectual endeavor." (WTID 1993).

In education and business coaching collaboration is referred to as two or more people working together to accomplish some objective, to achieve shared goals (Boston KM, 2014)

It is a recursive (Marinez-Moyano 2006) process where two or more people or organizations work together to realize shared goals, (this is more than the intersection of common goals seen in co-operative ventures, but a deep, collective determination to reach an identical objective) by sharing knowledge, learning and building consensus. Structured methods of collaboration encourage introspection of behaviour and communication (Spence 2006).

In this paper we discuss the changes in teacher-student roles and places in educational process that have occurred due to collaboration in education. The purpose of the article is to investigate the challenges and opportunities of collaborative learning in order to reveal how beneficial it is for stakeholders of education.

1. THE ESSENCE OF COLLABORATIVE LEARNING

The concept of collaborative learning (CL), the grouping and pairing of students for the purpose of achieving an academic goal, has been widely researched throughout the professional literature. The term "collaborative learning" refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own.

Thus, the success of one student helps other students to be successful (Gokhale 1995). Proponents of collaborative learning claim that the active exchange of ideas within small groups not only increases interest among the participants but also promotes critical thinking. According to Johnson and Johnson (1986), there is persuasive evidence that cooperative teams achieve at higher levels of thought and retain information longer than students who work quietly as individuals. The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers (Totten, Sills, Digby & Russ 1991).

Collaborative learning is considered by Panitz (1999) as a personal philosophy, not just a classroom technique. In all situations when people come together in groups, it suggests a way of dealing with people respecting and highlighting individual group members'' abilities and contributions. There is shared authority, as well as accepted responsibility, among group members for the group actions. The underlying premise of collaborative learning is based upon consensus building through cooperation by group members, in contrast to competition in which individuals best other group members. CL practitioners apply this philosophy in the classroom, at committee meetings, with community groups, within their families and generally as a way of living with and dealing with other people.

1.1. Collaborative Learning Benefits

While elaborating student collaboration tasks, it is essential to understand the CL academic, social, psychological and assessment benefits (Johnson & Johnson 1989). Nelson-Le Gall (1992) captures the nature of cooperative learning when she states "Learning and understanding are not merely individual processes supported by the social context; rather they are the result of a continuous, dynamic negotiation between the individual and the social setting in which the individual's activity takes place. Both the individual and the social context are active and constructive in producing learning and understanding" (p.52).

Fogarty and Bellanca (1992) highlight the reaction that teachers have after they implement cooperative learning paradigms when they state, "Surprisingly and almost unfailingly, once the philosophical shift begins, once teachers begin implementing cooperative interactions, the evidence of student motivation becomes so overwhelmingly visible that teachers are encouraged to try more. The momentum builds for both teachers and students, and before long the "new school lecture" becomes the norm in the classroom. By then, the novelty of the models is no longer the challenge. The challenge becomes choosing the most appropriate interactive designs for the target lesson; it is choosing a design in which the final focus rests on the learner, not on the lecturer". (p.84). They evolve their belief to point out that "the skillful teacher introduces increasingly engaging interactive models over time. As students become more adept in their social skills, the models are selected strictly for appropriateness. Initially, however, the models are subtly slotted into the lessons to familiarize students with the different interactions and to lead them toward involvement in the learning situation". (p.86)

1.2. Theoretical Perspectives on Collaboration

In 1996, Robert Slavin described a variety of perspectives on peer learning, including social-psychological, sociocultural, cognitive-developmental, and cognitive-elaboration approaches. Explanations of how and what peers can learn from one another differ. Angela O'Donnell and James O'Kelly (1994) note that classroom decisions a teacher makes in relation to cooperative or collaborative learning depend on the theoretical approach adopted. Social-psychological approaches suggest that the interdependence among group members is the underlying mechanism for effective cooperation. Interdependence is created by using group rewards or by encouraging social cohesion and a norm of caring and helpfulness. From a cognitive-developmental perspective, effective peer learning occurs as a result of processes of cognitive conflict and resolution, or through the modeling of skilled behaviour.

As Weiser (Weiser 1991: 94) stated, "the most profound technologies are those that disappear". He was the first scholar to define ubiquitous computing as an environment where the computer is integral but embedded into the background of daily life. Applying this concept to the education field, electronic learning (e-learning), or more specifically ubiquitous learning (u-learning) involves learning in an environment where "all students have access to a variety of digital devices and services, including computers connected to the Internet and mobile computing devices, whenever and wherever they need them" (van't Hooft, Swan, Cook & Lin 2007: 6).

In the education field, "ubiquitous computing allows us to envision a classroom in which the teacher remains focused on his or her field of expertise (e.g., math or social studies) while still utilizing technology to enhance student learning" (Crowe 2007: 129). If information is to be used in multiple contexts, then we must ensure multiple contexts learning strategies and ensure that students can widely use the educational information materials. Proceeding from the foregoing, it is possible to formulate some theses to be used in the implementation of innovative educational technologies and e-learning which didactics is created in nowadays:

(1) Learning should be an active process. Active process is to provide students with tasks for using information in practical situations. This information may be in a single learning environment of the institution and created by all players.

(2) Students must construct their own knowledge instead of personal perception without converting the data from teachers; students should be active participants in filling the educational space of the institution.

(3) The joint and cooperative learning must be implemented. Teamwork is a life experience of students to work in groups and allows using successes of other students and to learn from them.

(4) Students are required to provide the ability to control the learning process. This is possible by using formative assessment ideas – most MOOC use peer-to-peer evaluation technology.

(5) Students should be given time to think and for retrospective analysis of their activity (reflection). Such reflection is desirable to be constant and open.

(6) Students should feel that learning has a personal meaning for them. So it is useful for study materials to contain examples that are close to the interests of students and curious as additional information and take into account their individual needs and learning dominating styles.

(7) Learning should be interactive in order to ensure a high level and social significance. Training is an extension of the space of new knowledge, skills,

and relationships with referring to data bases and use resource of educational environment, including electronic.

(8) The learning space formed by a teacher consists of the following components: activity, constructive cooperation, collaboration, commitment, complexity, content, communicativeness, reflexivity.

Of all the educational paradigms under consideration, e-learning relies almost exclusively on collaboration as an educational template, skills formation and assessment tool and ultimate objective.

Forms of collaboration are comprised of 2 groups:

(1) Relationship oriented: Affinity networks, Learning communities

(2) Task oriented: Communities of Practice, Project Communities

Needs of collaboration in an open e-learning environment include the following issues:

- sharing information and documents
- collaboration across physical locations
- sharing creation and access to work products
- identifying and accessing external experts and resources
- classroom with easy-to-use tools
- document repository
- management tools, including scheduling and task management
- lists, tables, rosters, tasks, score cards
- communication tools, including e-mail, discussions, conferencing, voting.

A sociocultural perspective would suggest that the joint knowledge of the group members is greater than the individual knowledge of any member and that the group operates as an interacting system. In contrast, a cognitive-elaboration approach suggests that collaboration enhances student learning by providing a context in which individual learning is promoted by the use of more effective learning processes. In other words, an individual learns better with a peer because the peer provides an audience, prompts more metacognition, or maintains an individual's focus on a task. In creating and using collaborative groups for instructional purposes, teachers' decisions about the size and composition of groups, the kinds of tasks on which students will work, whether or not they should use explicit rewards, and the particular stance to take in relation to the collaborative groups will be influenced by the theoretical perspective that the teachers adopt.

2. COLLABORATIVE LEARNING CLASSROOM

Tinzmann, Jones, Fennimore, Bakker, Fine, and Pierce (1990) worked out four general characteristics of collaborative classrooms:

1. Shared knowledge among teachers and students.
2. Shared authority among teachers and students.
3. Teachers as mediators.
4. Heterogeneous groupings of students.

The first two capture changing relationships between teachers and students. The third characterizes teachers' new approaches to instruction. The fourth addresses the composition of a collaborative classroom.

Thus, shared knowledge and authority, mediated learning, and heterogeneous groups of students are essential characteristics of collaborative classrooms. These characteristics, which are elaborated below, necessitate new roles for teachers and students that lead to interactions different from those in more traditional classrooms. In a collaborative classroom, teachers are defining their roles in terms of mediating learning through dialogue and collaboration; facilitating to create rich environments and activities for linking new information to prior knowledge, providing opportunities for collaborative work and problem solving, and offering students a multiplicity of authentic learning tasks; modeling to share with students not only what one is thinking about the content to be learned, but also the process of communication and collaborative learning, which may involve thinking aloud (sharing thoughts about something) or demonstrating (showing students how to do something in a step-by-step fashion); and coaching as giving hints or cues, providing feedback, redirecting students' efforts, and helping them use a strategy. A major principle of coaching is to provide the right amount of help when students need it--neither too much nor too little so that students retain as much responsibility as possible for their own learning. (Tinzmann et al, 1990).

Regarding student roles in a collaborative classroom, the two major roles of students that are of crucial importance are collaborator and active participator with focusing on goal setting, designing, learning tasks and monitoring, which is closely connected with self-regulated learning and formative self-assessment. Interactions in a collaborative classrom occurs in the form of dialogue, which can trigger challenges and conflict to arise. Students need opportunities to move about, talk, ask questions, and so on. However, students should accept the parameters within which they make their choices. It is essential that rules and standards should be stressed from the beginning.

3. CHALLENGES AND OPPORTUNITIES IN COLLABORATIVE LEARNING

Traditional classrooms have been turning into collaborative classrooms, since educational systems have been responding to the changes in their environment. Yet, there have been tough resistance from those who fear they cannot fit a new education paradigm based more on collaboration than authority. Nevertheless, new challenges create new opportunities that are beneficial for all stakeholders of education.

Among the challenges, we would like to point out the following issues:

1) being an efficient mediator, facilitator, coach and, sometimes, mentor, teachers need constant practicing in sharpening their skills in advanced methods of training and technology for education;
2) elaborating student collaboration tasks might not be a simple task because to be a collaborator all the participants are supposed to be acquiring transferable skills and to be open enough to allow their dialogue to happen, which is quite difficult for the representatives of the utilitarian education model with its steep hierarchy and command principles;
3) scarce technological resources lead to time-consuming activities with poor performance and a low level of satisfaction;
4) shared responsibility for collaborative activities might cause conflicts among the participants of collaborative learning, which, in its turn, might decrease motivation and create unhealthy competition and bullying.

The opportunities that are created by teacher-student collaboration include:

1) narrowing generation gaps due to constant dialogue that smoothens the differences and facilitates tolerance to alternative values and differences (being different does not mean to be opposite any longer, for being different means to be good at something else which can be combined with the strentghs of others to produce a synergic effect or it can shrink weaknesses with some new unknown knowledge and skills);
2) multilevel interaction shows on practice the efficiency of different methods, techniques, tools and instruments, which allows to get rid of the ones that do not meet the requirements of modern interactions much quicker;
3) alternative sources of information help keep curricula updated;
4) as soon as the teacher is not the sole source of knowledge and understanding, students disclose their potential easier, because they do not need a permission for their teacher to be the way they are expected to be;

5) multiple sources of information facilitate creating skills in information verification, thus, in personal responsibility for decreasing information pollution and wastes;
6) democratic nature of collaborative learning contributes to the formation of democratic principles and values, which are necessary for democratic society to soundly function;
7) personification of agents of education, as well as their equal collaboration and mutual responsibility, prevents from corrupted practices;
8) empathy facilitated by collaborative learning reduces the level of social tension;
9) quality education is ensured by non-stop dialogue with real-time feedback that gives an opportunity to cost-efficient methods of regulation and administration of educational processes.

4. MODULE ON REMOTE COLLABORATION

To facilitate collaborative learning, higher educational establishments should implement new curriculum for their stakeholders to stay informed and educated regarding the requirements of ongoing social processes. The BGKU and US researchers have been designing a Module on Remote collaboration in framework WP4 of IRNet Project (http://www.us.edu.pl), which is based on the scientific findings and recommendations to exploit educational resources the fullest. The Module on Remote Collaboration focuses on the basic idea that students, who will come of age in the 21st century, need to be taught different skills than those learned by students in the 20th century, and that the skills they learn should reflect the specific demands that will be placed upon them in a complex, competitive, knowledge-based, information-age, technology-driven economy and society. Transferable skills are substantial for agent of education under globalization and integration. Module is designed for educators, administrators and managers for them to be able to understand the concept of collaboration and to implement collaborative learning procedures. The outcomes of the Module on Remote Collaboration are knowledge and skills in collaborating under conditions of geographically dispersed teams, global information sharing across time zones and physical locations with adequate resource identification and allocation. The researchers have created a MOOC for the students to learn how to organize theirs workplace with easy-to-use tools, document repository, management and communication tools. The main emphasis is put on an access to the latest team resources, any time, any place to ensure participation in asynchronous, threaded discussions.

The Module introduces collaborative techniques via collaborative learning in collaborative classroom (virtual collaborative classroom). The elaboration of student collaboration tasks is carried out considering the following forms of interactions for collaborative classroom instruction (Table 1):

Table 1.

Forms of Interactions for Collaborative Classroom Instruction

Same Time, Same Place	Same Time, Different Place
- Discussion - Brain storm - Communicative skills - Access to documents - Access to educator - Polling - Project/task management - Rosters of multiple types - Calendaring/scheduling	- Lecture - Discussion - Workshop - Research task - Tutoring - Conference - File sharing - Resources
Different Time, Same Place	**Different Time, Different Place**
- Resource - Control	- Message exchange - Review - Assessment - Resources

Source: Own research

Meeting the requirements for ensuring quality education, the Module on Remote Collaboration provides information on the model of quality requirements and collaboration (Figure 1.)

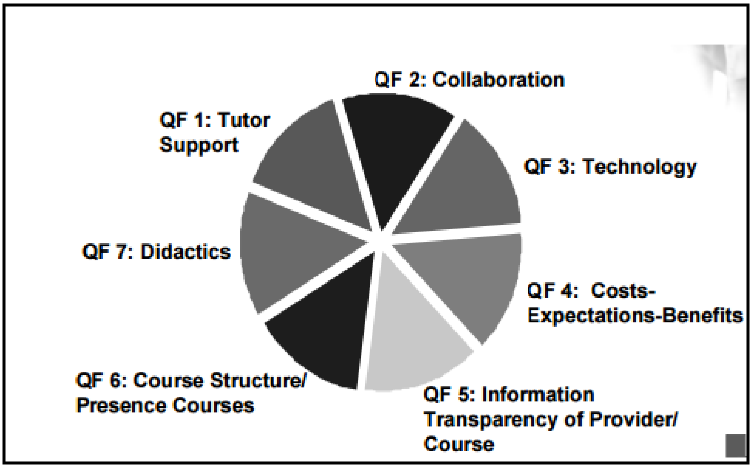

Figure1. Model of Subjective Quality Requirements
Source: Ehlers (2003)

The content of the Module on Remote Collaboration (Table 2) is supposed to become a constituent part of the normative curriculum of the academic staff advanced certification training.

Table 2.

Topics of Module on Remote Collaboration

Module on Remote Collaboration	Topics
Topic 1	Effective Collaboration and Its Assessment Criteria
Topic 2	ICT Tools for Collaboration
Topic 3	Elaboration of Collaborative Learning Tasks for Student Collaboration
Topic 4	ICT Collaboration Tools for e-Education

Source: Morze, Makhachashvili (forthcoming)

CONCLUSIONS

Quality education is supposed to be promoted and facilitated by effective collaborative communication. Collaborative education favours adjustments of curriculum objectives with wants and needs of agents of education, which should lead to improvements in educational systems for them to be responsive to real-time requirements. It should be stressed that collaborative communication significantly changes the roles of students and educators because it brings in flattened hierarchical structure of educational interaction. Consequently, this shift from the authoritative pattern of knowledge transfer to the democratic one of knowledge sharing requires definite understanding of the principles of elaboration of student collaboration tasks for all agents of education to clearly understand their roles and what is expected from them.

To facilitate collaboration learning, advanced experience of the teachers who have already created engaging units and activities for collaborative classroom instruction should be dispersed to involve agents and stakeholders of education into designing, working out and implementing collaborative learning curricula and incentives for educators. Collaborative learning is based on creating learning tasks that encourage diversity, but which aim at high standards of performance for all students. These tasks involve students in high-level thought processes such as decision making and problem solving that are best accomplished in collaboration. These tasks enable students to make connections to real-world objects, events, and situations in their own and an expanded world, and tap their diverse perspectives and experiences in order to obtain transferable skills and to be competitive on the labour market with a possibility of enoying high quality of life by doing what they want and getting what they need.

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REFERENCES

Cohen, E.G., 1986: *Designing group work: Strategies for the heterogeneous classroom*. New York: Teachers College Press 1986.

Crook, C., 1998: *Children as computer users: the case of collaborative learning*. Computers Education, 30, 3/4, 1998, pp.237-247.

Crowe, A. R., 2007: Learning to teach with mobile technology: A teacher educator's journey. In M. van't Hooft & K. Swan (Eds.), *Ubiquitous computing in education* (pp. 127-144). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Eccles, J. S., 1984: *Sex differences in achievement patterns*. In T. Sonderegger (Ed.), Nebraska Symposium on Motivation (Vol. 32, pp. 97–132). Lincoln, NE: Univ. of Nebraska Press. Eccles J. S., A Fogarty, R., & Bellanca, J., 1992. "The new school "lecture": Cooperative interactions that engage student thinking", p84-100, in Davidson and Worsham (Eds.), Enhancing Thinking Through Cooperative Learning, NY, NY: Teachers College Press, 1992.

Ehlers, U., 2003: *Qualität beim E-Learning. Empirische Grundlegung und Modellkonzeption einer subjektorientierten Qualitätsentwicklung*. Dissertation. Bielefeld, 2003.

Fantuzzo, J. W.; King, Judith A.; and Heller, Lauren R., 1992: *Effects of Reciprocal Peer Tutoring on Mathematics and School Adjustment: A Component Analysis.* Journal of Educational Psychology 84(3), Sept 1992, pp. 331–339.

Florio-Ruane, S.,1991: *Instructional conversations in learning to write and learning to teach*. In B.F. Jones & L. Idol (Eds.), Dimensions of thinking and cognitive instruction: Implications for reforms, Vol.2, Hillsdale, NJ: Lawrence Erlbaum, 1992, pp.365-386.

Gokhale, A.A., 1995: *Collaborative learning enhances critical thinking.* Journal of Technology Education, 7(1), ISSN 1045-1064: Collaborative learning enhances critical thinking, [online] at http://scholar.lib.vt.edu/ ejournals/JTE/v7n1/gokhale.jte-v7n1.html, (accessed 8 August 2016).

IRNet project web-site http://www.us.edu.pl

Johnson, D.W., & Johnson, R.T., 1989: Cooperation and competition: Theory and research. Edina, MN: Interaction Book Company, 1989.

Johnson, D.W., & Johnson, R.T., Holubec, E.J., 1986: *Circles of learning* (2nd ed.). Edina, MN: Interaction Book Company, 1986.

Johnson, D.W., & Johnson, R.T., Holubec, E.J., 1987: *Structuring cooperative learning: Lesson plans for teachers*. Edina, MN: Interaction Book Company, 1987.

King, A, 1999: *Discourse Patterns for Mediating Peer Learning.* In Cognitive Perspectives on Peer Learning, ed. Angela M. O'Donnell and Alison King. Mahwah, NJ: Erlbaum, 1999.

Nelson-Le Gall, S., 1992: *Children's instrumental help-seeking. It's role in the social acquisition and construction of knowledge*, In R., Hertz-Lazarowitz, & N., Miller (Eds.), Interaction in cooperative groups the theoretical anatomy of group learning, New York, USA: Cambridge University Publishing, 1992, pp.120-141.

O'Donnell, A. M., and Dansereau, D.F., 1992: *Scripted Cooperation in Student Dyads: A Method for Analyzing and Enhancing Academic Learning and Performance.* In Interaction in Cooperative Groups: The Theoretical Anatomy of Group Learning, ed. Rachel Hertz-Lazarowitz and Norman Miller. New York: Cambridge University Press, 1992.

Palincsar, A., Brown, A., & Campione, J., 1989: *Structured dialogues among communities of first grade learners*. Paper presented at the annual meeting of the American Educational Research Association: San Francisco, CA, 1989.

Palinscar, A., 1985: *The unpacking of a multi-component, metacognitive training package.* Paper presented at the Annual Meeting of the American Educational Research Association. Chicago, Il, 1985.

Panitz, T and Panitz, P., 2004: *Encouraging the Use of Collaborative Learning in Higher Education*. Encouraging the Use of Collaborative Learning in Higher Education, [online] at http://home.capecod.net/~tpanitz/tedsarticles/encouragingcl.htmPanitz, (accessed 8 August 2016).

Roschelle, J., 1992: *Learning by collaborating. Convergent conceptual change*. The Journal of the Learning Sciences, 2(3), 1992, pp. 235-276.

Roth, W., & Roychoudhury, A., 1993: *The concept map as a tool for the collaborative construction of knowledge: A microanalysis of high school physics students*. Journal of Research in Science Teaching, Vol. 30, Issue 5, 1993, pp.503-534.

Siemens, G., 2014: Connectionism*:* A Learning Theory for the Digital Age [online]. International Journal of Instructional Technology and Distance Learning. [online] at http://www.elearnspace.org/Articles/ connectivism.htm (accessed 8 August 2016).

Slavin, R. E., 1996: *Research on Cooperative Learning and Achievement: What We Know, What We Need to Know*. Contemporary Educational Psychology, Vol 21 (1) Jan, 1996, pp. 43–69.

Spence, Muneera U., 2006: Graphic Design: Collaborative Processes = Understanding Self and Others. (lecture) Art 325: Collaborative Processes. Fairbanks Hall, Oregon State University, Corvallis, Oregon. 13 April.

StateUniversities.com, [online] at http://education.stateuniversity.com/pages/1885/ (accessed 8 August 2016).

Suto I., 2013: 21st Century skills: Ancient, ubiquitous, enigmatic? Research Matters: A Cambridge Assessment Publication. [online] at http://*www.cambridgeassessment.org.uk/*

Tinzmann, B. M., Jones, B. F., Fennimore, F. T., Bakker, J., Fine, C., & Pierce. J., 1990: *What is collaborative classroom?* What is collaborative classroom? [online] at http://methodenpool.uni-koeln.de/koopunterricht/The%20Collaborative%20Classroom.htm, (accessed 8 August 2016).

Totten, S., Sills, T., Digby, A., & Russ, P., 1991: *Cooperative Learning: A Guide to Research.* New York: Garland, 1991.

Webb, N. M., and Farivar, S., 1994: *Developing Productive Group Interaction in Middle School Mathematics.* In Cognitive Perspectiveson Peer

Learning, ed. Angela M. O'Donnell and Alison King. Mahwah, NJ: Erlbaum 1994.

Weiser, M. 1991: The computer for the 21st century. *Scientific American, 265*(3).

Wertsch, J.V., 1991: *Voices of the mind*. Cambridge, MA: Harvard University Press 1991.

ACADEMIC E-LEARNING DILEMMAS

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Abstract: *The paper pays attention to the most crucial problems connected with implementing and carrying out e-learning classes at the university. Problems related to preparing and conducting e-courses are especially referred to. There have been described crucial issues that need to be copped with while taking care for the quality of academic distance methodology. The subject matter of presented issues results from the author's numerous research results obtained during her professional responsibility as the manager of the team for the e-learning implementation at the University of Dąbrowa Górnicza.*

Key words: generation, education, academic e-learning

INTRODUCTION

Nowadays distance learning is experiencing its renaissance. It is happening thanks to the development of the Internet, which has opened new opportunities for education. In modern times distance learning is understood as a process of teaching and learning that is carried out in a situation when its participants are separated by a spatial distance. The process is implemented synchronously and asynchronously. The Internet is a means by which the obstacle of distance between the educational process participants is overcome. The network most important strengths which decide its special usefulness in the development of distance learning are as follows:

- possibility of using accessible information resources;
- possibility of sending information in various forms (multimedia transmission, multi-code transmission);
- speed of information transmission;
- interactivity (mutual communication with recognition of subjectivity of all participants of the communication process);
- accessibility 7 days a week and 24 hours a day.

Thanks to these properties, it is possible to overcome barriers and meet educational aspirations of people who function in locations that are distant from educational centers.

The term “e-learning” has obtained many synonyms, among which the most frequent are the following examples: e-education, remote education, teaching by network and many others. In this paper these notions, although they differ in their meaning, will be treated interchangeably because all of them refer to the network education.

Speaking about academic e-learning, we think about benefiting from distance learning courses that are placed on the dedicated e-learning platform. The method of implementing courses on the platform depends on many factors: (Figure 1) i.e.

- university distance learning implementation procedure, which is determined by the university development strategy;
- applied e-learning courses implementation model, which must be designed in such a way that the performance of educational objectives is optimal.

The final result determines many important issues i.e.

- university procedures referring to the quality of e-learning courses,
- acceptance of the e-learning courses model by academic teachers,
- method of creating and delivering e-courses

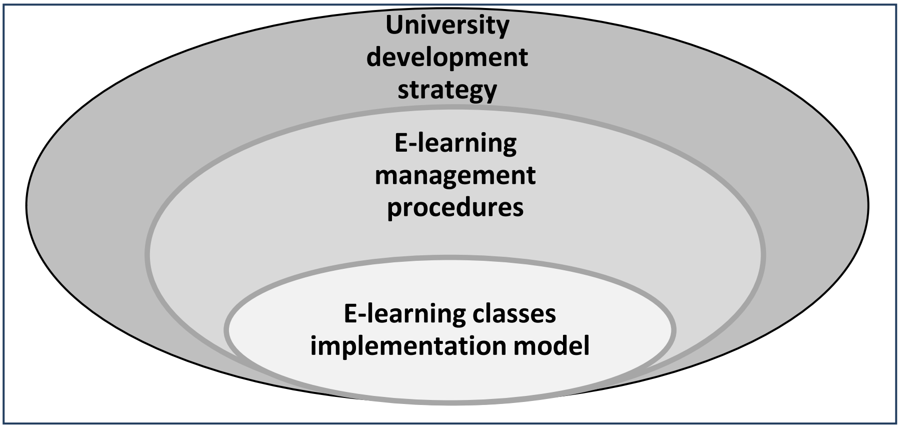

Figure 1. Structure of implementing e-learning classes at the university
Source: own study

Inclusion of e-learning classes in the university teaching process requires elaborating a separate case study in the form of a feasibility study. It constitutes a specific project of activities that takes into consideration the university specificity. The case study must follow the organization development strategy and must be the strategy’s inseparable element. On the basis of this, there should be defined procedures of distance learning classes’ management. The procedures are as follows:

- planning the scope of e-courses within the teaching process (a department responsible for arranging the process);
- administering the e-learning platform;
- cooperating with academic teachers in the scope of creating and delivering e-courses;
- implementing the quality of teaching procedures.

However, during the process of designing the e-learning classes model, apart from defining the structure of courses and adopting the convention that ensures the implementation of a teaching process in combination with the existing traditional forms of academic teaching, the following problems should be noted:

- to what extent do the existing rules of academic teaching implementation take into account the new actions strategies (learning, problem solving) that refer to the generation functioning in a digitalized world and how should the adopted so far organizational solutions change?
- in what way will the adopted new teaching model permit developing the potential of young people (creativity, time and knowledge management, ability to cooperate, ability to solve problems)?
- to what extent do the university classes prepare people for LLL-Life Long Learning in the digital world?

1. C GENERATION AT THE UNIVERSITY

Classical approach towards the implementation of a teaching process requires taking into consideration many integral components that interact with each other synergistically. There are among them the following elements: teaching objectives, content of education, applied forms and methods of teaching, teaching media as well as knowledge and assessment control rules. Their formulation and their rational selection have to ensure the achievement of educational outcomes in the form of defined competences. Apart from the above mentioned factors, planning the teaching process requires taking into account additional circumstances. They refer to participants who take part in the teaching process and the nature of an environment where these participants function. This knowledge determines the further design of the teaching process.

Knowledge concerning the action strategy, which has been created by young people within their computerized life, has become the key element. Owing to this, it is possible to understand mechanisms of learning which young people use, and to plan educational situations adequately in order to achieve the hierarchically top educational objectives. This knowledge is the elementary determinant that is applied to plan and undertake any actions connected with education (Bloom 1984; Niemierko 2002).

Civilizational change has resulted in creation of a new type of society. The modern generation of students is called the C generation (R. Friedrich, M. Peterson and others 2010). Researchers, while preparing the characteristics of such a generation, use three adjectives: *connect, communicate and change.* Young people, who were born after 1990 and who do not know the world without new technologies, conventionally belong to this community. These technologies are not new to them because they have accompanied them since they were born. These technologies have been around them and will always be (Morbitzer 2012). Most experts think that this group membership depends not on the age but on upbringing in the digital reality or on possessing features of "digital natives". It is possible to belong to a Y generation and to identify with the C generation. Differences probably result not from the date of birth but they are related to the moment when the Internet and social media have become an inseparable part of life of a given generation.

The characteristic feature of the C generation is constant experimenting and this way young people obtain knowledge and experience. Having access to many sources of information, young people often construct their knowledge about the world in a syncretic manner. Shaping their own identity, they search for balance, homeostasis, which gives them the feeling of security in a constantly changing world. It would be possible to assume that this eclectic approach to information constitutes the value that is based on openness to new solutions, creativity and innovativeness. However, without having the appropriate level of digital literacy, the effectiveness of activities in the framework of the network may be low.

Thanks to the continuous activity on the Internet, the C generation is characterized by the feeling of independence that provides the sense of autonomy, perpetration and control over individual actions, including learning. Such attributes as: the speed of information exchange, making decisions, multi-threading activities and resourcefulness constitute a derivative of a network activity.

Young people's active functioning in circumstances of a constant change causes the deprivation, and even rejection of existing traditional models of learning and problems solving. These models seem to be anachronistic and not adapted to present days. At the same time, very quick access to information, possibility of interacting and mobility as well as easiness in time and spatial boundaries crossing, which is very distinct for the cyberspace, favour creating new strategies of problem solving, encourage to cooperate, increase motivation to undertake various activities connected with creating own knowledge.

In view of the specificity of young people's functioning in a cyberspace, it is not possible to omit the above mentioned fact with reference to planning and constructing the teaching process. In a situation when the cyberspace has opened new opportunities for distance education, knowledge on the C generation is a very crucial factor for people responsible for designing the distance learning process. It is necessary to realize the differences referring to young and older generations functioning as well as to understand the mechanism of changes. This phenomenon was noted by Mark Prensky (2001) many years ago. He distinguished the generations of Digital Natives and Digital Immigrants.

The key task of education is preparing the young generation for functioning in the world, which we still do not know, which is being created and which will be created by young people. How young people will be prepared for this task and how education will fulfill its fundamental objective depend on the quality of work of the whole community of teachers and lecturers.

Unfortunately, applying information technology in academic education induces more often pejorative connotations. Undoubtedly, easy access to information, possibility of obtaining quick information exchange can foster the negative network behaviour such as: reproduction, plagiarism, superficial analyses or even fraud. Occurrence of such adverse phenomena encourages the academic staff to implement new methodological solutions that take into consideration the application of modern technologies into the teaching process. However, the dynamism of civilization transformations and expansion of new media in the society life induce nowadays the reflection concerning the academic education, especially in the field of methods and forms of teaching.

The modern teaching model that refers to the constructivist concept (Bruner 1987) clearly defined tasks belonging to students and teachers. Distance education perfectly follows this standard treating the e-course as a learning environment and assigning a teacher the education organizer objectives. At the same time the connectivist concept (Siemens, 2005), which underlines the human activity in a learning process via the network, strongly influences modern e-learning. It is possible to formulate a thesis that the major-related teaching outcomes obtained by students strongly depend on the adapted teaching model, including the distance learning, as well as on the active participation of students and academic teachers. More often within the higher education institution didactics, there appear elements of gamification or Project-Based Learning methods.

Organization of the distance learning depending on preparing strategies, procedures and a model of distance classes constitute challenge to university authorities as well as to the team responsible for the e-learning implementation and management of the distance learning process. However, there appears the most difficult problem, which is the preparation and management of e-courses because these activities require a direct involvement and high activity of the academic staff.

2. DESIGNING AND PROVIDING E-COURSES – CHALLENGES TO ACADEMIC EDUCATION - EVALUATION OF RESEARCH RESULTS

Thinking about academic e-learning, it is necessary to consider the model of academic classes implemented in this format at the very stage of designing them. Within most university solutions, blended learning is applied. This model matches advantages of distance learning and traditional instruction. At the University of Dąbrowa Górnicza three types of e-learning courses have been applied. They constitute exhancement of traditional academic forms of teaching and they are as follows: e-lecture, e-classes and e-seminar. They differ in their structure depending on educational objectives.

Adopting such a solution has been justified in some aspects:

- academic teachers and students are accustomed to the classic academic forms of teaching (lecture, classes, seminar);
- organization of a course of study and implementation of study fields standards.

Adopting such a model has enabled the gentle inclusion of e-learning classes into the university didactics.

The key significance for the teaching process effectiveness is provided by the concept of teaching objectives implementation as well as the concept of defined major-related teaching outcomes achievement in the framework of a given study course. So, the overarching objective is connected with the precise clarification: what changes have to be made in knowledge, abilities and attitudes of students with reference to key competences and a student's profile of a given study field (specialty) and in connection with National Qualifications Framework. The crucial fact should be emphasized. At the University of Dąbrowa Górnicza, although the general structure of an e-course has been defined, every academic teacher possesses possibilities of introducing his own original methodological solutions and deciding on the method of the e-course implementation. Work on the course is run with the cooperation with an e-course methodologist, whose task is to support and assist academic teachers.

The following assumptions have been accepted during the procedure of designing e-courses provided in the form of blended learning:

- e-courses should constitute an integral part of classes implemented in the framework of a given course, hence there is a need to extract a scope of a course content that is provided in the format of distance learning;
- the basis of a course is the preparation of a scenario that takes into consideration the division of a course content between both forms of teaching as well as the scenario should exactly define the course applied methods of teaching, methods of a course content presentation, a system of control and assessment of knowledge, moreover, interactions occurring among the complementary teaching process participants during traditional classes.

Methodological flexibility has been maintained while e-courses are designed. It is based on ignoring, in justified cases, the university's adopted e-course model. It depends on the model type. This exception involves the case of the implementation of such methodological solutions as gamification. Preparing e-courses for the C generation students is a big challenge to course creators. Functioning in Web 2.0 shaped in young people some expectations towards the method of presenting information that is accessible on the network. The key role is played by multimodality and a speed of information transmission as well as broad opportunities of interactions. Constructing a community of people learning via the network has caused the fact that nowadays we speak about the 2.0 e-learning, within which a person running classes, apart from making educational content available, opens the space devoted to a cooperation debate. It is expected that a person who runs classes will become a moderator and a trainer unleashing students' potential, who will inspire them to undertake effective actions and who will take care of the quality of education, motivate and support. Modern application of Web tools such as: an educational blog, RSS, bookmarking, screen casting, podcasting or a wiki environment within the academic education, significantly brings closer the academic didactic situations to the environment of the C generation functioning.

At the University of Dąbrowa Górnicza evaluation research is provided systematically among academic teachers and students who are involved in e-learning classes that are provided via the Moodle platform. The classes aim at researching the level of academic teachers' and students' satisfaction resulting from the participation in this form of teaching (stage I). Owing to obtained responses (feedback), it is possible to increase the e-courses quality systematically (stage II). All e-learning courses (e-lectures, e-classes, e-seminars) are submitted for evaluation. Elements of phenomenographic research are used in the research. They constitute an integral part of permanently implemented action research. In the academic year 2015/2016, the research conducted via the e-survey, which was addressed to students and academic teachers involved in e-learning, were carried out. The e-survey consisted of trigger questions, by means of which answers describing problems that usually accompany the implementation of e-learning classes as well as suggestions of these problems solutions were obtained. In this way, 26 academic teachers and 50 students, who were randomly selected and who represent all study fields at the Faculty of Applied Sciences, were researched. In view of the size of the paper, only chosen research results are provided.

3. E-LEARNING IN THE OPINION OF STUDENTS

Results of research conducted among the University of Dąbrowa Górnicza students entitle to formulate the following conclusions:

- It is essential to divide the e-course, which includes a specific range of learning content, into the so called "pills of knowledge". Students' time devoted to realization of separate modules should not exceed 20-30 minutes. Clear manner of formulating the learning content, its transparent schedule and presentation, have turned out to be very important for students.
- According to students the learning content included in an e-course should be presented in accordance with this content's nature. Hence, there is a

need to provide diversification in the content presentation (however, many forms of presentation of the same curriculum elements without specific justification should not be applied). Functioning in an image culture, students preferred the multimedia transmission in the form of screen casts and podcasts.

- Majority of researched students think that the most effective forms of motivation to study within an e-course are: referring to practice, applying the problem method and designing the appropriate activities enabling cooperation and discussions on optimal solutions. Presenting a problem i.e. in the form of a question or a task to fulfill aroused their interest, encouraged them to search for answers and created opportunities of individual learning. At the same time all these elements enabled cooperation. Such a form of classes helped increase the learning process participants' involvement. Consequently, students were able to reach higher stages of obtaining teaching objectives.
- According to students, the essential elements of e-courses are the interaction tools (problem forums, workshops, video conferences, webinars and others), which make it possible to exchange information among participants of a teaching process actively and multilaterally. They give opportunities to contribute to the content of an e-course.
- Students think that control and knowledge assessment are crucial elements of every e-course. In the case of e-lectures, control and knowledge assessment mainly provide the knowledge organization, focus attention on the most important problems and in consequence provide better exam preparation. However, during classes these elements provide the current and final control. According to the researched students, the waiting time for the task estimation provided by a teacher and obtaining feedback are important factors referring to the students' assessment. It should be noted that these elements of distance learning implementation impact essentially the dynamism of learning within an e-course. They mobilize participants to maintain regularity in the e-course implementation according to the established and adopted schedule of e-course classes. In order to ensure the highest effectiveness of e-courses, it is important to obtain students' approval referring to the rules of assessment. Clear and unequivocal definition of requirements and unchangeable rules of assessment during classes' implementation are golden rules.
- Planning studies within e-learning, and so, time management devoted to learning seem to be a big problem for all participants of the teaching process. Students think that possibilities of using the 24/7 platform may facilitate the learning process and make it more difficult at the same time. This way decreasing its effectiveness is observed. A good practice that is recommended to students is establishing their individual calendar consisting of a plan of convenient time devoted to the e-course tasks fulfillment with reference to the schedule presented by a teacher.

- Students' presented comments provide a very valuable research material enabling the improvement of the university adopted solutions in the scope of the academic e-learning. These comments constitute the exemplification of the C generation expectations.

4. E-LEARNING IN THE OPINION OF ACADEMIC TEACHERS

Usually the academic teacher responsible for the participants' work organization within the e-learning course is the key person. The method of distance learning implementation depends mostly on his competences. The fact that the e-course completion demands of academic teachers permanent improvement of their didactic abilities, including the cooperation with the e-learning methodologist as well as a platform administrator, is worth emphasizing.

In Poland the following models of creating and implementing the e-learning classes have been agreed:

- Lecturers prepare scenarios of the e-course implementation cooperating with an e-learning methodologist. Next, people responsible for the e-learning implementation create an e- course and position it on the platform (usually they are the workers of a unit managing e-learning). The course is run by a team consisting of a trainer (a person in charge of the coordination of students' activities) and a teacher (a consultant, a course supervisor.
- Lecturers use the platform with the implemented e-course editor according to the accepted model. They create and provide classes for students under the supervision of the e-learning center functioning at the university.
- Lecturers prepare e-courses on the basis of adopted standards; position them on the platform and conduct. All activities are fulfilled with the support of an e-learning methodologist and an e-learning platform administrator (solution accepted at the University).

All the presented solutions require academic teachers' preparation in the scope of methodology (construction and rules of providing e-courses), organization and technology (rules of the platform functioning, tools used to create an e-course, rules of the e-platform classes' implementation). It should be underlined that the introduction of e-learning into the university teaching process is a complex operation requiring special involvement of thoughtful actions. Preparing and running an e-course is a huge challenge to teachers. Their activity differs significantly from the one that occurs during providing classes by means of classic forms of academic teaching. Functioning in a created "virtual classroom", they are obliged to control and coordinate the work of students, to motivate, to inspire through solving problems, to assess, to encourage to be active and cooperative. The teachers' role changes in comparison to the one that results from the traditional academic teaching.

Changing the method of delivering classes as well as the specificity of a tool, which the e-learning platform is, require additional involvement of the e-course authors in the scope of acquiring new competences referring to preparing and running distance learning. These elements constitute the significant factor demotivating the implementation of e-learning classes. Understanding the essence of change referring to the method of running didactic classes, which take into consideration the cognitive and constructivist assumptions, was significantly difficult. Teachers participating in the implementation of e-learning courses clearly underline the fact that the teaching process in such a form is time consuming and laborious. However, over time, when teachers notice advantages of e-learning, they willingly undertake next challenges in this scope. The biggest expectations were formulated by them in relation to the university department that is considered to be an organizational, methodological and technical support.

CONCLUSION

E-learning courses implementation requires strategic planning because it constitutes the crucial element of academic teaching. The quality of conducted e-learning classes, similarly to regular meetings, influences the quality of education at the university. Implementing and improving this form of education enlarges the development of mobile technologies significantly. Dissemination of e-learning (mobile learning), has increased the universities' interest in all forms of Internet forms of teaching. However, shaping the educational process participants' new competences in the scope of teaching and learning is more important.

Unfortunately, due to the novelty of adopted methodological solutions, specificity of e-learning as well as requirements that this form of education has to meet, they have not already been enthusiastically accepted by the academic environment. It is a very inconvenient situation because expectations of the C generation towards the educational process, which is implemented via the network, as well as predictions referring to the education development on the basis of the Internet, clearly indicate the necessity to expand the distance learning teaching method.

Contemporary academic teaching is constantly changing. Modifications in the scope of forms and methods of education in the context of modern educational objectives are required. Application of modern methodological solutions such as: leading education, game-based learning, problem-based learning (Web Quest, case-study, design thinking) etc. They foster students' increase of interest in the learning process, motivate, teach the cooperation and "healthy competition" as well as provide auto-reflection and self-improvement.

It should be emphasized that the input and the scope of work, which must be involved in the preparation of a good e-course in accordance with adopted standards, usually exceed the academic teacher's possibilities. The most common mistake occurring in the academic environment is treating distance learning materials similarly to a multimedia presentation.

What is the direction of academic education? It is hard to say. Maybe soon university laboratories will see glasses that make it possible to move to a virtual world. Then the expanded reality will become universal. Maybe in lecture rooms devoted to provide demonstrations and simulations of various phenomena, holograms will be used and smart boards will replace the traditional ones (as it is at schools at the level of primary and secondary education)? It would seem that new technological and methodological solutions should enrich the academic methodology without redundant inertia. But on the other hand, it is not so clear. In the meantime universities will be entered by the C Generation.

Quality of academic distance education depends on many conditions. One of them is the issue of organization, including the most crucial procedures of e-learning functioning at the university. Also, the responsibility of individuals involved in the process of distance learning implementation, motivation systems, control of the course of procedures implemented according to the adopted strategy and finally the multilateral evaluation are crucial as well. Development of e-learning at the university requires also systematical innovative actions that would improve the opportunities of educational purposes feasibility.

It is possible to say that the variety of opportunities of the educational process organization in the digital world can make the modern educational process designers free from the negative impact of the technological determinism. This bold statement results from the fact that the variety of solutions with the application of modern technologies let us focus attention on teaching objectives (learning outcomes) and select such methods and tools, which enable to reach these goals, including the students' activities on the network. The abve mentioned conditions determine the selection of a course structure and its manner of implementation.

Referring to the research results conducted at the University of Dąbrowa Górnicza, it is possible to define the main areas that influence the academic e-learning quality. They are as follows:

- Selection of a platform enabling the effective implementation of educational objectives;
- Flexibility of distance learning forms that have been adopted at the university and that are integrated with traditional forms of academic teaching;
- Maturity and variety of methodology; permanent improvement of academic teachers abilities in the scope of modern methodological solutions (with reference to the constructivist and connectivist theories);
- Consideration of diversified forms of communication in e-courses on the basis of experiences obtained in social media; benefiting from ingenuity and inventions of the educational process participants;

- Management of distance learning processes; preparation and application of evaluation procedures; monitoring of learning systematically.

But cooperation of the e-learning classes' administration unit with e-course teachers and with students at every stage of the e-learning implementation is the most crucial.

Long ago we gave up the computer-aided education that was implemented on the basis of programmed teaching schemes. New technologies have created completely different opportunities of students' educational process implementation. Methods of including students' abilities into the e-learning teaching process depend on the general concept of e-learning implementation at the university and on lecturers' e-competences as well as on understanding the change and openness to new solutions. Conducted research confirms that students expect changes. They hope that suggested e-learning classes will meet standards, which they are accustomed to using the Internet every day.

REFERENCES

Bloom B. S., 1984: *Taxonomy of Educational Objectives Book 1: Cognitive Domain*, 2nd edition. Addison Wesley Publishing Company, ISBN 10: 0582280109 ISBN 13: 9780582280106

Bruner J.S., Haste H., 1987: *Making sense. The child's construction of the world*, New York: Methuen

Friedrich R., Peterson M., Koster A., Blum S., 2010: *The Rise of Generation C. Implications for the World of 2020*, Booz & Company, p. 2. [on-line] at http://www.itdl.org/journal/jan_05/article01.htm (accessed July 15, 2016)

Morbitzer J., 2012: *O istocie medialności młodego pokolenia,* NEODIDAGMATA 33/34 POZNAŃ 2011–2012 [on-line] at https://repozytorium.amu. edu.pl/bitstream/10593/10280/1/131-154.pdf, pp. 136-139, (accessed July 15, 2016)

Niemierko B., 2002: *Ocenianie szkolne bez tajemnic*, WSiP, Warszawa, ISBN 83-02-08284-8, pp. 29-51.

Pilch T., Bauman T. 2001: *Zasady badań pedagogicznych. Strategie ilościowe i jakościowe*, Wydawnictwo Akademickie „Żak", Warszawa, pp. 267-357.

Prensky M., 2001: *Digital Natives, Digital Immigrants*, By from on the Horizon (MCB University Press, Vol. 9 No. 5, October, (access: 15.07.2016)

Siemens G., *Connectivism: A Learning Theory for the Digital Age,* [on-line] at http://www.itdl.org/journal/jan_05/article01.htm, (accessed July 15, 2016)

III. E-LEARNING IN THE DEVELOPMENT OF THE KEY COMPETENCES

ICT-COMPETENCE OF UNIVERSITY TEACHERS IN PROFESSIONAL DEVELOPMENT AND SCIENTIFIC ACTIVITY

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Abstract: *The ongoing development of the higher educational system prompts university professors to use information and communication technologies not only in the educational process, but also in research and professional development, which has become a part of their professional competence. Many higher education institutions are in need of a new generation of skilled staff with high research potential, who are motivated to generate scientific innovation. Competent use of ICT improves pedagogical effect and boosts students creative potential. The paper reveals ways in which university professors use ICTs in their professional development and scientific activities.*

Keywords: ICTs, ICT-competence, university professors, scientific activity, professional development

Aided by the use of new computer technologies the teacher becomes increasingly important in the educational process, guiding students’ independent learning, consulting and assisting them. The effectiveness and efficiency of teachers' efforts are reached through fruitful collaboration with students and colleagues, due to teachers’ ability to interact in digital environment, to carry out the selection, structuring and evaluation of information required for a wide range of educational needs.

To effectively use information and communication technologies in their work, teachers should know and be able to analyze all existing and emerging e-learning means (electronic textbooks, encyclopaedias, virtual laboratories, integrated learning environment); be able to work with these tools, select the software that will provide optimal processes of presenting course material and managing their teaching. Compared to traditional technologies, information and communication technologies have significant advantages in scientific activity and professional development because they allow to automate the process of gaining, structuring and applying the course material, owing to the interactivity of many electronic aids; ICTs also permit to access and handle large amounts of information, develop information culture, teach students to find and use different types of information, which is one of the most important skills in the modern world etc.

THE ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Aspects of ICT use in education have been the subject of many scientific publications of leading researchers. In particular, we should mention the papers of Bezpalko V., Zhaldak M., Zimin A., Ershov A., Kozlakova I., Kozyar M., Mashbitsa Yu., Monakhov V., Morze N., Rakov S., Ramskoy Yu., Talyzina N., Shkil M. et al..

Scientific perception of the nature and value of information and communication competence of the teacher in a modern university was carried out in papers of the following scholars: Makarenko A., (Makarenko 2013), Vasilenko S. (Vasilenko, Kirda 2014), Konevschinskaya J. (Konevschinska 2014), Oros B. (Oros 2015), Ovcharuk O., Gurzhiy A. (Ovcharuk, Gurzhiy 2013) et al.

ICT competence is considered as a component of professors' professional competence (Didukh 2012), moreover, it is increasingly seen as a prerequisite for further professional growth (Kuzminska 2012).

It is also stressed that current level of ICT competence is the main barrier to full implementation of ICT technologies in higher education. Here the author argues that professors should not only be competent to use the available ICTs but also become the developers of their own learning aids (Oros 2015).

Thus, Makarenko A. examined the conditions behind the formation of basic ICT competencies of teaching staff in higher educational institutions of Ukraine and concluded that teachers under the age of 40 attained the highest level of ICT competence while in age group 51-60 years and above have the lowest one, due to lack of computer training during basic education (Makarenko 2013). Chernikova L. argues the need to introduce a regional model of formation and development of teachers' ICT competence, which consists of motivation-oriented, organizational, procedural and evaluative-effective components. Vasilenko S. researched into aspects of SMART Notebook software for the management of a learning process in the form of interactive classes and highlighted the main points in favour of the use of SMART Notebook for the creation of monographic teaching resources (Vasilenko, Kirda 2014). Konevschinskaya O. confirmed methodological approaches to the formation of the ICT competence of tutors and to the determination of its levels for the effective functioning of resource centres within distance learning departments of universities (Konevschinska 2014).

With the utmost importance of ICT competence for professors, it is still crucial to develop adequate standards for it on various levels of educational system (Ovcharuk 2013).

In this respect we were particularly enriched by the scientific developments of N. Morze (Morze, Kocharian, Varchenko-Trotsenko 2014; Morze, Varchenko-Trotsenko 2014; Morze, Kocharian 2014), dedicated to the analysis of various aspects of information and communication competence of university teachers. In particular, of special importance was the interdependence between quality of educational environment and the level of ICT competence of research-academic staff; besides, the articles discuss the model of corporate standard for ICT competence of research-academic staff, instruments to measure ICT competence of masters and the methods of integration of ICTs into the educational system; the articles also describe in detail the ways to apply webinar-oriented platforms for professors' advanced training.

Among the foreign researchers significant contribution to the development of this aspect was made by the following researchers: K. Denek, B. Siemieniecki, M. Kus, M. Zajac, R. Parzęcki, D Williams, E. Smyrnova-Trybulska (Smyrnova-Trybulska 2007; 2012) et al.

However, despite huge scientific interest in the role of ICTs in modern education there is a trend among scientists to focus attention mainly on advantages and disadvantages of using ICT in teaching students. In this analysis of the role of information and communication technologies in science and further professional development of teachers has not produced such wide discussion, thus we can state the lack of attention of modern researchers to this aspect. All this confirms that the study of existing and potential advantages of ICTs in teacher training gives you the opportunity to discover new perspectives on improving the quality of higher education and the integration of Ukraine into the world scientific and educational environment.

The objectives of the paper. The purpose of the article is to analyze the existing situation in the field of shaping ICT competence of a university teacher and the scope of use of information and communication technologies in the scientific activity and professional development of scientific and teaching staff. For more detailed analysis of this issue we carried out a sociological research to determine the scope of use of information technologies in science, means of integration of scientific and teaching activities, the assessment of teachers' activity in electronic environment, the advantages, problems and motives, slowing the introduction of e-learning technologies in teaching. This study was carried out in the framework of 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», financed by the European

Commission under the 7th Framework Programme, within the Marie Curie Actions International Research Staff Exchange Scheme. Project participants are universities from Poland, the Netherlands, Portugal, Spain, the Czech Republic, Slovakia, Australia, Ukraine and the Russian Federation. One of the Ukrainian representatives in this project is Dniprodzerzhinsk State Technical University (DSTU).

Selecting DSTU as an object of study is due to the fact that its characteristics represent it as an average university of Ukraine, which allows to apply the research results to a wide range of technical universities of Ukraine.

The sociological study was conducted with the help of a special questionnaire which was suggested to teachers and heads of structural divisions of DSTU in May 2015. The survey involved 53 employees of the University, of which 89% were scientific and teaching staff (59% - associate professors, 26% - teachers, 4% - full professors) and 11% - heads of departments. The results of empirical research allow to make some conclusions about the peculiarities of teachers' use of ICTs in scientific and professional growth.

The hypotheses of the study:

1. Teachers often use special information search systems to find scientific information.

2. The most common way of integrating research and teaching is live presentation in the classroom about current scientific research.

3. Teachers use electronic media to find information useful for professional development.

4. The greatest impact on the introduction of e-learning in teaching is teacher training in the field of ICT and e-learning

Statement of research material. First of all, in our study teachers were given the opportunity to evaluate different aspects of ICT use in their research (Fig. 1). As a result, it was found that the largest number (26.3%) of teachers indicated that they use special information search systems to look for scientific information. Also, a large number of DSTU employees use ICTs in their scientific work to participate in conferences and electronic workshops (22.4%), they use ICTs as well to search for the information and to learn about current developments of foreign and Ukrainian scientists in scientometric and abstract databases (19.2%).

However, it should be noted that teachers use ICT the least in order to maintain their electronic portfolio (1.3%), to manage activities of the scientific community (1.3%), to participate in online research communities and international research networks (1.3%).

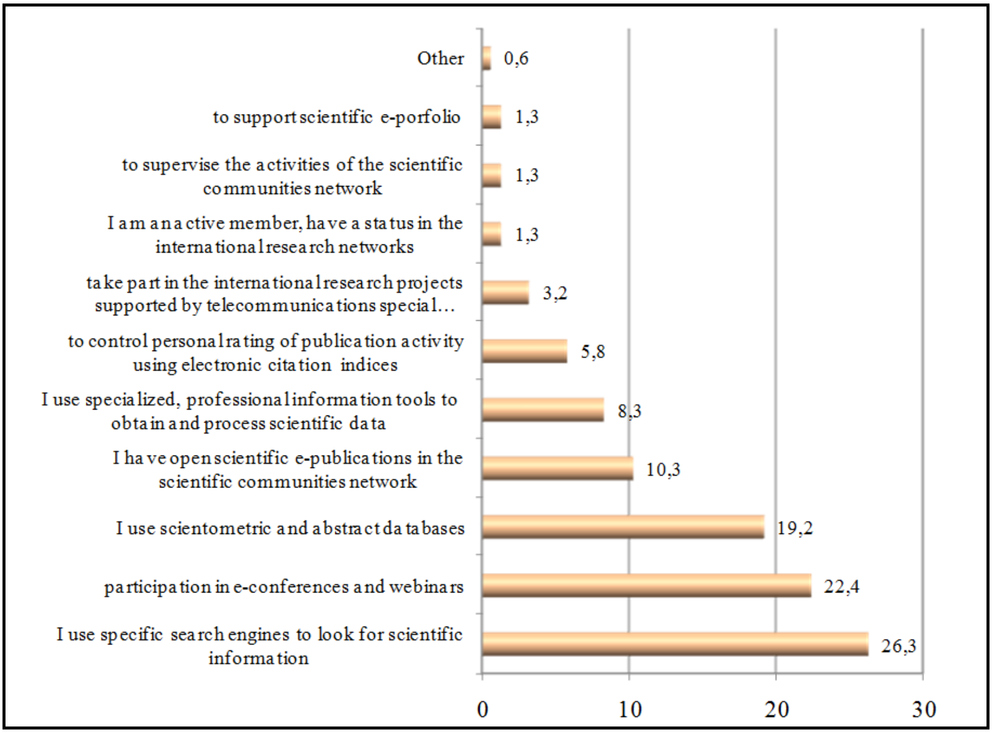

Figure 1. Professors' use of information technologies in research activities (%)

Source: Own work

In 2014, a new law "On Higher Education" was adopted in Ukraine, according to which the scientific component of teachers' obligatory workload grew in amount. Scientific, scientific-technical and innovative activity in higher educational institutions as an integral part of the educational activities and is carried out with the aim of integrating the scientific, educational and manufacturing activity in the higher education system. At the same time the implementation of scientific and technical activities by universities, academies and institutes is mandatory. The subjects of scientific activities are research and academic staff, other employees of educational institutions and students of these higher educational establishments. The main purpose of scientific, scientific-technical and innovative activity is to gain scientific knowledge through research and new developments and use their potential for the creation and implementation of new competitive technologies, types of equipment, materials, etc. to provide innovative development of society, to train future experts of innovative fields (On higher education 2014).

In this regard, it was wise to identify the ways in which teachers can integrate the results of research and teaching activities. As a result it was found that most of the teachers talk about the actual scientific studies during lectures (30.8%). Besides, teachers provide students with references to scientific publications as additional sources of information (23.9%); together with their students teachers take part in scientific conferences, students' scientific communities and networks (23.1%) and offer students (mostly Master students) tasks, based on materials from scientific databases, open scientific publications and scientific conferences (19, 7%). It is worth considering that only a very small part of professors use their own teaching resource (e-portfolio) - 2.1%.

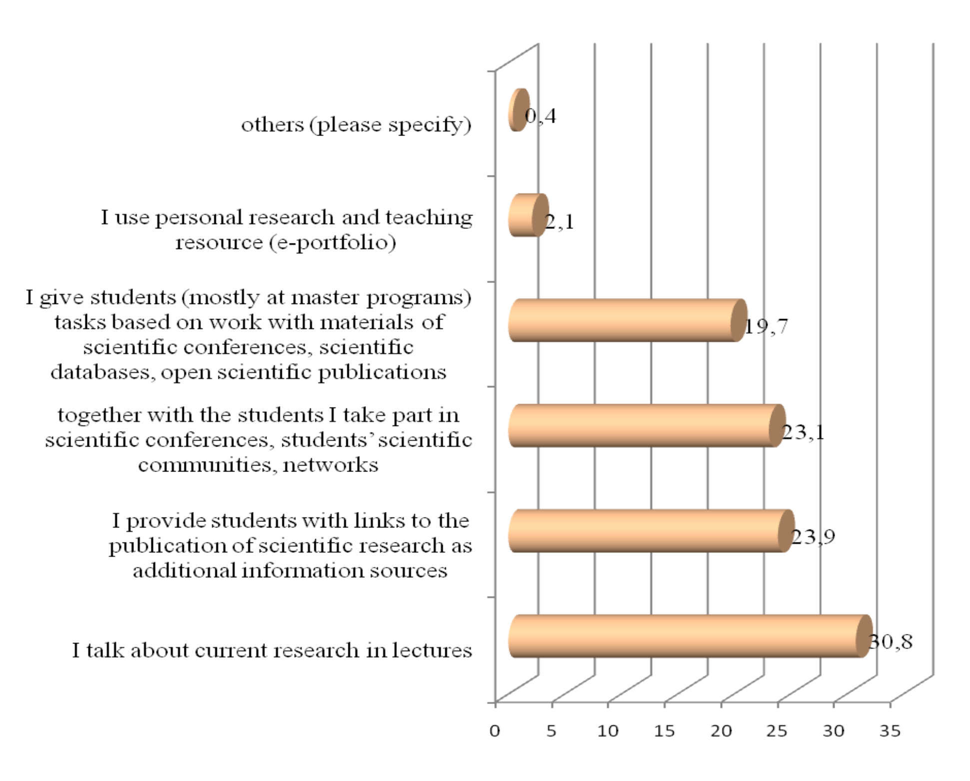

Figure 2. Ways of combining research and teaching activities (%)
Source: Own work

In this connection we should pay special attention to the use of electronic portfolios by modern Ukrainian scientists and educators. The results of the study show that DSTU professors do not attach much importance to this issue, compared to leading universities. In our opinion, it is determined, above all, by the lack of university regulations and rules about their creation and further management. The portfolio enables students and university leaders to evaluate the professionalism and efficiency of teachers' work during the attestation of academic staff. At the same time, electronic portfolio is a significant support for teachers when they independently analyze, summarize and structure results of their work, besides, when they objectively assess their capabilities and plan actions to overcome the difficulties and achieve better results.

The **main advantage of the portfolio is the ability** to demonstrate in open access mode to all the interested the most significant results of practical activities to assess professional competence. These results are:

– teaching activities and its methodological support (developed e-learning courses, teaching and learning materials, curricula);

– supporting creative and athletic achievements of students (participation in competitions and contests);

– professional development (advanced training, international creative and sporting activities, registration of copyright, grants, awards, scholarships);

– scientific publications (monographs, articles in the Scopus' database, articles in specialized journals, scientometric and open databases, textbooks, manuals, articles in collections of conference materials and other publications);

– citation index of open publications (bibliographical indices, h-index, i10-index);

– participation in international and national research projects;

– scientific school (Morze, Varchenko-Trotsenko 2014).

Thus, a professional electronic portfolio can be a professional asset for teachers, especially when it is well-made and serves many users' purposes. Portfolio is an open proof of what exactly the professor is working on, what his professional and scientific achievements are, which becomes relevant during attestation and expert review of professor's contribution during the awarding of academic rank or competitive selection.

The validity of such an interpretation is confirmed by universities employees, assessing their own actions in an electronic environment, aimed at professional development and further training. The analysis of hierarchical distribution of responses (Figure 3) allowed to state that the creation and improvement of individual professional portfolio as a factor of influence on professional development takes only the second place in popularity (only 13.7% of respondents), with a considerable gap from the first place – where 47.1% of the respondents opted for the search of information, useful for professional development.

From this we can conclude that not all teachers understand the significance and the importance of creating and maintaining a professional portfolio in electronic form, and those who understand it consider it highly labor-intensive and time-consuming, the time for the development of a portfolio could more rationally be used to prepare for the classroom training with students, to get new relevant information in libraries and on the Internet, to write scientific articles and for further professional development of teachers.

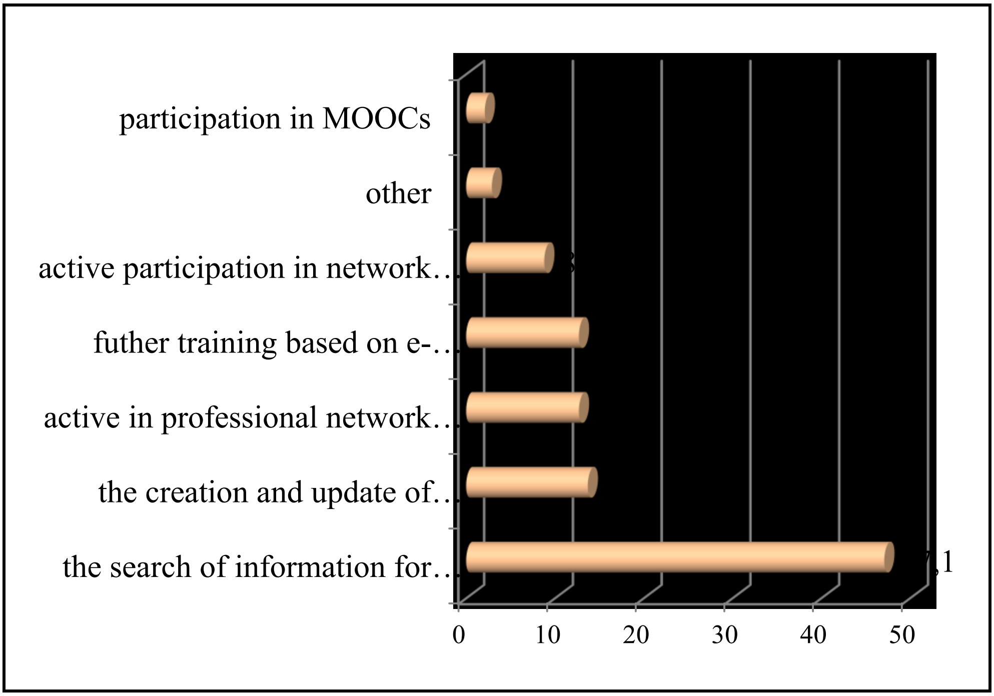

Figure 3. Evaluatıon of onlıne actıvıtıes for professional growth and further training (in %)

Source: Own work

As can be seen from Fig. 3, 12.7% of our respondents feel comfortable using e-learning for further training and the same number of respondents actively participate as observers in online discussions and debates, 25.4% in sum. At the same time, participation in massive open online courses rightly occupies the last place in the ranking of the respondents - only 2.1%. In our opinion this is due to the specifics of Ukraine: Ukrainian professors simultaneously wish to improve their professional skills from the comfort of home, where they can access information in the Internet and at the same time many required courses remain inaccessible for them due to their high cost and professors' poor knowledge of the English language. An important impetus to fill the vacuum in the knowledge of English among teachers was the adoption of new regulations on awarding scientific degrees in August 2015.

It ruled that to assign the title of professor and associate professor a candidate should have a certificate in accordance with Pan-European guidelines for language education (at B2 level or above) or qualification documents associated with the use of the English language.

Our objective was also to see how the processes in the information environment influence the implementation of e-learning in teaching and almost one third of the teachers evaluated very positively, namely with 5 out of 5 points, the training on ICTs and e-learning for teachers (Table 1).

Although the comparative analysis of positive (4 and 5 points) and negative (points 1 and 2) evaluation showed that negative evaluation is slightly higher on the whole (43.4%) than the positive one (39.6%). Many researchers attribute this to the age characteristics of the teaching staff and the need to develop a special program on computer literacy for elder professors.

At the same time it may result both from low level of computer training, and from poor technical conditions for the use of internet resources in teaching. It should be noted that in Ukraine in general and in the city of Dniprodzerzhinsk in particular, there is a successful program to support the competitiveness of workers on the labor market for vouchers obtained in

Table 1.

The influence of processes in the information environment on the implementation of e-learning in teaching (in %)

Effects in the information environment	Mark				
	1	2	3	4	5
Teacher training in ICTs and e-learning	20,8	22,6	17	7,5	32,1
The fact, that other professors widely use distance learning instruments and e-learning tools	15,1	24,5	30,2	11,3	18,9
It is a common practice in the university to evaluate professors' performance and their use of distance learning techniques	28,4	18,7	30,2	9,4	13,3
I can see the results, that I can not obtain without the use of these technologies	22,7	18,7	9,4	20,8	28,4

Source: Own work

the territorial bodies of the State employment service. The program provides a one-time free training in ICT for people with higher or vocational education, aged 45 and above till retirement, whose insured service within the institution is 15 years and more. Every year this program is becoming increasingly popular among teachers of Dneprodzerzhinsk State Technical University. This program has been around for three years and if in 2013 the retraining course in Software Engineering attracted only 5 employees of the University, according to data for 2015 the same program already has 14 students. Nevertheless, the question of a more differentiated approach to such training and more profound training on the use of ICTs in pedagogical activity is still relevant. All this proves that the academic staff of higher education sector acknowledge the usefulness and the need in continuous improvement of their knowledge in the field of ICTs, which will enable them to proudly meet current challenges from the information environment to their professional activities.

All the above mentioned is confirmed by further analysis of Table 1, as most teachers do see results that cannot be obtained without the use of ICTs. It is exactly this effect that gained the biggest amount of positive feedback (49,2%), while the negative one gained only 41.4%. The medium feedback (mark 3) was given by professors to the effect that other professors are widely using distance learning technologies and e-learning instruments (30.2%) and the common practice in the university to evaluate professors' performance and their use of distance learning techniques (30.2%).

It should be noted that in modern conditions the formation of ICT competence of teachers is an urgent problem, since it is exactly teachers' proactive approach to their duties that helps prepare students to live in a modern society, thoroughly permeated by information technology. Creative teachers seeking to keep pace with the times, should explore the possibilities of ICT use and implementation in their practice, guide their students in this world of new technologies and shape their information literacy. The teachers, skilfully and effectively dealing with technology and information, have different, new way of thinking, fundamentally different approaches to the assessment of emerging problems, to management of their own work, and a more up-to-date approach to teaching students. Due to constant increase and acceleration of the information flow teachers need to keep track of innovation in all spheres of public life and stay in touch with students to update the content of education and to ensure the rapid exchange of information between the participants in the educational process. All this can not be done without the use of ICT in the process of learning. This teacher does not only constitute, promote and educate students, but with the introduction of new technologies he has a powerful incentive for self-education, professional growth and creative development.

CONCLUSIONS

Thus, the analysis in this study showed that necessary conditions for effective and systematic improvement of teachers' ICT competence are motivation (both internal and external), the need and the willingness of the teacher to conduct classes using ICT, recognized transfer of theoretical knowledge and developed skills into practical teaching. ICT competence of modern teachers is one of the most important indicators of their professional performance and at the same time a prerequisite for further improvement of their professional competence, which prompts the development of in-service ICT-enhanced advanced training of modern teachers.

As a result of verification of the main hypotheses they have been confirmed.

1. The majority of teachers most often use special information search systems of scientific data for their research work - 26.3% of respondents.

2. The most common way of integrating research and teaching is a story in the classroom about the current research. This is evidenced by 31% of the surveyed teachers.

3. Most of the teachers (in our research - 47%) use electronic media to find information, useful for professional development.

4. Teacher training in the field of ICT and e-learning has the greatest impact on the introduction of e-learning in teaching which is confirmed by 39.6% of teachers.

Prospects for further research. In connection with the above, the authors of this work see prospects for further scientific research on the problems of formation and improvement of teachers' ICT competence in the theoretical-methodological and scientific-expert provision of relevant processes of updating legal, organizational and motivational components, and in further research on the development and implementation of distance learning system and enhancing ICT competences of teachers and students.

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REFERENCES

Didukh L.I., 2012: *Information-communication competence of a professor. Problems and prospects of training for humanitarian-technical elite*. Coll.of scient. papers. Ed. by Tovazhniankiy L.L., Romanovskiy O.G. Kharkiv, NTU "HTU", 2012, Iss. 32-33 (36-37), P.152-161

Konevschinska, O.E. 2014: *Formation of ICT-competence of tutors within resource centres of distance learning. Information technologies and means of education*, 2014, Vol. 42, Iss. 4, P. 20-32, [online] at http://www.nbuv.gov.ua/UJRN/ITZN_2014_42_4_4, (accessed 20 May 2016) [In Ukrainian]

Kuzminska O.G., 2014: *ICT-competence of a professor in a contemporary university. Scientific researches and their practical application*. Modern state and ways of development. SWorld 1-12 October 2014. [online] at http://www.sworld.com.ua/konfer36/409.pdf, (accessed 30 May 2016) [In Ukrainian]

Makarenko, A.Yu., 2013: *Personnel aspects on the problem of formation of professors*' ICT-competence. Scientific treasury of the Donetsk education, 2013, № 1, P. 82 – 89, [online] at http://www.nbuv.gov.ua/UJRN/Nsod_2013_1_22, (accessed 1 April 2016)

Morze N.V., Kocharian A.B., Varchenko-Trotsenko L.O., 2014: *Webinars as a means of improving professors' excellence*. Informatics and information technologies in educational institutions, 2014, Vol. 42, Iss. 4, P. 118-130. [online] at http://www.nbuv.gov.ua/UJRN/ITZN_2014_42_4_13, (accessed 20 May 2016)

Morze, N.V., Kocharian, A.B., 2014: *Model of standard for the ICT-competence of university professors in view of improving the quality of education*. Information technologies and means of education, 2014, Vol. 43, Iss. 5, P. 27-39. [online] at http://www.nbuv.gov.ua/UJRN/ITZN_2014_43_5_5. (accessed 20 May 2016) [In Ukrainian]

Morze, N.V., Varchenko-Trotsenko L.O., 2014: *E-portfolio as an instrument of measuring the results of modern university professors' academic performance*. Information technologies and means of education, 2014, № 5, P.36-41. [In Ukrainian]

"On higher education": the law of Ukraine from 01.07.2014 No 1556-VII. - [online] at http://www.zakon0.rada.gov.ua/laws/show/1556-18, (accessed 14 April 2016) [In Ukrainian]

Oros, V., 2015: *The formation of professors' ICT-competence in the context of life-long learning*. New Pedagogical thought, 2015, №2б, P. 204-206. [online] at http://www.nbuv.gov.ua/UJRN/Npd_2015_2_50. (accessed 5 June 2016) [In Ukrainian]

Ovcharuk O.V., 2016: *Information-communication competence as a subject of discussion: international approaches*. Computer in family and in school, 2013, №7, P.3-6. [online] at http://nbuv.gov.ua/UJRN/komp_2013_7_2, (accessed 14 April 2016) [In Ukrainian]

Ovcharuk, O.V., Gurzhiy, A.M., 2013: *Polemic issues of information-communication competence: international approaches and Ukrainian prospects*. Information technologies in education. Collection of scientific papers. Iss. 15, Kherson, KSU, 2013, P. 38-42. [In Ukrainian]

Smyrnova-Trybulska, E.N., 2007: *Bases of formation of information competences of teachers in the field of distance learning*. Monograph, Kherson: Ailant, 2007, 704 p. [In Russian]

Smyrnova-Trybulska, E.N., 2012: *Some aspects of informatization of higher education in a number of central European countries*. Scientific herald of NPU named after M.P. Dragomanov. Ser. №2. Computer-oriented educational systems: Coll. of scient. papers. Ed. board. K., NPU named after M.P. Dragomanov, 2012, № 13 (20), P. 53-66. [online] at http://www.enpuir.npu.edu.ua/handle/123456789/3399, (accessed 14 April 2016)

Vasilenko, S.V., Kirda, A.V., 2014: *Smart Notebook as a means to develop research competence*. Information technologies and means of teaching, 2014, Vol. 41, Iss. 3, P. 142-150 [online] at http://www.nbuv.gov.ua/UJRN/ITZN_2014_41_3_15, (accessed 20 April 2016) [In Ukrainian]

E-ASSESSMENT IN MEDICAL EDUCATION

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Abstract: *In education, assessment is a continuous process which may perform numerous functions, such as diagnosing, supporting, motivating, controlling or summarising. As a continuous process, assessment takes time, and therefore, where possible, it is replaced by e-assessment. In medical sciences, theoretical knowledge is often assessed using electronic tests based on multiple choice questions. However, the method of preparation to this type of exams and the mere filling of the test form may be problematic for students. Given the above, the authors have decided to monitor the students' approach to the online tests in order to eliminate or correct any arising problems. This document presents the results of surveys taken in the academic years 2014/15 and 2015/16.*

In addition, the article shows the role of formative and summative evaluation in e-assessment as well as the need to apply standards for the development of assessment tools and systems. Even with many advantages, the e-assessment is still rarely used, mainly due to a large load of work and measures at the first implementation stage, as well as the lack of preparation of the academic staff. Therefore, in the authors' opinion, the popularisation of good practices may contribute to improvements in this field.

Keywords: assessment, e-assessment, summative assessment, formative assessment, medical education, MCQ exams, e-examination, e-assessment standards, distance education

INTRODUCTION

Assessment has always formed an integral and important part of education, particularly in formal education. Presently, assessment is not limited to the final evaluation issued at the end of the course (summative assessment), but may play a monitoring and controlling functions in the education process (Boud 2000). As this is a repetitive and time-consuming process, it more and more often takes the electronic form, especially in academic education. In this case, we talk about e-assessment.

Robert Clarisó (Caballé, Clarisó 2016: 73) define the e-assessment as:

e-assessment, which is also known as online assessment, is the continuous electronic assessment process where information and communication technology is used for the presentation of assessment activity, and the recording of responses.

Crisp (2007) classifies the e-assessment into diagnostic, summative and formative assessment, based on the learning stage where the evaluation is conducted. Diagnostic test is a test that evaluates the current knowledge prior to taking the course, which allows to establish the requirements and the scope of educational activities for a particular student. Formative assessment is used as support in the teaching and learning processes. It provides teachers and students with information on the students' current achievements as well as their strengths and weaknesses. Furthermore, the information is provided in such a form as to determine what the teacher or student should do next in order to improve the process. Formative assessment may also be motivating for students, as it shows their competence level, often against a background of the entire group, which allows them to track their learning progress. Summative assessment is the assessment given at the end of the course to evaluate the students' knowledge or skills and to issue an appropriate certificate.

Formative assessment uses various tools to achieve the teaching goals (Ridgway, McCusker, Pead 2004). Diagnostic and formative assessments may help increase the teaching efficiency. Cook and Jenkins (2010) emphasize the important role of such e-assessment constituents as: immediate feedback, objective evaluation and a wide range of tasks and activities. Apart from the advantages, we can also mention the disadvantages such as: required Internet access or user identification, but the main barrier is still the need to educate the academic staff in the field of e-assessment.

There are also issues related to the applied software. E-assessment greatly depends on the systems and tools used. Most tools for test creation are based on MCQs (multiple choice questions), true/false, short answer, and fill in the blanks questions (Marriott 2009, Pachler, Daly, Mor, Mellar 2010). They are great at testing your factual knowledge but can't be directly used to test practical skills (Gruttmann, Böhm, Kuchen 2008).

1. E-ASSESSMENT

On the one hand, e-assessment offers a range of benefits in improving the process of learning, and on the other hand – a reduced workload for the teachers and administrators. The main benefits in the e-assessment process include the elimination of time and space restrictions existing in the case of paper or face-to-face exams, as well as time savings during individual monitoring of students. At the same time, the immediate feedback allows for a genuine formative evaluation.

E-assessment usually takes the form of electronic tests. The most popular types of tests include:

- *Placement tests*, which allow to determine the initial level of students' knowledge or skills in order e.g. to classify them into appropriate learning groups.
- *Diagnostic tests*, which have been developed to catch the students' shortcomings during an academic semester or year.
- *Progress tests*, used to establish if the students have mastered the studied material. If not all the results exceed the required threshold, the teacher should determine the reason and try to eliminate it.
- *Achievement tests*, used to check whether the student has achieved the course objectives. Such tests are carried out at the end of the course and cover the entire material. They should be analysed very thoroughly in order to specify the strengths and weaknesses of the syllabus.

E-portfolio is a tool aimed at supporting the students in tracking their own progress. It allows the students to become familiar with their achievements and deficiencies, and enables the teacher to get a full digital image of the student's progress and output. This assessment method is time-consuming for large group but it allows teachers to analyze the progress by comparing the students' initial works with subsequent ones, not only by collating the grades.

1.1 Formative e-assessment

Formative assessment is the most popular in higher education and may include most of the teacher's evaluative methods. This type of assessment is used during the learning process and provides the teacher with information required to adjust the teaching methods, if necessary (Gage, Berliner 1998: 529). This category includes progress tests and diagnostic tests. Students must be informed of the evaluation results as soon as possible. The method is very well received if the test results are analysed by the teacher, and the style or contents of the course are changed where necessary. This is called *washback effect* (Heaton 1990:16). It is the most beneficial if the formative assessment is a continuous process which, thanks to the teacher's and students' efforts, contributes to the development of the teaching curriculum and to the preparation for the other type of assessment – summative assessment.

Two aspects are important in the formative assessment: appropriate choice of evaluation time and the feedback. This type of assessment may have a large impact on the current method of learning, and feedback may be used to improve the results achieved by the students in the summative assessment (Crisp 2011). Formative assessment allows the students to become more aware of their capabilities and supports self-education.

Black and Wiliam define five key strategies (Black, Wiliam 2009) of the formative assessment process:

- *engineering effective classroom discussion, questions, and learning tasks that elicit evidence of learning;*
- *providing feedback that moves learners forward;*
- *clarifying and sharing learning intentions and criteria for success;*
- *activating students as owners of their own learning; and*
- *activating students as instructional resources for one another.*

Formative assessment affects all the students and may increase the overall level of the group. The authors highlight the importance of timely and constructive feedback, which may positively motivate the students to effective learning (de Bruyn, Mostert, Schoor 2011).

1.2 Summative e-assessment

The main difference between the summative and formative assessments lies in their objectives. The goal of the summative assessment is to give a value, and therefore it is often quantitative, while the formative assessment is qualitative. Sometimes it is used in the middle and/or at the end of the learning period, to determine the degree in which the curriculum has been realised. Examples of such assessment may be electronic achievement tests or final exams. Summative assessment plays an important role in the determination of the final grade for a given subject/course, and at some universities it may constitute even 60% of the credit. Both assessment categories (summative and formative) are essential and complementary to each other. If the summative assessment proves that the majority of the group did not achieve the level established by the teacher, it means the formative assessment had not been planned in an appropriate manner (Heaton 1990). For this reason, the diagnostic tests should not be conducted at the very end of the semester; otherwise it will be too late to introduce any changes to the teaching process. Many academic teachers forget about the role of formative assessment in education, focusing only on the summative assessment.

1.3 E-assessment standards, systems and tools

Similar to e-learning, in the e-assessment it is important to have the possibility of exchanging data, share the resources and cooperate between different education systems. A range of standards have been developed to achieve this. The conformity with standards at the stage of planning and implementing the tools and systems ensures their interoperability, reusability, accessibility and durability in e-learning and e-assessment systems. To date, many standards and specifications have been developed, which (to a smaller or larger extent) were implemented in common practice. For example, LOM (Learning Object Metadata), SCORM (Sharable Content Object Reference Model), IMS QTI (Question and Test Interoperability), IMS LIP (Learner Information Package), IMS LTI (Learning Tools Interoperability) are recommended for e-assessment systems. Let us focus on two popular standards.

SCORM is a collection of standards and specifications designed by ADL (Advanced Disitributed Learning Initiative, https://www.adlnet.gov/adl-research/scorm/). Educational material along with metadata is archived in a single file (format ZIP), which enables automation of the publishing process. Contemporary LCMSs (Learning Content Management System) use integrated procedures for unpacking the ZIP file, and then activate their own modules for metadata analysis and materials presentation based on the analysis result. The SCORM standard also includes tests contained in the package. The LCMS database receives the total score obtained by the student by marking the correct answers. It is a simple and interesting opportunity to transfer ready, closed tests between different LCMS applications (Bohl, Scheuhase, Sengler, Winand 2002). No additional adaptation is required. At the same time, it should be noted that the SCORM content interpretation modules automatically format a range of graphic layout components, and therefore the teaching material may look differently in various LCMS version.

IMS QTI is a standard of sharing the tests and data acquired in the e-assessment process. It defines the data structures which guarantee the interoperability between questions and tests systems (IMS Question & Test Interoperability Specification, https://www.imsglobal.org/question/index.html). Furthermore, QTI version 2.0 allows for the creation of different types of questions, such as: multiple choice, ordering, association, union, fill in the blanks, essays, hotspots, object positioning, and painting. The use of XML to describe the tests enables their use on different types of equipment, such as: desktop computers, laptops and other mobile devices. The use of tools supporting the standards is necessary to integrate the e-assessment systems with the LMSs (Learning Management Systems).

The main objective of the e-assessment systems is to monitor the student's learning progress. The system must enable evaluation using different types of questions, immediate feedback, automatic assessment, calculation of weighted average grade, quiz customisation, statistical analysis of the results, reduction of fraud risk by randomizing the questions, and the use of timers. Such systems are mainly developed in academic centres and they are usually not open-source tools. Examples of assessment systems:

ACME is a web-based e-learning tool developed by the University of Girona targeted towards formative assessment, improving the teaching and learning of mathematics studies in Industrial Engineering and Engineering. The system is not an open-source tool (Caballé, Clarisó 2016:77).

TRAKLA2 developed using Java by the Department of Computer Science and Engineering in Helsinki University of Technology. The system is an environment for learning data structures and algorithms using simulations, which can be automatically graded (Caballé, Clarisó 2016:78).

Additionally, there are many different types of tools being useful in the e-assessment process in distance learning, e.g.: SCHOLAR (Heriot-Watt University. SCHOLAR http://courses.scholar.hw.ac.uk/vle/scholar/session.controller?action=home), Moodle Quizzes (Moodle, https://moodle.org/) or Hot Potatoes (Hot Potatoes, http://hotpot.uvic.ca/). Each of them realises one or more of the mentioned testing methods.

2. E-ASSESSMENT IN MEDICAL EDUCATION

In medical sciences, the assessment and e-assessment processes often use tests based on multiple choice questions (MCQ). Such an examination method is perfectly fit for the verification of theoretical knowledge, is unbiased (the questions are evaluated by the computer, so there is no risk of favouritism), and the selection of the right answer is quick and unambiguous. However, MCQ exams may not be directly used to verify practical skills, such as communication with the patient.

2.1 MCQ exams

A common mistake made by the students preparing for the MCQ exams is their conviction that they are memory tests, i.e. that it is enough to remember a given scope of material and to memorise it during the exam. Such tests may also verify the ability to interpret information and apply the acquired knowledge, both in typical and untypical medical cases. Thus, to perform well at an MCQ test, it is not sufficient to memorise the contents of the lesson or handbook.

The Internet offers a lot of advice, and even entire courses which teach how to prepare for an MCQ exam and MCQ exam answering technique. Here is a model list of guidelines taken from the course *How to succeed at MCQs* (http://www.mondofacto.com/study-skills/exams/how-to-succeed-at-mcqs/02.html):

1. Revise everything, and don't try to 'question spot'. MCQ exams can cover an awful lot of material - that's the point.
2. Make sure your knowledge is sufficiently specific. MCQs can be highly specific, so a general knowledge of an area might not be enough.
3. However, a good broad knowledge is helpful when attempting to deduce the correct answer to a question you're unsure of.
4. Practice, practice, practice and then do some more practice. Gather together as many questions as you can lay your hands on.
5. Make sure your practice MCQs cover material that's relevant to your course; there's no point in learning things you won't be asked.
6. Pile on the pressure by practising under exam conditions. This will help you become accustomed to answering questions against the clock, and allow you to accurately judge how much time you can allow for each question.
7. If you try to recreate exam conditions when you practice, you'll find your memory will be triggered under similar conditions in the exam hall.
8. Revise the things you don't know. Sounds obvious, but you're actually more likely to spend time on topics you already know - it's more fun and can be better for morale. Be brave, and tackle your weakest areas (neurology?!) first.
9. Revise with friends; it's easier to stay motivated - and much more fun! You can share knowledge this way too. Make sure you revise with friends of a similar ability - there's nothing more depressing than finding everyone else knows more than you do. Alternatively, if you relish a challenge, try revising with the best and brightest - they may inspire you to raise your game.
10. On the day of the exam, make sure you're clear about the exam format: how many questions are there? How long have you got? Will there be negative marking?

2.2 Motivation

Guidelines 4, 6 and 7 prove the important role of the self-assessment tests in the preparation for the exams. The authors' experience shows that the medicine students of Poznan University of Medical Sciences do not fully seize the opportunity to learn using the self-assessment tests, though their influence on the final exam results is noticeable (Kołodziejczak, Roszak, Ren-Kurc, Bręborowicz, Kowalewski 2015: 217-223). To find the reasons for this and to determine the students' approach to the e-exams, the authors decided to conduct regular surveys. The results of a two-year study, carried out at the Pathophysiology Department of Poznan University of Medical Sciences in the academic years 2014/15 and 2015/16, are presented in chapter 3.

3. E-ASSESSMENT IN THE OPINION OF MEDICAL STUDENTS

3. 1 Background

At Poznan University of Medical Sciences, the subject of pathophysiology for the second year of the medicine course is conducted with the blended learning method, using the online course. The access to materials available at the e-learning portal is opened for the students a week before the course begins and expires after it is completed. The portal offers the contents that support stationary classes and lectures as well as self-learning materials. They include lectures with the teacher's voice comments, clinical cases to be studied before the stationary seminars, and self-tests. The learning materials available on the portal are divided into 10 content-related blocks being consistent with the schedule of stationary classes. The subject concludes with an exam conducted via the e-learning portal.

The pathophysiology students may use a range of electronic revision tests that allow them to verify their level of knowledge before each of the 3 stages: initial physiology test, seminar completion assessment and final examination.

The electronic tests for the pathophysiology course are composed of multiple choice questions. The self-tests consist of 15 or 30 questions and feature a limited completion time. Students may fill the same tests maximum 5 times, and the questions are each time drawn randomly from the database.

Upon completing the course, the students fill an electronic questionnaire to evaluate the course for the quality, accessibility and usability of the electronic materials, including self-tests, and to list the advantages and disadvantages of studying with the use of the e-learning portal and e-assessment system.

3.2 Participants

The analysis will cover the results of 475 questionnaires filled by the second-year medicine students of Poznan University of Medical Sciences in the academic years 2014/15 and 2015/16.

3.3 Data collection and analysis

The survey data have been collected on the e-learning portal OLAT (Online Learning And Training) and then saved as an Excel spreadsheet. The data were analyzed using the Pearson Chi-square test. Calculations were carried out at statistical significance $\alpha=0.05$ in STATISTICA v. 12.0 from StatSoft. Inc. (Tulsa, USA).

3.4 Results and discussion

In the first place, the students evaluated the benefits of learning with the use of the e-learning course, by answering the following question: "In my opinion, the advantages of this learning method are:". Most of the options included in this question concerned the e-assessment system provided for the course. The students could choose maximum 3 out of 7 available options. The answer structure is presented in Table 1.

Table 1.

Comparison of the answers to the question worded "In my opinion, the advantages of this learning method are:" in the academic years 2014/15 and 2015/16.

Variant of the answer	Academic year 2014/15 n=245	Academic year 2015/16 n=230	p value
Possibility of learning at any place and time	73%	75%	0.663
Possibility of checking the current level of knowledge using the self-tests, which motivates me for further work	49%	40%	0.051
Immediate result obtained upon test completion	44%	59%	**0.001**
Possibility of practicing in the conditions and using the materials similar to the ones given at the completion assessment tests/exams	42%	32%	**0.020**
Possibility of verifying errors by subsequent attempts taken at any time after filling my knowledge gaps	30%	23%	0.096
A random, personal set of questions	13%	5%	**0.005**
I do not see any advantages	< 1%	0%	0.302

Source: own elaboration

Students of both years have mostly appreciated the possibility of studying at any place and time. Significant differences ($p<0.05$) in their replies have been found for the following options: "immediate result obtained upon test completion", "possibility to practice in the conditions and using the materials similar to the ones given at the completion assessment tests/exams" and "a random, personal set of questions". The latter option, i.e. the random set of questions, has aroused the strongest emotions among the students during final exams and partial assessment tests. The survey has shown that the 2015/16 year students would prefer to have the same questions for all of them, as this would give them a stronger feeling of justice. This is the reason why the grade given to this option as an advantage was lower.

Similarly, the students have assessed the disadvantages of studying with the learning portal. By answering the question worded "In my opinion, the disadvantages of this learning method are:", they could mark maximum 3 options. The answers are compared in Table 2.

Table 2.

Comparison of the answers to the question worded "In my opinion, the disadvantages of this learning method are:" in the academic years 2014/15 and 2015/16.

Variant of the answer	Academic year 2014/15 n=245	Academic year 2015/16 n=230	p value
Too few possible attempts to each test	25%	10%	**< 0.0001**
The time for filling the test is too short	3%	1%	0.160
I do not like this type of assessment – a poor result demotivates me	2%	4%	0.245
I do not like learning under time pressure (a fixed deadline for taking the test prior to the final assessment test and exam)	17%	24%	0.079
Impossibility of consulting / clarifying any doubts regarding the correct answer to the questions included in the self-test	84%	80%	0.335
The test contains too many questions	< 1%	2%	0.327
I do not see any disadvantages	9%	10%	0.682

Source: own elaboration

The evaluations of the disadvantages of learning with the portal were similar, and the only difference resulted from the fact that in the academic year 2015/16 the number of attempts to take each available self-test was increased. The most significant disadvantage indicated by the students of both years was the impossibility to clarify their doubts related to the choice of a correct answer. As mentioned above, the need to provide feedback is very important in the formative assessment, which is proved by the students' expectations. The fact that they could verify if their answer was correct appeared to be insufficient.

As during the pathophysiology course, all the assessment tests, exams and self-tests are electronic and include multiple choice questions, the students are also asked about the advantages and disadvantages of such an evaluation method. Similarly to the previous years, the students could choose maximum 3 options. Table 3 presents the answers to the question “I liked the test in the electronic format because...”.

Table 3.

Comparison of the answers to the question worded “I liked the test in electronic format because...” in the academic years 2014/15 and 2015/16.

Variant of the answer	**Academic year 2014/15 n=245**	**Academic year 2015/16 n=226**	**p value**
Time of the test measured individually	33%	36%	0.466
The same time for everyone	22%	26%	0.3020
I know my results immediately	94%	92%	0.434
A random, personal set of questions	7%	2%	**0.023**
I see a clear list of questions and I can start by selecting the best-known answers	34%	30%	0.330
I can see which questions I have already answered	34%	35%	0.959

Source: own elaboration

According to the students, the biggest advantage of the electronic tests was the immediate information on the result, provided upon completion. The option “a random, personal set of questions” was the least popular advantage, and the arisen difference proves the initial conclusion that the students of the lower year would prefer the same questions for everyone. The structure of answers for the other options is very similar for both analysed groups.

Finally, the comparison of the answers to the question worded “In my opinion, the negative features of the electronic tests are:”. The results are presented in Table 4.

Table 4.

Comparison of the answers to the question worded “In my opinion, the negative features of the electronic tests are:” in the academic years 2014/15 and 2015/16.

Variant of the answer	**Academic year 2014/15 n=142**	**Academic year 2015/16 n=145**	**p value**
Unclear way of doing the test	27%	39%	**0.024**
It is difficult to read the text on the screen	40%	34%	0.265
The computer distracts my attention	29%	25%	0.439
I don’t like being assessed by a computer	10%	10%	0.954
You have to be more skilled in doing online tests	29%	24%	0.363

Source: own elaboration

Negative experience with the electronic exams were mostly related to difficulties in filling the test and reading the text on the screen. Until now, students have usually taken tests in the paper form (primary and middle school graduation exam, final exam of secondary education), which makes them less experienced in filling the test on the computer. As we know, it is easier to focus on a paper sheet than to read the text on the screen. Ten percent of the students in the analysed groups do not like being evaluated by a machine, which may surprise considering the fact that it is a way that guarantees objectivity and eliminates favouritism.

Some students have omitted the answer to this question, which resulted in the difference in the number of analysed questionnaires compared to the previous ones. For the authors, it is a guideline that the options in this question should be examined in more detail.

CONCLUSIONS

Assessment is intrinsically linked with the teaching process. Technical progress allows for the automation of activities involving the collection, management and distribution of tests, which in turn allows the examiners to save time (Ren-Kurc, Roszak 2011; Roszak, Kołodziejczak, Kowalewski, Ren-Kurc 2013: 35-36). In this way, assessment is transformed into e-assessment, which may have a positive influence on the teaching process, adapt it to the demands and capabilities of learners and motivate them to continue their work.

In medical sciences, e-assessment based on MCQ tests is a common practice. Proper preparation to the e-exam does not only involve mastering the theoretical knowledge, but also the possibility to take several training sessions in conditions being similar to the ones at the exam. The feedback obtained from the self-tests may (during revisions before the actual exam) allow to find and correct any deficiencies. It is also important to identify the nature of problems in filling the electronic tests and to eliminate them.

Surveys carried out by the authors prove that students appreciate the benefits of the electronic tests, the most valued being the possibility of obtaining the result immediately after the exam is completed, and the possibility of verifying the current level of knowledge using the self-tests. As results from the comparative analysis, students have an established approach to the advantages and disadvantages of e-assessment, and equal exam conditions provided to all the students even imply the aim to unify the questions.

E-assessment based on highly specialised systems and tools allows the teachers to constantly monitor the students' progress, to control the learning process in order to improve the teaching efficiency, and to attain the educational objectives. In the authors' opinion, e-learning will gradually become more popular, which may be considerably influenced by the popularisation of good practices.

REFERENCES

Advanced Disitributed Learning Initiative, [online] at https://www.adlnet.gov/adl-research/scorm/, (accessed 22 July 2016)

Black P., Wiliam D., 2009: *Developing the theory of formative assessment*. Educ. Assess. Eval. Account, No. 21(1), 2009, pp. 5-31. ISSN: 1874-8600

Bohl, O., Scheuhase, J., Sengler, R., Winand. U., 2002: *The sharable content object reference model (SCORM) – a critical review.* Proceedings of the International Conference on Computers in Educations (ICCE'02), December 2002, Auckland, New Zealand, IEEE 2002, pp. 950-951. ISBN: 0-7695-1509-6

Boud, D., 2000: *Sustainable assessment: rethinking assessment for the learning society*. Studies in Continuing Education, No. 22(2), 2000, pp. 151-167. DOI 10.1080/713695728

Caballé, S., Clarisó, R., 2016: *Formative Assessment, Learning Data Analytics and Gamification, In ICT Education*, Academic Press, 2016. ISBN: 978-0-1280-3637-2

Cook, J., Jenkins, V., 2010: *Getting Started with e-Assessment*. Project Report. University of Bath, [online] at

Crisp G., 2011, *Teacher's Handbook on e-Assessment*. Transforming Assessment − An ALTC Fellowship Activity, [online] at https://www.dkit.ie/system/files/Teachers%20Handbook%20on%20e-Assessment%20G%20Crisp%20Transforming%20Assessment.pdf, (accessed 27 July 2016)

Crisp, G., 2007: *The e-Assessment Handbook*. Continuum International Publishing Group, London 2007. ISBN: 9780826496287

de Bruyn, E., Mostert, E., Schoor, A., 2011: *Computer-based testing – the ideal tool to assess on the different levels of Bloom's taxonomy*. International Conference on Interactive Collaborative Learning (ICL2011), September 2011, Piešťany, Slovakia, IEEE 2011, pp. 444-449. ISBN: 978-1-4577-1748-2

Gage, N.L., Berliner, D.C., 1998: *Educational psychology 6th ed.* Houghton Mifflin. Boston 1998. ISBN: 978-0395797945

Gruttmann, S., Böhm, D., Kuchen, H., 2008: *E-assessment of mathematical proofs: changes and challenges for students and tutors.* International Conference on Computer Science and Software Engineering, December 2008, Wuhan, China, IEEE 2008, pp.612-615. ISBN: 978-0-7695-3336-0

Heaton, J.B., 1990: *Classroom testing*. Longman, New York 1990. ISBN 9780582746251

Heriot-Watt University. SCHOLAR, [online] at http://courses.scholar.hw.ac.uk/vle/scholar/session.controller?action=home, (accessed 27 July 2016)

Hot Potatoes, [online] at http://hotpot.uvic.ca/, (accessed 27 July 2016)

How to succeed at MCQs, [online] at http://www.mondofacto.com/study-skills/exams/how-to-succeed-at-mcqs/02.html, (accessed 27 July 2016)

http://opus.bath.ac.uk/17712/1/Getting_started_with_e%2Dassessment_14Jan2010.pdf, (accessed 20 July 2016)

IMS Question & Test Interoperability Specification, [online] at https://www.imsglobal.org/question/index.html, (accessed 27 July 2016)

Kołodziejczak, B., Roszak, M., Ren-Kurc, A., Bręborowicz, A., Kowalewski, W., 2015: *Creating digital question databases: Use of self-tests in teaching medical subjects*, Logical, Statistical and Computer Methods in Medicine, Studies in Logic, Grammar and Rhetoric, No. 43(56), 2015, pp. 211-227. ISSN: 0860-150X, ISBN: 978-83-7431-464-0

Marriott, P., 2009: *Student's evaluation of the use online summative assessment on an undergraduate financial accounting module*. British Journal of Educational Technology, No. 40(2), 2009, pp. 237-254. DOI 10.1111/j.1467-8535.2008.00924.x

Moodle. Open-Source Community-based Tools for Learning, [online] at https://moodle.org/, (accessed 27 July 2016)

Pachler, N., Daly, C., Mor, Y., Mellar, H., 2010: *Formative e-assessment: practitioner cases.* Computers & Education, No. 54(3), 2010, pp. 715-721. DOI 10.1016/j.compedu.2009.09.032

Ren-Kurc, A., Roszak, M., 2011: *Evaluation of the teaching process. The organization of test exams and survey*, In: Information Technology in The Teacher's Workshop, The new educational challenges, Sc. ed.: Migdałek, J. and Stolińska, A., Academic Publishing House of the Pedagogical University of Cracow, Cracow 2011, pp. 255-257. ISBN: 978-83-7271-649-1 [In Polish]

Ridgway, J., McCusker, S., Pead, D., 2004: *Literature Review of e-Assessment.* NESTA Futurelab Series, Report 10, [online] at http://dro.dur.ac.uk/1929/1/Ridgway_Literature.pdf, (accessed 20 July 2016)

Roszak, M., Kołodziejczak, B., Kowalewski, W., Ren-Kurc, A., 2013: *Standard Question and Test Interoperability (QTI) – the evaluation of student's knowledge*, e-mentor, No. 2 (49), 2013, pp. 35-40. ISSN: 1731-7428 [In Polish]

FOREIGN LANGUAGE COMPETENCE SUPPORTED BY ICT AND DISTANCE LEARNING

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Abstract: *The paper deals with a problem of improving and keeping a foreign language competence of academic staff at the technical oriented faculty. The author's point of view is based on the University of Defence environment where the international military standard NATO STANAG 6001 is implemented. The target group characteristics are described and discussed. Pros and cons of the current approaches are stated. The use of modern technologies and distance learning are emphasized but with the necessity of the independent human beings needs in mind. Finally, a solution which could be beneficial is formulated.*

Keywords: academic staff, CLIL, ESP, language competence, STANAG 6001.

INTRODUCTION

The article is written from the Department of Communication and Information Systems of the Faculty of Military Technology (FMT) of the University of Defence (UoD) point of view. Its goal is to introduce the FMT environment and the conditions for language skills improving and testing of its academic staff. The author would like to formulate his opinion on the future development and future suitable solutions in this field which could also be interesting for the academic staff of other technical oriented faculties.

1. PROFESSIONAL FOCUS OF THE FMT

The Faculty of Military Technology (FMT) of the University of Defence (UoD) is a technical oriented faculty of a state military university. In the last years it has prepared new study programmes for its military and civilian students separately.

Firstly, since 2014, the FMT has been realizing, according to the new requirements of the Czech Ministry of Defence (MoD), its new five-year Master's degree programme named Military Technology. This new Master's degree programme has only one field of study. This field of study is also named Military Technology. 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. These are as follows:

- Automated Command and Control Systems;
- Combat and Special Vehicles;
- Communications and Information Systems – Information Technology (IT);
- Communication and Information Systems – Communication Technology (CT);
- Aircraft – Avionics and Armament;
- Aircraft – Airframes and Engines;
- Air Radio Navigation systems;
- Air Staff Officer;
- Airbase Engineering Support;
- Radar Technology and Electronic Warfare;
- Air Traffic Control;
- Military Geography and Meteorology;
- Military Pilot;
- Weapons and Ammunition;
- Military Engineering.

One year after, since 2015, the FMT of the UoD has been started the new civilian Bachelor's degree study programme "Technologies for Defence and Security". It covers three fields of study:

- Communication and Information Technologies;
- Technologies for Protection of Assets and People;
- Weapons and Ammunition.

Two new fields of study are being prepared for accreditation process. These are:

- Aviation Techniques;
- Geography and Meteorology for Defence and Security.

A very large range of various technical fields covered by the FMT UoD is visible from the previous text. These technical fields have their own special terminology which is not always generally known.

Contemporary technical fields are especially connected with English which is also the foreign language No. 1 at the FMT UoD. Not only General English but also English for Specific Purposes (ESP) plays an important role at the FMT UoD. Besides, other world languages such as French, German and Russian have also their important place in a professional communication and their knowledge is ever welcome there.

2. THEORETICAL BACKGROUD

The theory of Second Language Acquisition (SLA) is often presented by a model which was developed and described by Krashen (1981), (1982). He described how the process of language acquisition and language learning occurs. Hutchinson and Waters (1987) specified the concept and scope of ESP. Further development of ESP was done by Dudley-Evans and St. John (1998).

Nowadays, foreign language teaching, learning and testing are strongly influenced by modern ICT. Stankova (2009) described effort of English language teachers to provide UoD students and staff with access to an effective e-learning support. Franc and Stankova (2011) propose Moodle as an efficient and cost-effective technological solution for a virtual learning environment in the Czech Armed Forces (CAF).

Some authors are publishing their latest articles focused on key components of work efficiency in the field of foreign language, e.g. motivation (Kotekova 2015), self-regulated learning of adults (Kalenda and Vavrova 2015), CLIL method usage (Prochazkova 2015), effectiveness of ESP e-Learning course from the users' point of view (Kucera and Kucirkova 2015).

3. NATO STANAG 6001

All NATO member states are required to guarantee communication competence of their military professionals and employees of MoD. English language exams are based on the STANAG (Standardization Agreement) 6001 specified by NATO Standardization Agency (2010) in contrast with the Common European Framework of Reference for Languages (CEFR) specified by the Council of Europe (2014). Useful information connected to STANAG 6001 can also be found at the Military English web (2015).

3.1 Structure of the NATO STANAG 6001 Language Exam

NATO STANAG 6001 is a language proficiency scale designed to allow comparisons of language ability in different countries. STANAG 6001 clearly specifies the requirements for particular language skills. Descriptions give detailed definitions of the proficiency levels in the commonly-recognised language proficiency skills:

- "Listening" (L),
- "Speaking" (S),
- "Reading" (R),
- "Writing" (W).

The language exam according to the STANAG 6001 consists of 4 independent exams which are taken place on the same day.

The language proficiency skills are broken down into six levels coded 0 through 5. In general terms, skills may be defined as follows:

- Level 0 – No proficiency;
- Level 1 – Survival;
- Level 2 – Functional;
- Level 3 – Professional;
- Level 4 – Expert;
- Level 5 – Highly-articulate native.

A series of plus (+) descriptions is provided. A plus indicator may be added to a base level for training, evaluation, recording or reporting purposes, to indicate a level of proficiency that substantially exceeds a 0 through 4 base skill level, but does not fully or consistently meet all of the criteria for the next higher base level. In the Czech Republic a plus (+) descriptor means 60 % of a higher level.

3.2 NATO STANAG 6001 Language Exams in the MoD

Nowadays, every working position in the MoD has set an English language proficiency profile SLP (Standardized Language Profile) by four numbers, e.g. SLP 3322 means level 3 in Listening, level 3 in Speaking, level 2 in Reading and level 2 in Writing. Every employee, including academic staff at the University of Defence, has to fulfil the language requirements by December 31, 2019. If not, he/she will not be qualified enough for his/her working position.

Language examination according to NATO STANAG 6001 is provided by the Language Training Centre (LTC), which is a part of the University of Defence. The mission of the Testing and Methodology Department (OTM) of LTC is to organize and guarantee the quality of language tests according to STANAG 6001 in the following languages:

- English (up to Level 3),
- French, German, and Russian (up to Level 2).

4. LANGUAGE REQUIREMENTS FOR THE ACADEMIC STAFF

The FMT academic staff members in terms of language training specifics are a very highly diversified audience. Their foreign language needs can be structured into a general knowledge of a foreign language and knowledge of a foreign language in a specific area − not only the department focus but often also individual concrete focus.

Each academic staff essentially requires knowledge of at least one foreign language at a level enabling him/her:

- to read with understanding a foreign language professional literature from his/her professional focus;

- to write articles in professional and scientific journals in the field of his/her specialization;
- to prepare contributions to conference proceedings, technical and scientific conferences;
- to process expert opinions to publications and other scientific works;
- to create computer presentations for conferences and seminars;
- to work actively at conferences and seminars on the topic prepared;
- to engage in discussions at conferences and seminars;
- to prepare study materials for students in a foreign language;
- to conduct formal and informal discussions when dealing with foreign students;
- to conduct formal and informal discussions during negotiations with partners from abroad;
- to use e-mail communication in a foreign language;
- to use voice communication over the Internet with foreign partners.

Available foreign language courses aimed at a concrete output SLP (e.g. SLP 2222) are offered in face to face and blended forms. It is not possible to take part in the same course more than once. The method of self-regulated learning seems to be the most often used by the academic staff. It is sometimes the only possible method of language learning of academics due to their uneven workload and duties during the academic year.

The LTC can support this process in the field of general English without problems but the academic staff should be also trained and tested in ESP according to the focus on specific technical fields of various departments. The special technical terminology and its proper usage can be for English language teachers rather difficult and sometimes almost out of their competency borders.

5. LANGUAGE TESTING APPROACHES DEVELOPMENT

The foreign language competences should be permanently developed to the level required by an employer or a higher level according to an individual ambition of a concrete academic worker. The compliance between the current level of language skills and the level required should be verified. This verification should be conducted in a suitable manner to find out the real status or confirm the expected level of foreign language competence.

Two approaches to the foreign language testing in MoD Czech Republic are compared in Table 1. The author believes that the main weak point of the current MoD Czech Republic measures is unlimited validity of the last result of NATO STANAG 6001 exams. It would be interesting to verify if exams results older than 1 year are telling the truth about the current state of required language skills.

Table 1.
Comparison of previous and current testing solutions in MoD

Solution	Validity of language exam result	Pros	Cons
Previous	The best result in testing history is valid without restriction.	Enables further education without worrying about losing.	The result does not correspond to the current state.
Current	The last result of language exam is valid without restriction.	The result may better correspond to the current state.	Demotivation for further learning and improving of language skills.

Source: Own work

Based on the author's experience from the FMT UoD environment, the suitable solutions could be formulated as follows:

- the period of testing could be 1 year;
- the best result achieved in the last two years could be taken as valid.

This approach should bring a very good motivation for lifelong language learning of the academic staff and the knowledge of real true data about language competence of every person. On the other hand, this approach can lead to much more work for testers.

The alternative solution which reduces demands on testers could be based on the so-called "light version" of NATO STANAG 6001 testing. It would be intended for them who have fulfilled their required SLP. These "SLP confirmation exams" proposal could consist of only the "Listening" and "Reading" NATO STANAG 6001 exams. The LTC can realize these exams in their IT classrooms without major problems if requested. The academic staff should confirm SLP within one year. Without successfully passed "SLP confirmation exams" at least once in last two years the validity of NATO STANAG 6001 exams should be lost.

Due to the fact that NATO STANAG 6001 is not very well known outside the military, the author prepared a proposal of solution which could be used at technical faculties generally. The base of this proposal is a modification of the NATO STANAG 6001 approach. In order to reduce the workload of testers the suitable massive use of ICT is assumed.

It is necessary to keep in mind that "Writing" exam requires a computer application which can be the same or similar to one which for the last few last years has been used by OTM LTC UoD during the English NATO STANAG 6001 "Writing" exams.

A test taker fulfils his/her assignment with the help of a standard computer keyboard. No dictionaries or other helpful materials are permitted. He/she can copy and paste parts of his/her text and all the time he/she has information about how many words are contained in his/her current written text and how much time remains until the end of his/her exam. Till the end of a time limit the text which should fulfil the assignment, is upload to the server for the evaluation by testers. This approach to the "Writing" exams is very beneficial for both test takers and testers. Pleasant computer environment for test takers and especially a comfortable evaluation environment for testers can hardly be compared with previous handwritten exams.

Table 2 presents the author's proposal for the English language testing of the academic staff which could find its place at technical faculties.

Table 2.

Proposal of the content of annual testing for keeping language competency

Skill	Place	Method	Time
Listening (General English)	Computer classroom	30 items audio or video recordings, test taker selects one correct answer from 4 options (multiple-choice questions, one correct out of 4).	40 minutes per one group of test takers.
Speaking (both General English and ESP)	Not important	Free discussion focused on selected topics with two testers.	15 minutes per one test taker.
Reading (General English)	Computer classroom	30 items texts possibly with graphical information, test taker selects one correct answer from 4 options (multiple-choice questions, one correct out of 4).	40 minutes per one group of test takers.
Writing (General English)	Computer classroom	Test taker has to fulfil an assignment on PC; no helpful materials can be used.	30 minutes per one group of test takers.

Source: Own work

The author assumes that his proposal for the future approach to foreign language skills testing with one year testing period could bring new motivation and better results in the field described. Group testing in a computer classroom is possible for "Listening", "Reading" and "Writing". It can be realized annually on the base of contemporary NATO STANAG 6001 exams. The only problem could arise with the "Speaking" exam. The NATO STANAG 6001 approach to this exam may be unworkable because of time demands placed on testers.

6. POSSIBLE USEFUL AND EFFECTIVE ELEMENTS OF LANGUAGE PREPARATION

The suggested conception for academic staff preparation is based on a conviction that the key to success rests in the application of the typical principles of "open learning", "distance learning" and "e-learning", such as openness to everyone, independence of time and pace of study. The reinforcement and support of individual preparation and study of academic staff by the sensitive, balanced and attractive use of the accessible ICT always has to be considered priority.

The system should efficiently facilitate the preparation and perfection of all four language skills that are tested as a part of the STANAG 6001 exam (L, S, R, W). Moreover, it would be beneficial to devote a lot of space and means to support English grammar and ESP. As a result there are six areas involved mastering of which guarantees the resulting quality of the whole.

Besides common support of general English, ESP should be supported by the co-operation of faculty technical departments and language professionals including native speakers, if possible.

The author means that the most effective supporting elements for the academic staff are:

- teaching foreign students in the Czech Republic in English;
- participation in Erasmus+ programme, especially in English speaking countries, according to the faculty offer and real possibilities;
- taking part in group consultations especially with native speakers;
- the possibility to be supported by ICT learning tools;
- group discussion on selected topics with native speakers;
- self-assessment on the base of ICT with an emphasis on the listening skill.

The self-assessment tools play a role of a very significant factor in the whole process of study and preparation for the language exams. The elderly often find out that their listening skill is getting worse and it is necessary to practise it regularly. Age affects this skill very negatively.

CONCLUSION

The topic of foreign language competence of academic staff requires permanent attention at the faculty and department levels. Academic staff of technical faculties need to study especially English because knowledge of this language enables and supports research activities and development of guaranteed technical study fields. Underestimation of this task can also lead to unpleasant effects in publishing activities and co-operation with foreign partners. Keeping records of the true level of foreign language skills is a key prerequisite for required work results of the academic staff.

The main suitable form of language training for academic staff is especially self-regulated learning supported by ICT. It should probably be a form of distance learning, supplemented by group self-guided tutorials. This self-study should be supported by properly processed electronic materials available on a server of the faculty, which employs this academic staff. This method of language learning of academics may be, due to their uneven workload and working, the most effective way. The described author's proposal of the rules for the language competence testing can contribute to keeping up-to-date foreign language competences of the academic staff. Due to possible technical and professional demands, the necessary co-operation among technical departments and foreign language teachers is suggested.

REFERENCES

Common European Framework of Reference for Languages: Learning, Teaching, Assessment, [online] at http://www.coe.int/t/dg4/linguistic/source/framework_en.pdf, (accessed 28 June 2016)

Dudley-Evans, T. and St. John, M., 1998: *Developments in English for Specific Purposes*. Cambridge University Press, Cambridge, ISBN: 978-05-215-9675-6

Franc, V. and Stankova, E., 2011: *E-Learning through Moodle in the ACR from the Administrator, Tutor and Student Perspectives*, Distance Learning, Simulation and Communication (DLSC 2011), University of Defence, Brno, pp. 87-94, ISBN: 978-80-7231-695-3

Hutchinson, T. and Waters, A., 1987: *English for Specific Purposes: A Learning-Centred Approach*. Cambridge University Press, Cambridge, ISBN: 978-0-521-31837-2

Kalenda, J. and Vavrova, S., 2015: *Mapping the Self-Regulated Learning of Adults*, Proceedings of the 12th International Conference on Efficiency and Responsibility in Education (ERIE 2015), Czech University of Life Sciences, Prague, pp. 239-249, ISBN: 978-80-213-2560-9

Kotekova, D., 2015: *How to Enhance Motivation in Students of a Foreign Language*, Proceedings of the 12th International Conference on Efficiency and Responsibility in Education (ERIE 2015), Czech University of Life Sciences, Prague, pp. 263-272, ISBN: 978-80-213-2560-9

Krashen, S., 1981: *Second Language Acquisition and Second Language Learning*. Pergamon Press, New York, ISBN: 0-08-025338-5

Krashen, S., 1982: *Principles and Practice in Second Language Acquisition*. Pergamon Press, New York, ISBN: 0-08-028628-3

Kucera, P. and Kucirkova, L., 2015: *Effectiveness of Business English e-*

Learning Course Viewed from Student's Perspective, Proceedings of the 12th International Conference on Efficiency and Responsibility in Education (ERIE 2015), Czech University of Life Sciences, Prague, pp. 303-309, ISBN: 978-80-213-2560-9

Language Training Centre University of Defence, [online] at http://www.unob.cz/en/lc/Pages/ default.aspx, (accessed 28 June 2016)

Prochazkova, L., 2015: *Overcoming the Affective Barriers to CLIL in Mathematics Teacher Trainees*, Proceedings of the 12th International Conference on Efficiency and Responsibility in Education (ERIE 2015), Czech University of Life Sciences, Prague, pp. 460-467, ISBN: 978-80-213-2560-9

STANAG 6001 – Military English exams and tests, [online] at http://www.stanag6001.com/, (accessed 28 June 2016)

STANAG 6001 NTG (EDITION 4) – Language Proficiency Levels, [online] at http://www.unob.cz/cjv/Documents/Stanag6001_AJ.pdf, (accessed 28 June 2016)

Stankova, E., 2009: *Tailoring English Language Learning Object to Students' Needs*, Distance Learning, Simulation and Communication 2009, Proceedings, University of Defence, Brno, pp. 165-168, ISBN: 978-80-7231-638-0

EVALUATION OF THE IMPLEMENTATION OF ICT IN THE PROFESSIONAL TEACHING AND RESEARCH DEVELOPMENT OF UNIVERSITY FACULTY

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Abstract: *This article shows results obtained after evaluating the integration of ICT in the professional, teaching and research development of university faculty members.*

The research has been implemented in the frame of the IRNET European Project. A questionnaire designed ad hoc has been applied to a number of universities that join the mentioned project. The questionnaire was validated by experts from member institutions. Reliability was accomplished by using Cronbach's Alpha procedure and the coefficient obtained was 0,879. Faculty members from the University of Extremadura, Spain composed the sample.

The results confirm beliefs and attitudes of faculty staff concerning the following items: teaching, educational work, research, in-service training, professional development and understanding the role of ICT in education, knowledge of information tools.

Keywords: ICT, Higher Education, Professional development, Teaching, Research.

INTRODUCTION

In our society, teaching is becoming one of the most challenging occupations, as knowledge is expanding rapidly and modern technologies demand teachers to learn how to use such technologies to teach. While new technologies increase teachers' training needs, they are, however, not sufficient. Information and communication technology (ICT) can provide more flexible and effective ways for professional development for teachers, and connect teachers to the global teacher community (Jung 2005).

Guasch, Alvarez & Espasa attempted to shed light on the competencies a university teacher must have in order to teach in virtual learning environments. They consider the fact that a teacher training experience should involve the methodological criteria established in line with theoretical principles. The main objective in their study was to assess a conceptual-methodological framework for the design of training proposals aiming to develop teachers' competencies for virtual environments in higher education.

Others, as Harris & Sass (2007) suggest that policy investments in the quality of teachers may be related to improvements in student performance They believe that policies adopted by states regarding teacher education, licensing, hiring, and professional development may make a significant difference in the qualifications and capacities that teachers adopt in their teaching philosophies.

The international community is aware of the necessity of investing in lifelong learning for teachers, and one of their main priorities is ICTs. It is undeniable that current society requires updating teachers in order to train future students to face professional life and the labour market. E-learning and b-learning are impacting in universities in order to create more flexible curricula and target as many international students as possible. ICTs are not an option anymore; therefore it is a responsibility of every university to address the best procedures in order to train their workforce and staff to face new society's requirements. As Cech & Bures (2004, p.25) believe, "*today's economic and social changes force universities to try to find new learning approaches*".

Universities should be conscious of how their teachers utilize ICT in their training in order to easy the use of technology and facilitate updated methodologies. It is well known that specific fields of knowledge can customize technology to approach research and findings to students, nevertheless: How is this being done at the different universities analysed in this study?

The frame of the study is the "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 (IRNET)", developed by ten universities within and outside the European Union. The objective of the study is to "develop new tools for advanced pedagogical science in the field of ICT instruments, distance learning and intercultural competences" (Kommers et al., 2014). The project, designed by packages, aims in Pakage 4 the "analyses and evaluation of the level of ICT, e-learning and intercultural development in every partner countries". A number of studies were developed in order to meet objective 4. The one presented here is related to the evaluation of university faculty mentioned below.

With this in mind, the main goal of our study is to evaluate teaching, research and intercultural of the implementation of ICT by IRNET member universities' faculty.

METHODOLOGY

The design of the study is descriptive and uses surveys developed through the implementation of a questionnaire described as follows: (Cubo, Martín, & Ramos 2011).

The sample consists of faculty members from the following institutions:

1. Borys Grinchenko Kyiv University (BGKU), Ukraine.
2. Herzen State Pedagogical University of Russia, St. Petersburg.
3. University of Silesia, Katowice, Poland.
4. University of Ostrava (OU), Czech Republic.
5. Constantine the Philosopher University in Nitra (UKF), Slovak Republic.
6. University of Extremadura, Spain.

The results showed in this article are based on 34 responses by University of Extremadura (Spain) professors. The reference population is 1.911 university professors and the return rate is 1,77%. The distribution by employment status is:

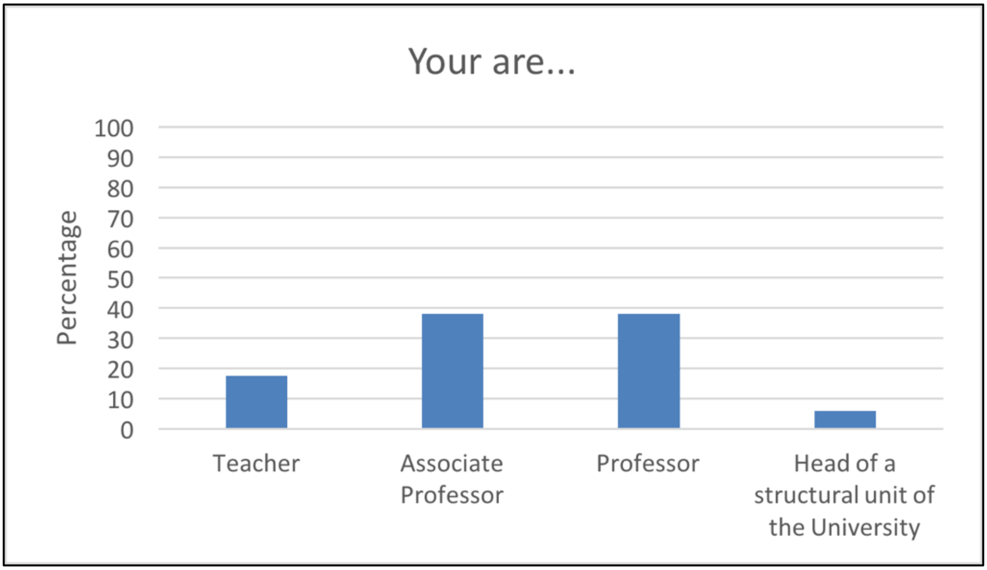

Figure 1. Faculty distribution by professional status

The applied questionnaire was composed by 18 grouped questions in a 4-dimesion structure:

1. Teaching, educational work.

2. Research.

3. In-service training, professional development.

4. Understanding the role of ICT in education, knowledge of information tools.

The complete version of the questionnaire can e located at:

https://docs.google.com/document/d/1KhC-_eZuJ9EsRmdZLLchYIkfD3iy8NrBZC0PYzIRZmA/edit?usp=sharing

Every dimension contains multiple choice questions, valuation questions trough a 5-point Likert scale. The questionnaire was implemented on line through resources and tools offered by University of Silesia, Katowice, Poland.

The validity of the questionnaire was achieved by consulting with faculty members of IRNET joining institutions. A query procedure was developed in order to agree upon the structure and content of the questionnaire from the first to the latest version.

The reliability was obtained by means of using Cronbach's Alpha coefficient. Results shown below indicate an appropriate credibility:

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,879	,874	18

Figure 2. Questionnaire's reliability

RESULTS

Results achieved from some of the four dimensions' most representative are shown below.

Dimensión 1. Teaching, educational work.

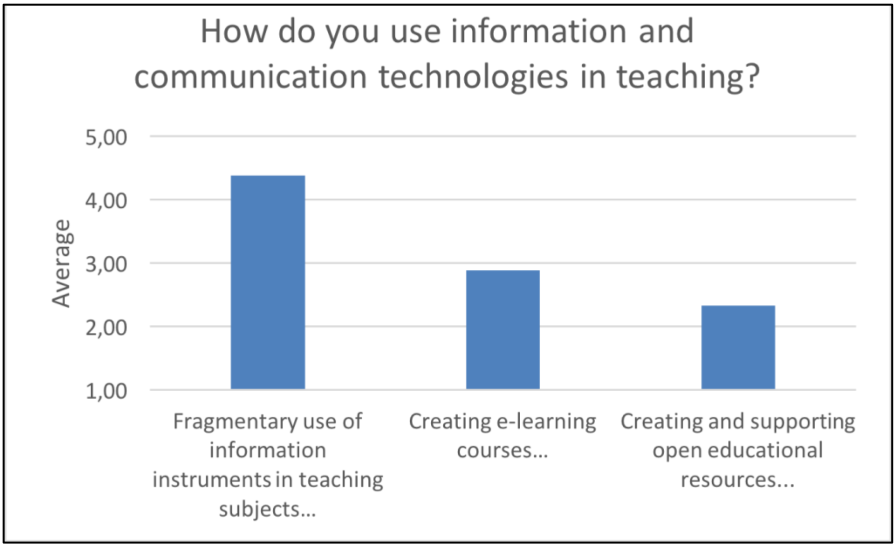

Figure 3. Use of information and communication technologies in teaching

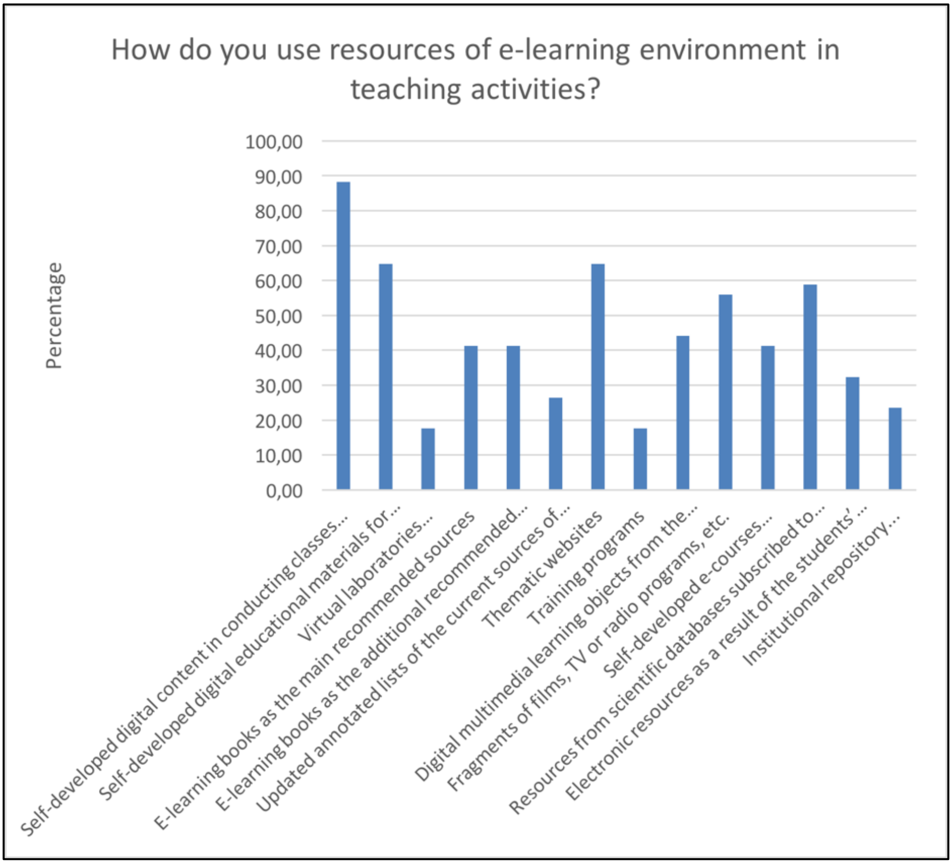

Figure 4. Use of resources of e-learning envionment in teaching activities

Dimensión 2. Research.

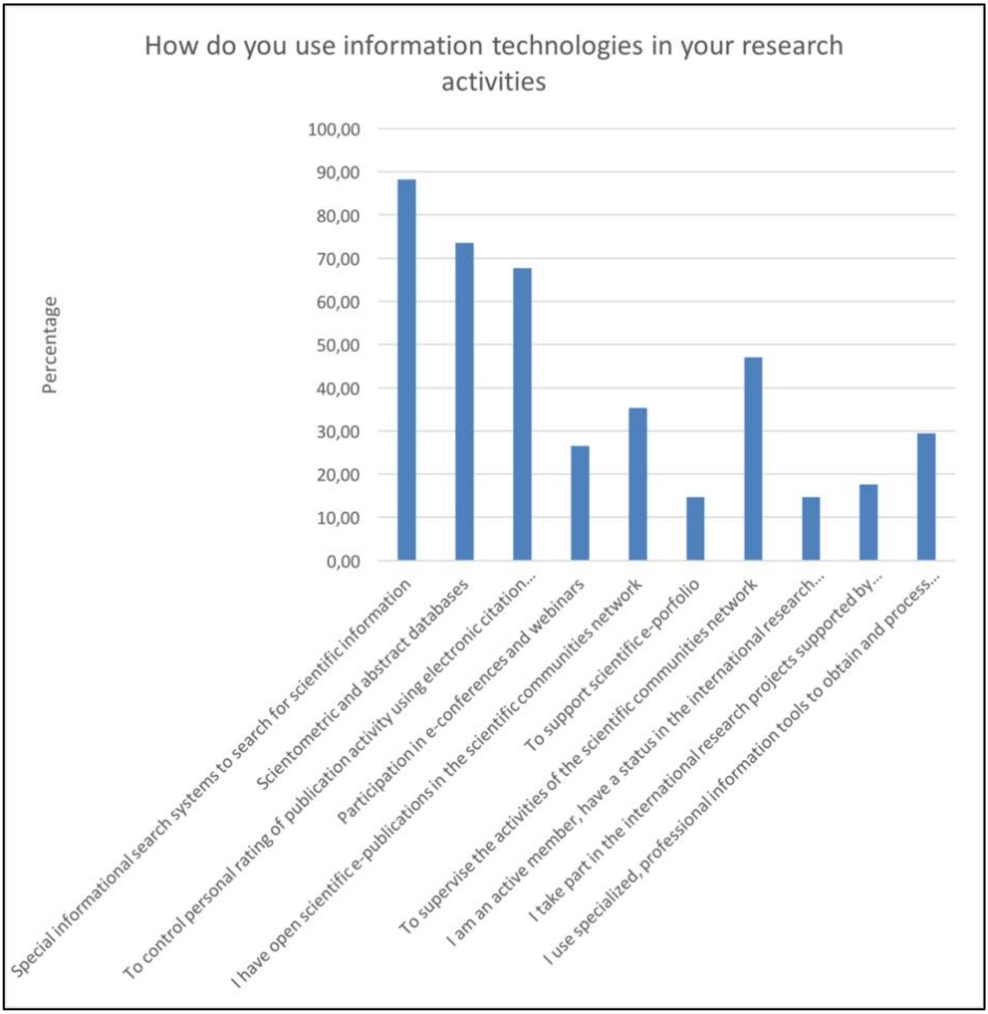

Figure 5. Use of information technologies in the research activities

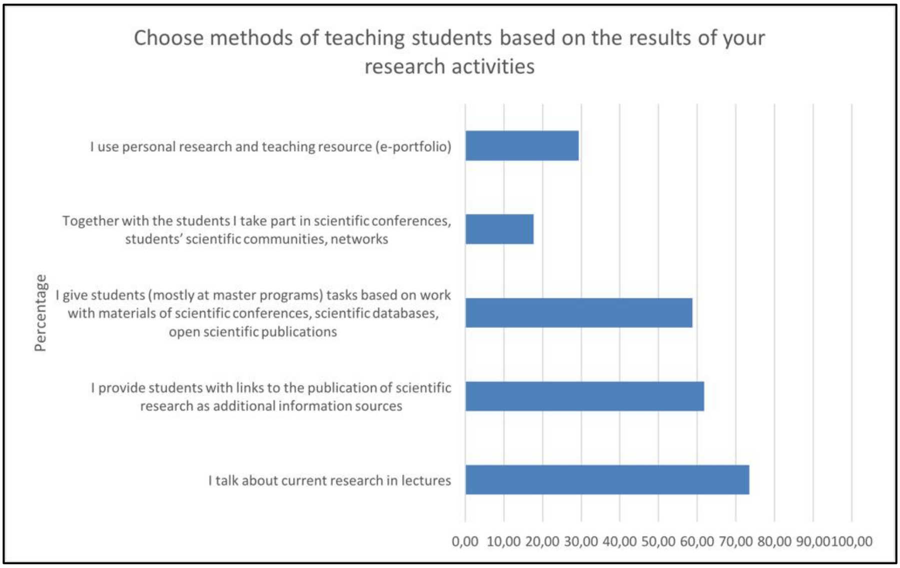

Figure 6. Methods of teaching students based on the results of the research activities

Dimension 3. In-service training, professional development.

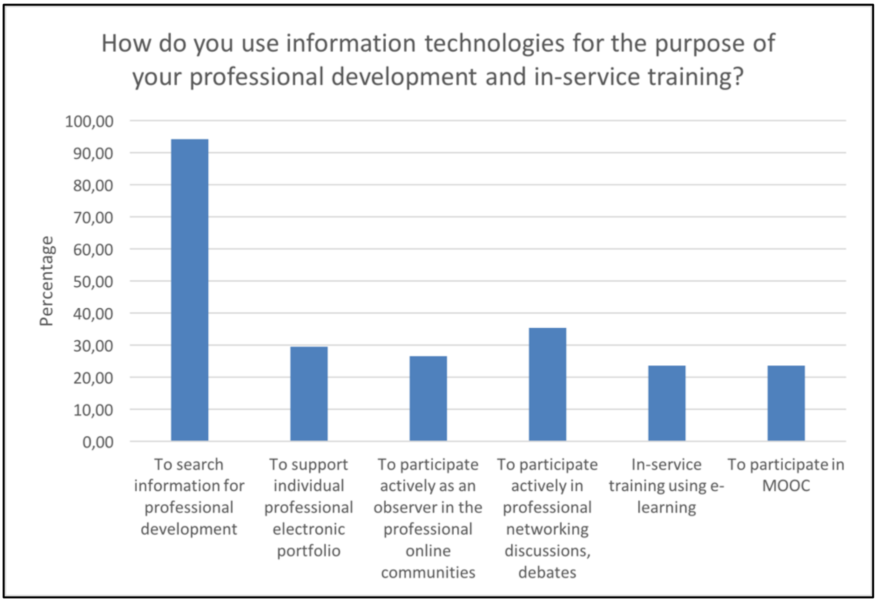

Figure 7. Use of information technologies for the purpose of the profesional development

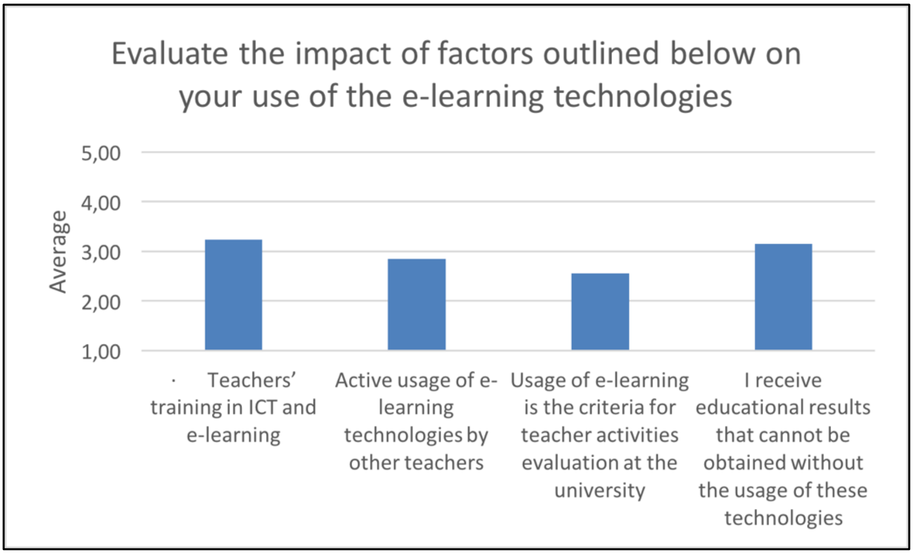

Figure 8. Impact of these factors on the use of the e-learning technologies

Dimension 4. Understanding the role of ICT in education, awareness of information tools.

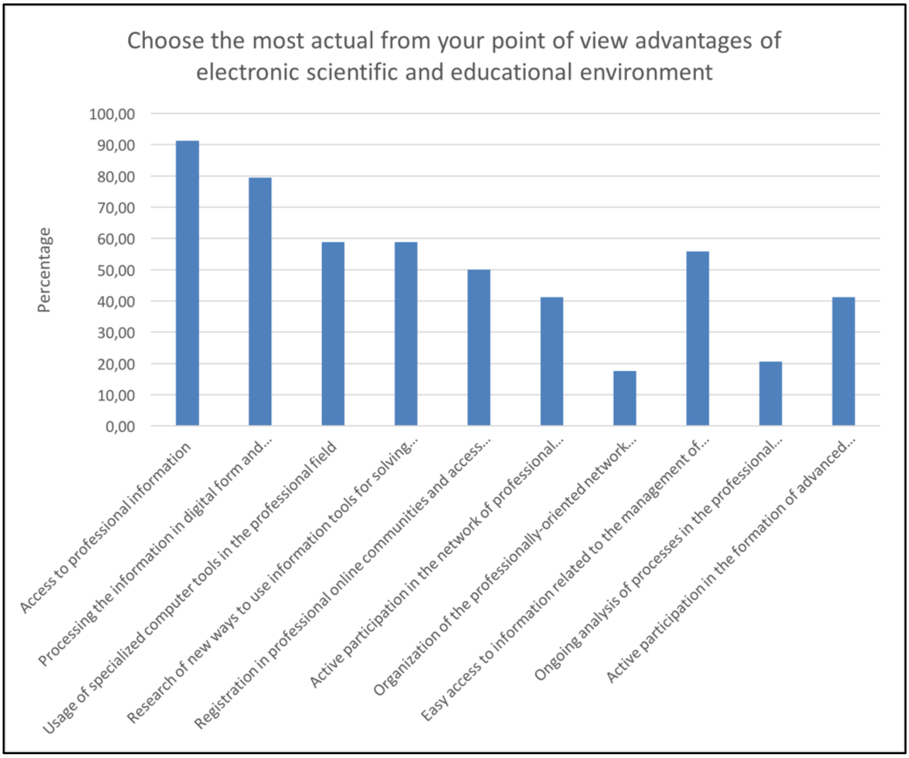

Figure 9. Advantages of electronic scientific and educational environment

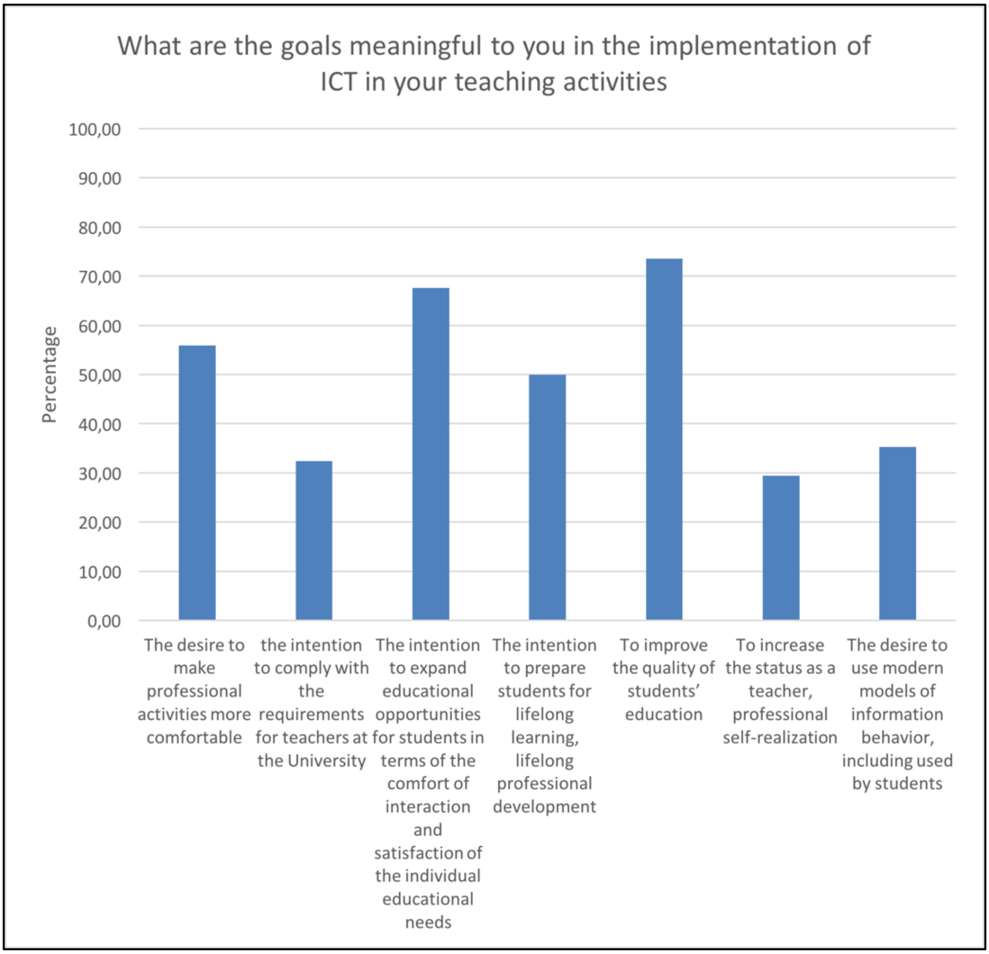

Figure 10. Goals meaningful in the implementation of ICT in the teaching activities

Finally, the relation between faculty members' professional status and the valuation of the university´s facilities.

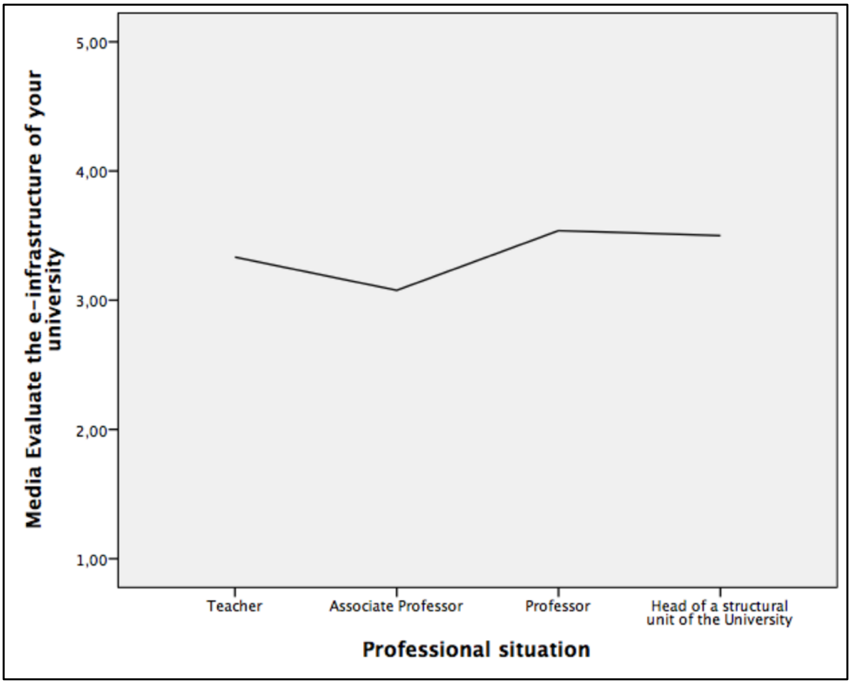

Figure 11. Relation between faculty members' professional status and the valuation of the university´s facilities

Test H by Kruskal-Wallis informs that the null hypothesis has been accepted and there are no significant differences statistically speaking between faculty professional status and their opinions on university's digital facilities and e-infraestructure.

Test statistic[a,b]

	Evaluate the e-facilities of your university
Chi-cuadrado	1,400
gl	3
Sig. asintót.	,706

a. Test H by Kruskal-Wallis

b. Grouping variable: Professional status

Figure 12. Test H Kruskal-Wallis

CONCLUSION

Considering the size of the sample, the results obtained should be considered exploratory, in other words, regarded as indicators of opinions and attitudes of university faculty on the significance of ICT regarding professional, teaching, and research development of university faculty members.

Bearing in mind the difficulties to elaborate a questionnaire among a number of universities that belong to different linguistic and cultural contexts. The instrument employed can be considered to be a starting point for this study.

The results obtained indicate that in faculties' opinions:

- In the teaching-learning processes, ICT are principally used for digital presentations and for the communication with students.
- University e-learning resources are mainly employed to share class presentations, information and teaching material with students.
- For research activities, ICT are primarily employed to search for scientific information and to evaluate scientific production.
- Results of research activity are useful and for teaching.
- Regarding professional development of ICT, they have an essential impact in the training of professors.
- The most relevant aspect of ICT in education is related to the Access to information and with the possibility to utilize digital tools such as Office, email, etc.
- The main objectives to employ ICT in education are to enhance the quality of education as well as student's ICT competences.

REFERENCES

Cech, P., & Bures, V., 2004: E-learning implementation at University. *3rd European Conference on E-Learning*, (Rosenberg 2003), 25–34.

Cubo Delgado, S., Martín Marín, B., & Ramos Sánchéz, J. L., 2011: *Métodos de investigación y análisis de datos en ciencias sociales y de la salud*. Madrid: Pirámide.

Guasch, T., Alvarez, I., & Espasa, A., 2010: University teacher competencies in a virtual teaching/learning environment: Analysis of a teacher training experience. *Teaching and Teacher Education*, *26*(2), 199–206.

Harris, D. N., & Sass, T. R., 2007: Teacher training, teacher quality and student achievement. *Education*, *8*(march), 1–61. http://doi.org/10.1016/j.jpubeco.2010.11.009

Jung, I., 2005: ICT-pedagogy integration in teacher training: Application cases worldwide. *Educational Technology and Society*, 8 (2), 94-101.

Kommers P., Smyrnova-Trybulska E., Morze N., Noskova T., Pavlova T. & Yakovleva O., 2014: First outcomes of WP2 research carried out within the Framework of the IRNet project – international research network. In M. Turčáni (Ed.) DIVAI 2014 – Distance Learning in Applied Informatics, (pp. 357-372). Constantine the Philosopher University in Nitra, Faculty of Natural Sciences, Department of Informatics.

DEVELOPMENT OF INFORMATICS COMPETENCES OF COMPUTER SCIENCE TEACHERS DURING THE TRAINING COURSE "COMPUTER GRAPHICS"

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Abstract: *Learning of computer graphics by the students of information specialties in pedagogical universities is related to the modern trends of information and communication technologies (ICT) development. The article substantiates the necessity of introducing this course in the educational process of training of future computer science teachers. It is indicated that learning of the course contributes to formation of important interdisciplinary and disciplinary professional competences needed for modern ICT experts and future computer science teachers.*

Keywords: computer graphics, training of future computer science teachers, competence approach.

INTRODUCTION

Informatization of education makes demands on the modern teacher to master computer technologies. The growth of the modern society sets absolutely new tasks for education system. First of all, this requires forming of the personality that effectively responds to the technologies upgrading. Now the society needs the pedagogy on the base of which the components of creative style of human thinking is formed.

The main feature of the thinking style is the ability to analyze any problems, establish systematic relations, identify contradictions and find ideal solutions to them, and predict possible options of the solutions development. People with such thinking style are ready for the changes in technologies. They consider these changes an opportunity to gain moral vital satisfaction from solving current intellectual problems. Formation of such qualities in young people is provided by using the competence approach in education.

Similar research is substantiated by many theorists and practitioners of using the competence approach in the experts training, including the training of future teachers (Zhaldak, Ramskyi & Rafalska 2009; Smyrnova-Trybulska 2007; Bibik, Ovcharuk 2005; Kuzmina, Strutynska 2011; etc).

Changing of social conditions constantly improves educational concepts. Now the main priorities in the education system are not only skills and knowledge, but also the personality of the student with his/her individual characteristics and abilities. Thus, there is a task to define training time as student creative work aimed at active scientific and educational activities and the use of modern information technology. The view concerning the self-education and the content and methods of the disciplines varies under the influence of new information technologies. The process of informatization of education allows teachers to use in teaching a wide range of information technology, one of which is computer graphics.

Computer graphics is a relatively new area of human activity, which is a set of hardware and software for the creation, saving, transmission, processing and visual presentation of graphic data.

The purpose of the article writing is the justification of necessity in the training of computer graphics for the students of pedagogical universities. If the computer science teacher masters the basics of computer graphics design, he/she will actively use a variety of computer tools in the professional activities. This will expand the choice of materials and forms of educational work. Also it will make possible to independently create own training materials that are fundamentally different from traditional ones. This will help to make lessons more vivid and exciting and give the impetus to the pedagogical creativity on the basis of the modern techniques and technologies.

1. THEORETICAL BASIS OF LEARNING COMPUTER GRAPHICS BY FUTURE COMPUTER SCIENCE TEACHERS

Computer graphics is considered a set of methods and techniques for converting data into graphics presentations (and vice versa) with the use of a computer.

The student which masters the basics of computer graphics may present the training material through computer visuals. Wide expansion of multimedia technologies requires preparing of future computer science teachers with including a necessity of them taking a computer graphics course. For this purpose educational course “Computer Graphics” is created. The main requirement for prior training of students is gaining of basic computer science course.

The purpose of the course is systematization of knowledge on modern graphics programs, mastering the skills of using basic software tools for working with raster and vector graphics, and forming practical skills related to software products of raster and vector graphics at the expert user level.

This purpose is realized through **the goals and objectives of the course “Computer Graphics”:**

- Providing the students with strong and conscious mastering of knowledge about principles and processes of creating and processing of graphic images;
- Forming of the students holistic understanding of the principles for working with programs of raster and vector graphics;
- Learning of formats of graphic files and the practicability of their use while working with different graphics programs;
- Training of the students for gaining by them the skills of creating and editing of their own images with the use of graphics software tools;
- Training of the students for gaining by them the skills of making graphic data exchange between programs;
- Forming of the students’ practical skills of working with modern graphics software;
- Training of the students for gaining by them motivated development of designing task and choice of the optimal algorithm of actions;
- Development of the students’ creative thinking;
- Mastering the skills of individual and team activities while the developing and implementing of the object models projects;
- Forming and developing of the students’ motivation to learn environmental, mathematical and technological sciences based on the use of modern computer design;
- Developing of the skills of conscious and rational use of software tools in their training activities to solve specific problems.

The course consists of 72 learning hours, 54 hours of them are class exercises, 18 hours are dedicated for the students’ individual work, 18 hours are lectures, and 36 hours are laboratory works.

After studying of the course, students should **know** the following:

- features, advantages and disadvantages of raster and vector graphics;
- methods of describing colors in computer graphics (color models);
- how to obtain the screen and printer colors;
- how to save image files in raster and vector formats;
- graphic data compression methods;
- problems with graphics file format conversion;

- purpose and functions of various graphics programs.

As a result of gaining of the practical part of the course, students should **be able to:**

1) Create their own graphics with the use of basic tools of the vector graphics editor, namely:

- create drawings from simple objects (lines, arcs, circles, etc.);
- perform basic operations with objects (deleting, moving, scaling, rotating, mirroring, etc.);
- form their own color shades in various color models;
- paint drawings with the use of different types of fillings;
- work with the paths of objects;
- create drawings with the use of curves;
- create graphics with the use of methods of organizing and combining of objects;
- create three-dimensional images;
- use various graphical effects (volume, flow, figure cutting, etc.);
- create labels, titles and place text in a path.

2) Edit and create raster images, namely:

- highlight fragments of images with the use of different tools (area, lasso, magic wand, etc.);
- move, duplicate, and rotate selected areas;
- edit photos with the use of different decoration methods;
- save selected areas for further use;
- plot the photos (make multilayer documents);
- paint black and white sketches and photos;
- use different effects for the text;
- make tone correction of photos;
- retouch photos;
- make exchange of files between graphics programs.

3) The basic system controls of objects animation and scenes visualization.

Thematic scheduling of lectures.

1. *Methods of graphics presentation. Color in computer graphics.* **RGB** color

model. Forming of own color shades on the screen. CMYK color model. The interrelation between of RGB and CMYK color models. **HSB** (Hue - Saturation - Brightness) color model.

2. *Graphics files formats.* Vector formats. Raster formats. Methods for compressing of graphic data. Saving of images in standard formats as well as graphics programs formats. Conversion of files from one format into another format.

3. *Graphics creating. Vector graphics.* Basics of work with objects (objects operations). Drawing of basic geometric objects. Selecting of objects. Painting of drawings.

4. *Methods of organizing and combining of objects.* Methods of combining objects (grouping, combining, and welding). Excluding of one object from another object.

5. *The volume (three-dimensional) effect.* Flow. Work with the text. Saving and loading of images. Work with the drawings made in different program versions, importing and exporting of images.

6. *Work features of the programs for creating and editing of raster images.* The use of different selection tools: *Area, Lasso, Magic Wand*. Masks and Channels. Collage. Basics of work with layers.

7. *Editing of photos with the use of different decoration methods*. Drawing and coloring. Correction of tone and color. Retouching photographs. Color and tone correction. Retouching of photos. Work with the paths.

8. *Filters. Styles. Images optimization.* Saving on the web pages.

9. Animation designing.

A tentative list of laboratory works:

1. Graphics creating. Vector graphics. Drawing of basic geometric objects.

2. Objects highlighting. Painting of drawings.

3. Methods of organizing and combining of objects. Methods of combining objects (grouping and combining). Excluding of one object from another object.

4. The volume (three-dimensional) effect. Flow. Work with the text.

5. Saving and loading of images. Work with the drawings made in different program versions, importing and exporting of images.

6. Work features of the programs for creating and editing of raster images. The use of different selection tools: *Area, Lasso, Magic Wand.*

7. Masks and Channels.

8. Collage. Basics of work with layers.

9. Drawing and coloring.
10. Drawing and coloring correction.
11. Retouching of photos. Work with the paths.
12. Filters. Styles.
13. Images optimization. Saving on the web pages.
14. Designing and creating of animations.
15. Individual and team projects.

At the end of the course the team presentation of the implemented projects should be made.

2. TRAINING TECHNIQUES OF COMPUTER GRAPHICS FOR FUTURE COMPUTER SCIENCE TEACHERS

The conducting of laboratory works needs modern material logistics and software. There is no question concerning the material logistics, but the software should be chosen just by the teacher. There is no doubt that the characteristics of commercial versions of professional Adobe Photoshop or Corel Draw are wider comparing with other programs. But also other freeware distributed programs can be applied for performing of some tasks. Here are some examples of such software to work with raster graphics (Gurskiy, Bondarenko & Bondarenko 2007; Pavlyk, Shkitsa & Chaplinskyj 2005):

1) GIMP is a very popular graphics editor. The main functions of the two editors are very similar: almost every Photoshop tool has an analogue or alternative in GIMP, although implementation of specific instruments may have different individual characteristics.

2) The program PhotoFiltre includes filters which are similar to Photoshop. They are applied for rotating the images, changing the size, printing in various sizes, and adding the limits. Software tools have plugins.

3) PhotoScape is quite simple program for creating of different decorative frames for photos. Also this program is good for publishing of photos on the Internet or printing of photos. PhotoScape allows you to combine several photos into one photo, create an animated GIF, divide the photo into several parts, make a screenshot of your computer screen and record it to the disk, convert RAW format into JPG, rename a specific number of photos and so on. Software tool provides support of Adobe Photoshop filters. Also it is optimized for work with the slides.

4) Program PAINT.NET has an interface which is similar to Photoshop, including *History*, *Layers*, and *Palette*. There is support for work with layers, as well as a big library of filters and special effects.

Figure 1. Students' work (Anna Sheliia and Max Boner) performed with the use of raster graphics editor

Figure 2. Students' work (Anna Sheliia and Max Boner) performed with the use of raster graphics editor

Figure 3. Students' (Anna Sheliia and Oksana Mirgorodchenko) works performed with the use of vector graphics editors

Figure 4. Students' (Anna Sheliia and Oksana Mirgorodchenko) works performed with the use of vector graphics editors

Figure 5. Students' (Anna Sheliia and Oksana Mirgorodchenko) works performed with the use of vector graphics editors

Figure 6. Students' (Anna Sheliia and Oksana Mirgorodchenko) works performed with the use of vector graphics editors

There are programs (e.g., Inkscape) that are similar to above-mentioned programs. Inkscape is the free vector graphics editor, which is functionally similar to

Illustrator, Freehand, CorelDraw, or Xara X. It uses the W3C standard called Scalable Vector Graphics (SVG). The software supports SVG tools such as figures, paths, text, markers, clones, alpha-channel, transformations, gradients, textures and grouping. Inkscape supports Creative Commons metadata, editing of units, layers, complex path operations, raster graphics vectorization, text on a path, text wrapped into the figure, XML-data direct editing and so on. It imports files of formats such as JPEG, PNG, TIFF, etc. and exports PNG files and files of some vector formats.

3. DEVELOPMENT OF INFORMATICS COMPETENCES OF COMPUTER SCIENCE TEACHERS DURING THE STUDYING OF COMPUTER GRAPHICS

Now there is enough experience and materials of traditional system of teachers training. However, this system is not fully consistent with the new paradigm of education and doctrine of Ukrainian education development in the 21st century, in particular with regard to the use of new information technologies for intensification of learning process, creative thinking of students, and forming of informatics competences.

According to N. Morze (2010), informatics competences include the following knowledge and skills:

- understanding of basic computer programs, including graphics editor, word processor, spreadsheets, databases, tools for creating of presentations, data saving and processing; education in the field which is based on the use of the Internet services etc.;
- understanding of the potential of information technologies for employment opportunities, support of innovation persons' activity, and involvement people into the society business;
- basic understanding of the reliability and validity of the data obtained and respect for ethical principles while the use of interactive information technologies.

These competences include the following skills and abilities:

- ability to search, collect, create, organize electronic data, systematize the data and concepts, skills to distinguish subjective from objective, real from virtual, relevant from irrelevant; ability to use the necessary tools (presentations, graphs, charts, and knowledge maps) for a comprehensive understanding and presentation of data;
- ability to search and find necessary websites, use the Internet services and Web 2.0 services;
- ability to use information technology with taking into account critical thinking about unfolding situation, innovation activity in different contexts at home, at

work (school) and leisure.

These competences include the following attitude to ICT: the habit of using information technologies individually and in teamwork, the ability to determine the value of certain data and information; a positive attitude to the rules of safe and responsible work on the Internet, including personal issues and understanding of cultural differences between people; interest in expanding of the horizons with the use of ICT by participating in various communities, including cultural, social, etc.

The professional competences of the teachers can be divided into three groups (Smyrnova-Trybulska 2007; Pidgorna 2012; Golovan 2007; Yashanov 2012):

1) Subject (related to the discipline, which is taught by the teacher);

2) Didactic and methodical (related to skills of teachers, especially, the use of active learning, i.e., project methods, training and collaborative, use of the modern didactic technologies);

3) Educational (related to different methods of influence on students and communication).

The content of the components of informatics competences for the teachers is closely associated with the content of subject and didactic and methodical competences.

The process of learning of "Computer Graphics" needs applying of different educational methods of teaching: verbal (lectures, conversations, explanations), visual (presentations, illustrations, observations), and practical (laboratory work, individual and team projects). Formation of subject competences in computer graphics is possible during the project activity of students in the learning process of the course.

The idea to include project activities in the educational process was offered by American teacher and philosopher John Dewey over a century ago. Defining of the project essence as a pedagogical phenomenon is very complex, because the project and educational process can be extremely complex. The word "project" is translated from Latin. This means "thrown forward", "idea", "plan", etc.

The great advantage of the use of project activities in the educational process is forming of professional and informatics competences such as:

- to plan activities with previous predicting and considering of all possible results;
- to use a lot of data sources;
- to individually collect and analyze materials, correlate facts and argue opinions;
- to make decisions;

- to gain social contacts (allocate duties and interact with each other);
- to create the final product, i.e., material medium of project activity (report, essay, film, calendar, brochure, script, program, website, etc.);
- to present the developments to the audience;
- to evaluate themselves and others.
- Students have the opportunity to choose the project goal and the final result. The teachers, if necessary, can adjust this.

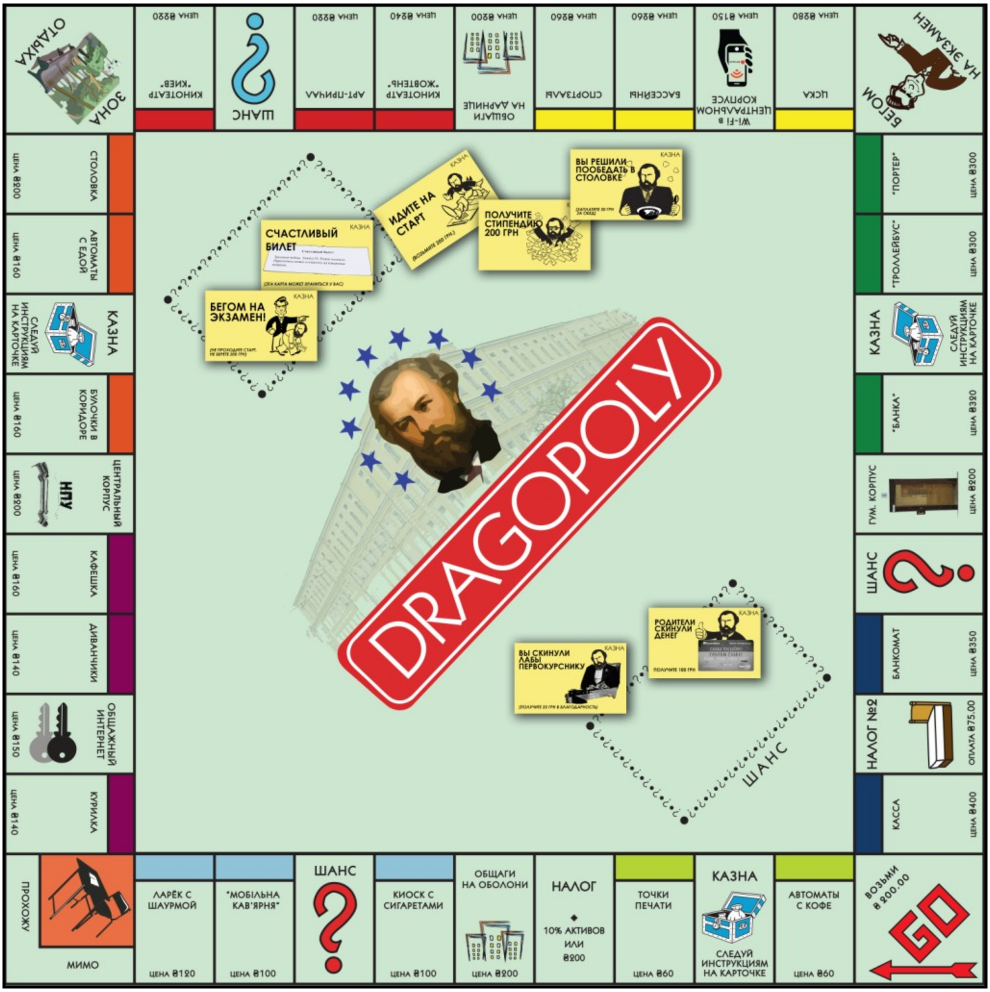

Figure 7. The fragment of the "Drahopoliya" project made by Volodymyr Karlash, Dmytro Danylov, Anna Sheliia, Anastasiia Prisiazniuk, Valentyna Usenko

As an example, it is possible to present the result of the "Drahopoliya" team project which is completed by 4th year students of the specialty "Computer Science*"

(Faculty of Informatics and Computer Science of the Dragomanov National Pedagogical University). A small group of five people has developed their own version of the popular tabletop game "Monopoly". The playing field and over 100 cards have been created with the use of graphics editors. Also fictional tasks for all the game steps have been developed.

Each project participant was performing his/her part of the work during the semester. Due to this, the students have gained skills of using different software tools for working with graphics, team working, and presenting their activity results. Also they have improved their overall level of informatics competences.

4. CONCLUSIONS

Subject competences formed during the course "Computer Graphics" can be used by students for creation of printed materials, scientific visualization and applied research related to various subject fields (physics, chemistry, biology and others). Created images can be used in reports, articles, and multimedia presentations, placed on web pages or imported to the documents of the publishing system. Computer graphics competences, which are formed after taking the course "Computer Graphics" by students, can be basis for further improvement of skills in the field of three-dimensional modeling, animation, video editing, and creating of virtual reality.

Focusing on the competence approach in the process of computer graphics training at the pedagogical university contributes to forming of subject competences of future teachers. Besides that, it also furthers formation of the components of professional and cultural competences in general.

Thus, learning of computer graphics contributes to forming of the students' scientific view, development of the creative potential of students, their constructive, imaginative, spatial, associative thinking that is a fundamental feature of professional education and a criterion of the learning process effectiveness.

REFERENCES:

Bibik N.M., Yermakov O.V., Ovcharuk O.V. and others, 2005: *Competence education – from theory to practice.* Pleyady, Kyiv, 2005. [In Ukrainian].

Golovan M.S., 2007: *Informatics competence: essence, structure and formation. Computer science and information technologies in educational institutions.* Scientific methodological periodical, 2007, №4, P. 62-69. [n Ukrainian].

Gurskiy Y.A., Bondarenko S.V., Bondarenko M.Y., 2007: *The best tricks and effects of Photoshop, CorelDRAW 3 ds Max.* Full-color edition (+video course). Piter, St. Petersburg, 2007, 224 p. ISBN 5-469-00668-9 [in Russian].

Kuzmina N.M., Strutynska O.V., 2011: *Competence approach to teachers training of information system and technologies.* Information technologies in the education. Edited volume, №9. KSU publisher, Kherson, 2011, P. 56-62. [in Ukrainian].

Morze N.V., 2010: *How to train teachers in order to change their considering of computer technology as a miracle in education?* A computer at school and at home, 2010, №6. – P. 10-14, [online] at http://nbuv.gov.ua/UJRN/komp_2010_6_4 [In Ukrainian].

Pavlyk I.V., Shkitsa L.Y., Chaplinskyj S.S., 2005: *Computer graphics.* Abstract of lectures. Fakel, Ivano-Frankivsk, 2005. [In Ukrainian].

Pidgorna T.V., 2012: *The structure of informatics competences.* Series 2: Computer-oriented learning systems, №12, P. 109-116, [online] at http://nbuv.gov.ua/UJRN/Nchnpu_2_2012_12_17 [In Ukrainian].

PSD.ru Anatomy of Adobe Photoshop [online] at http://www.psd.ru/map/ [In Russian].

Smyrnova-Trybulska, E.N., 2007: *Fundamentals of Generating Information Competences of Teachers in the Field of Distance Learning. Monography*. Ailant, Kherson, 2007, 704 p. ISBN 966-630-040-1. [In Russian]

Yashanov S.M., 2012: *Theoretical and methodological basis of the informatics educating of labor training teachers*. Thesis paper. Dragomanov National Pedagogical University, Kyiv. [In Ukrainian].

Zhaldak, M.I., Ramskyi, Y.S., & Rafalska, M.V., 2009: *Model of social and professional competences of Computer Science Teachers*. Scientific journal of Dragomanov National Pedagogical University. Series 2: computer-oriented learning systems, 7 (14), 2009, P. 3-10. [In Ukrainian].

THE LEVEL OF INDIVIDUALIZATION AS ONE OF THE QUALITY DIMENSIONS OF E-LEARNING

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Abstract:*The goal of this article is to examine the issue of individualization of the learning process in e-learning systems and blended learning as an element of evaluating the quality of courses. This aspect of on-line learning is often omitted or treated marginally. Modern research on the learning process indicates that there is significant importance in adjusting the learning environment to the individual learning needs and preferences of the learner. Popular methodical and technical solutions in on-line learning and distance education should also incorporate and support actions that allow for the individualization and personalization of the widely understood process of teaching and learning. This, in turn, will indirectly contribute to improving the effectiveness and overall quality of learning.*

The considerations presented in this article showcase a variety of forms, activities and tools that support the individualization of learning and teaching in e-education. Certain criteria for evaluating the quality of e-learning courses have been proposed which indicate the level of individualization in various aspects of learning.

Keywords: e-learning, blended learning, quality of e-learning, individualization, personalization

INTRODUCTION

Modern trends in education clearly indicate the growing significance of actions that personalize the learning process to the individual needs of learners. In light of the broad usage of new information and communication technologies the learning and teaching environment is being enriched with new quality which is worth using for supporting the efforts of learners trying to reach their educational goals.

Up to this point the experience in supporting the educational process with technological tools indicates that virtual space and digital resources allow for a greater modification of the learning process in such a way as to incorporate individual conditions and personal preferences of learners. These tendencies are more and more evident in advanced and complex e-learning systems and blended learning. It is a result of the idea that e-learning is based on the necessity of the student to directly engage in the learning process and take responsibility of their educational actions. That is the reason why designers of e-learning systems are trying to incorporate a broad range of resources and tools in courses, so that the learners can modify their educational space to their individual preferences and priorities. (Ehlers 2004).

1. QUALITY OF E-LEARNING FROM DIFFERENT PERSPECTIVES

Topics on e-learning systems can be seen from different perspectives - respective of situations, different factors might be considered such as economical, organizational, legal or social. The most common and typical understanding of *quality* of e-learning refers to obtaining the best learning achievements and excellence in performance (Ehlers, U., Goertz, L., Hildebrandt, B., Pawlowski, J. M.). However, when considering the problem of quality at the institutional level of education, the running costs, which is the ratio of investment to obtained results. U. Ehlers rightly points out that when defining the term *quality* we position ourselves in a multidimensional space. That is why we can talk about various interpretations, kinds and levels (Ehlers 2004).

For example, in the ELQ (E-learning quality) model developed by the Swedish National Agency for Higher Education, used for the evaluation of e-learning, there are 10 quality dimensions models for assessing quality in e-learning, including: material (content), structure and virtual environment, communication (cooperation, interactivity), student assessment, flexibility and adaptability, support (student and staff), staff qualifications and experience, vision and institutional leadership, resource allocation, the holistic and process aspect (Ferreira, Andrade 2011).

When analyzing the quality of e-learning from the user's perspective - a learner who is using distance learning methods, we can consider quality on several levels connected to the basic elements of the learning process. The first level is context-quality, the second, structure-quality, the third, process-quality, and the fourth, output-quality or impact-quality (Ehlers 2004).

However, in *Quality in e-Learning from a Learner's Perspective* the authors defined seven main fields of quality based on empirical research. The defined fields with listed dimensions are shown in Table 1.

Table 1.

Fields of quality from a Learner's Perspective

Quality field	Dimensions
Tutor Support	interaction centeredness, moderation of learning processes, learner vs. content centeredness, individualized learner support, goal- vs. development centeredness, traditional communication media, synchronous communication media, asynchronous communication media
Cooperation and Communication in the Course	social cooperation, discursive cooperation
Technology	adaptivity and personalization, synchronous communication possibilities, availability of content (technical)
Costs - Expectations - Value	expectation of individualization and need orientation, individual non-economic costs, economic costs, practical benefits, interest in course and media usage
Information transparency	counseling (advice), organizational information, information about course goals and contents
Course structure	personal support of learning processes, introduction to technical aspects and to the content, tests and exams
Didactics	background material, multimedia enriched presentation material, structured and goal oriented course material, support of learning, feedback on learning progress, individualized tasks

Source: Own work, based on U. Ehlers, Quality in e-Learning from a Learner's Perspective, European Journal of Open, Distance and E-Learning 2004 EURODL, http://www.eurodl.org/?p=archives&sp=full&article=101

Many of the mentioned elements of evaluating the quality of learning in e-learning models refer directly or indirectly to topics on the individualization and personalization of learning.

An interesting proposal from Poland on the quality of evaluating e-learning courses, are the criteria developed by the Society of Academic E-Learning (SEA)(*Wybrane kryteria oceny* , 2008). In the prepared proposals the authors refer to the topics on quality in four fields: course organization, course development, running the course and evaluation. Here you can also find the elements that refer, in varying degrees, to different aspects of the individualization of learning actions.

2. INDIVIDUALIZATION POSSIBILITIES IN THE LEARNING PROCESS

When talking about the problem of individualization in education it is worth starting with defining individualization and how it can be run. In general, the individualization process is "modifying content, methods and learning resources to individual skills, abilities and interests of learners" (*Encyklopedia PWN,* 2016). Conversely, in the case of defining the quality of learning the levels and types of individualization can differ greatly. Well-known theorists of the learning process such as R. M. Gagne, L. J. Briggs and W. W. Wager enumerate several of them. Starting with full individualization, which is achieving general learning goals, which the student will reach independently (*independent study plans*), by planning their individual learning process, choosing the right strategies and learning materials. The second level includes self-study (*self-directed study*), which is setting detailed learning goals, however, without specifying the approach in which they will be reached. The teacher may suggest a list of books and provide didactic materials. The student, however, is not obligated to use them. The other kind of individualized learning are programs focused on the learner (*learner-centered programs*). Learners in these programs can decide on the learning content, which they will master (however, usually there is a basic requirement - a specified canon obligatory for all learners). The pace of learning is one of the significant factors in differentiating the learning process. Learners can work at their pace (*self-pacing*), however, the learning goals established by the teacher remain mutual and specified by the teacher. The last approach to the individualization of the learning process mentioned by the authors is learning determined by the student (*student-determined instruction*). It is characterized by the decision-making power of the student who chooses the basic elements of the didactic process, that is learning goals, strategies, materials and didactic materials as well as the pace of learning (Gagne, Briggs, Wager 1992).

When describing the issue of differentiation instruction, K. Scalise emphasizes that it is similar in the traditional learning process and e-learning - only the tools are different. There are three fields in differentiation instruction: differentiation of content, differentiation of learning style approach and differentiation of product. The first field offers students the chance to start at different stages in the curriculum and proceed at different paces, the second field emphasizes different modalities of learning style or learning preference, such as visual and auditory learners, and the third field gives different assignments to different students, and brings different work products (Scalise 2007).

Considering the described approaches, it can be assumed that the individualization process is understood as a differentiation of the didactic process with regard to personal preferences and choices of the learner. It is usually realized in learning practice by modifying or adjusting the following elements:

- **didactic materials** – learners can choose different forms of didactic materials, starting to learn at any stage of the learning material and mastering it at their pace;
- **the course of the didactic process** – learners, according to their preferences can use different methods and forms of learning, there is also a possibility of modifying the methods of learning to the style of the learner, such as intelligence profiles (H. Gardner multiple intelligences), sex or other social factors;
- **learner achievements** – learning goals can often be modified to fit individual needs, current results or the entry-level knowledge of the learner, the tools may also be different;
- **relations** – differentiation of the teacher's actions to shape attitudes, elevate and sustain motivation to reach the established learning goals, support the student in the learning process;
- **learning environment** – learning conditions can be modified, such as individual work, group work, ICT, Internet (on-line learning), multimedia, etc.

3. INDIVIDUALIZATION OF LEARNING IN E-LEARNING COURSES AS AN ELEMENT OF QUALITY EVALUATION

Coming to the analysis of the actions, that increase the level of individualization in e-learning courses, simultaneously considered as criteria for the evaluation of e-education, it is worth introducing a certain differentiation. In many situations the terms "individualization" and "personalization" are synonymous and are used interchangeably. However, when we are talking about personalizing the virtual space - specifically in the Polish language - we are referring to the technical side, to the changes in the preferences of the programs and applications according to one's liking. This element is an important aspect of on-line learning. The solutions used in this aspect make the learning environment user-friendly.

Below we will characterize six areas of e-learning systems in which actions supporting individualization of learning may have a significant impact on the quality of learning.

3.1.Resources and didactic materials

The first area of investigation comprises resources and didactic materials. While analyzing their quality it is worth looking at the volume of educational resources. The available materials can be divided into groups - the ones that are obligatory for all students and the ones that are elective which supplement or expand knowledge from a specific area. The learner decides which resources they will use, according to their needs. The other commonly used solution in learning practice that enriches didactic resources is supplying the courses with references (hyper-links) to external sources. In this way it is possible to extend the scope of available resources in the course.

The quality also depends on the variety of the forms of presenting the learning content. The educational materials can be published in various formats such as text, multimedia, photography, animations, simulations or interactive texts and quizzes. It is important to present the learning content in many ways - the learner will choose the form of the content according to personal preferences. Dependence of the form of presentation on the preferences of the user creates a situation in which we are talking about different perception profiles and styles of learning.

Another feature that supports universality is the availability of educational materials on different platforms. Especially important in this case are mobile devices, which facilitate learning in the right place and time.

3.2.Structure and organization of the didactic environment

The fundamental premise of e-learning is flexibility of the learning process - it allows the student to independently decide on the time and place where learning takes place. A well-designed system should incorporate this practice in different scopes. Personalization can, however, reach deeper, and impact other remaining elements of the system, including the organization of the virtual space, the choice of learning methods or methods of communication. Designing e-learning courses in such ways so that the user can choose their own personalized path of mastering the material is difficult in reality but creates more engagement. It also makes them create their own, unique path which is facilitated by the non-linear structure of the courses, which also makes it easy to jump from on topic to the another according to their needs and searching for common things and all related contextual informational actions.

However, one of the most valued elements that allows for the differentiation of the didactic process is the possibility to choose the preferred learning strategies based on various didactic resources. It takes place by choosing the appropriate learning method (ex. expository and problem methods), modifying the actions in the course (individual and group work), designing many types of interactions between users - didactic content in the course. There is a great variety of methods and learning techniques in courses; the project method is widely used, as well as didactic games, brainstorming techniques, etc. They allow to cooperate with other participants of the learning process, they help to make new contacts and intensify relationships as well as share knowledge and experience.

3.3.Means of communication and cooperation

Means of communication of the participant with the course lecturer should not be treated lightly as they contribute to the overall evaluation of the quality of e-learning. It is good when a student has the option to choose the means of communication with the lecturer as well as with other students. Every course should include many channels of synchronous and asynchronous communication.

Aside from the basic means of communication such as e-mail, communicators, chats, on-line forums, it is worth using tools of group-work such as wikipedia, on-line seminars and conferences. The communication tools in the course should not only facilitate information flow but also allow to create social networks of learners and reach mutual learning goals.

From the perspective of managing their own learning process, it is inevitable to have an extensive system of notifications, such as a calendar with important dates, notification windows with reminders about upcoming events or incoming messages.

3.4.Student assessment

Individualization in the scope of controlling knowledge and achievements of the learner is quite difficult to achieve in reality. It is more useful not in e-learning courses, but in the case of creating a learning environment using new technologies (on-line learning, web-based learning). When advanced adaptive education systems allow to modify learning goals, if the didactic goals are dependent on the level of initial knowledge of the learner, the possibility of establishing learning goals individually is less likely.

It is much easier to supply the course with the option to choose the method of controlling the quality of knowledge and skills. The evaluation of the user's progress can be done with tests, quizzes, individual tasks, group projects, research reports, essays, etc. A factor that facilitates individualization is the further supplementation of e-learning systems with self-control tools that allow to verify the knowledge by the course participants. Information obtained in this way facilitates the management of the learning process and planning of future tasks.

3.5.Flexibility and adaptability

In the case of this category the adaptation of the virtual learning environment is analyzed from a technical standpoint. It is based on determining the ability to change the settings and preferences of the interface, modifying it to the specific needs of the learner. Elements that are considered include: graphical template (including the option to change fonts, the position of navigational elements, colors), managing the method of displaying and playing multimedia materials, the availability of additional features or software.

The option to modify the courses to the needs of dysfunctional special needs learners. The materials included in the course should meet the Web Accessibility Standards.

3.6.Teacher assistance and individual support systems

The last considered category in this article, tightly connected to the individualization process, is supplying the courses in assistance and support systems at different stages of the learning process. The main goal of the teacher is to help the learners to master the learning material and to acquire knowledge. The teacher can support the learner in a specific situation by additional information and supplementation, comments on the tasks, feedback on tests and exercises, monitoring learning progress, awards and praises for accomplished tasks. Generally, this evaluation method relates to the presence of various forms of individual support from the teacher and using motivational techniques (i.e. additional materials for those who are interested).

The discussed factors, that facilitate the individualization in the learning process in e-learning systems, are shown in table 2.

Table 2.

The option of individualization and personalization in e-learning in the context of quality evaluation

Dimensions quality.	**Factors that facilitate individualization in e-learning**
Material content	• the large volume of educational resources, the presence of obligatory and elective materials, supplying with links to external sources which supplement or extend knowledge in a specific field • the variety of presented educational content (the option to choose forms of presentation), different media forms (text and multimedia materials, such as images, photographs, charts, diagrams, maps, podcasts, videos, simulations, animations, web resources, interactive quizzes, tests and crosswords). • interdisciplinary, availability in different platforms, content modified to the requirements of different devices, particularly mobile devices. • using tools of course presentation that facilitate the individualization of the message with the inclusion of different styles of perception and learning (visual, auditory and kinesthetic)
Structure and virtual environment	• the ability to use various means and didactic strategies (planning different interactions - didactic content), • ensuring the use of a variety of methods and learning techniques (i.e. suppository and problem) • the ability to modify the work schedule, • non-linear course structure, the ability to change the order of the topics, creating a personalized path of mastering the learning material
Communication, and cooperation	• the presence of various synchronous and asynchronous communication channels, the ability to choose the means of communication (e-mail messages, communicators, chats, tools

	for group work, seminars, on-line conferences).
	• extensive assistance system (pop-up windows, reminders, calendar)
	• the ability to participate and build the community in the course
Student assessment	• the ability to individually establish or modify learning goals, determine the didactic goals from initial knowledge
	• the ability to choose the method of controlling knowledge and skills (individual tasks, individual and group projects, tests, quizzes, projects, research reports, essays)
	• the presence of activities that allow the participant of the course to independently verify their knowledge
Flexibility and adaptability	• The possibility of adapting the work environment in the technical aspect, setting-up the interface preferences, adapting the appearance by modifying the settings (graphical template, font size and type, the way in which the course elements are displayed, color change, playing multimedia materials, etc).
	• The ability to adjust the courses to the needs of dysfunctional individuals, special needs learners and the disabled.
Support	• This aspect refers to the various forms of support from the teacher. The teacher can support the student in a specific situation with additional information, comments to tasks, etc.
	• using motivational techniques (i.e. additional material for those who are interested, feedback from tests and exercises, monitoring progress in learning, awards for completed tasks).

Source: Own work

List of tasks and activities that help to adjust the learning process to the needs of the learner. This statement does not provide all possibilities; it is rather a hint - as in which course elements play a significant role in the context of individualization from the perspective of the quality of the entire learning process.

4. CONCLUDING REMARKS

To sum up the existing considerations it can be assumed that the individualization level in the learning process with the use of new technologies, specifically e-learning models, can be seen as one of the most essential dimensions of criteria in the quality of learning. Many factors can contribute to adjusting various forms of elements of the learning process to the individual preferences of on-line learners. These facilitators contribute to improving the effectiveness of learning and are perceived as positive by the learners. It is worth noting, however, that implementing an individual approach in learning largely consists of developing the virtual environment, and is connected with high financial costs, which do not always translate into a clear and significant improvement of the entire system. Nonetheless, in many cases actions that are supposed to support the individualization process can take place at all stages of implementing e-learning solutions and the benefits of them can be achieved with little cost.

REFERENCES

Ehlers, U., 2004: *Quality in e-Learning from a Learner's Perspective*, „European Journal of Open, Distance and E-Learning" 2004 EURODL, [on-line] at http://www. eurodl.org/?p=archives&sp=full&article=101 (accessed 26 July 2016).

Ehlers, U., Goertz, L., Hildebrandt, B., Pawlowski, J. M., 2005: *Quality in e-learning. Use and dissemination of quality approaches in European e-learning. A study by the European Quality Observatory*, Luxembourg: Office for Official Publications of the European Communities, [on-line] at http://www.rcc.gov.pt/SiteCollectionDocuments/Qualitye-learning05.pdf (accessed 26 July 2016).

Encyklopedia PWN [PWN Encyclopedia], [on-line] at http://encyklopedia.pwn.pl/haslo.php ?id=3914639 (accessed 3 July 2016)

Ferreira, S. A., Andrade, A., 2011: *Systematic analysis of Quality Technology Enhanced Learning Environments in higher education: an organizational perspective 2.0* [in] *Education in a technological world: communicating current and emerging research and technological efforts.* A. Méndez-Vilas (Ed.) Formatex Research Center, [on-line] at http://www.formatex.info/ ict/book/428-439.pdf

Gagne R. M., Briggs L. J., W.W. Wager, 1992: *Zasady projektowania dydaktycznego [Principles of Instructional design],* WSiP, Warszawa, p. 287.

Glossary of Education Reform, [on-line] at http://edglossary.org (accessed 26 July 2016).

Scalise, K., 2007: Differentiated e-learning: five approaches through instructional technology, "International Journal of Learning Technology" 3(2), January 2007, Research Gate, [on-line] at https://www.researchgate.net/publication/ 220497459_Differentiated_e-learning_five_approaches_through_instructional _technology (accessed 26 July 2016).

Scalise, K., 2007: *Differentiated e-Learning: What it is and five approaches*. https://net.educause.edu/ir/library/pdf/CSD4903.pdf (accessed 26 July 2016).

Wybrane kryteria oceny kursu internetowego przygotowane przez SEA [Selected criteria for evaluating Internet course prepared by SEA], [on-line] at http://www.cko.us.edu.pl/images/stories/cko/prawo/Standardy_prowadzenia_k ursu_e_learningowego.pdf (accessed 29 July 2016).

IV. DISTANCE LEARNING AND LIFELONG LEARNING. E-LEARNING FOR SOCIETAL NEEDS

THE USE OF MOOCs FOR TRAINING OF THE FUTURE COMPUTER SCIENCE TEACHERS IN UKRAINE

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Abstract: *The article is examines the global trends in MOOCs development, problems and perspectives of implementation and using of MOOCs in Ukraine. Some experience of MOOCS introduction to face-to-face learning is analyzed. The article is includes the analysis of authors' experience concerning the MOOCs recommended for supporting of training of the future computer science teachers in Ukraine. The authors offer the way of MOOCs introduction for supporting face-to-face learning in three stages: a) pre-university preparing of students; b) additions to the traditional courses with MOOCs training elements; c) advanced training and retraining of specialists. The authors' experience of using MOOC in these three stages are described and discussed. Finally, the problems that appeared and solutions which could be beneficial formulated.*

Keywords: MOOCs, Training Teachers, Future Computer Science Teachers, Integration of MOOCs and Traditional Learning.

INTRODUCTION

Massive Open Online Courses (MOOCs) have brought about the real educational revolution. The MOOC is an educational model that brings online learning content to any person willing to participate. An increasing number of MOOCs is offered by higher education institutions and companies, and many authors have pointed at the important role of open online courses for lifelong learning.

According to the statistics of the year 2010, every sixth American student of the full-time education has used an online course to any extent. Now amount of MOOCs users is increased. Video lectures of different schools began to appear on the Internet in the late 1990s. Massive open online courses also provide interactive communication opportunity for students and teachers. Also they make possible online exams.

According to the data collected by MOOC aggregator “Class Central” (www.class-central.com, accessed on 25 July 2016), the total number of students who signed up for at least one online course has crossed 35 million in 2015 – up from an estimated 16-18 million in 2014.

Approximately 1,800 new courses were announced in 2015. As a result, the total number of courses announced since the inception of MOOCs has increased to 4,200 (Shah 2015).

MOOCs attract a lot of students, but only a minority of the students succeeds in completing these courses (Reich 2014). A typical example is an edX course (MIT and Harvard). Only 7,157 students (from 154,763 students registered on electric circuits) have received the certificate (Breslow et al, 2013).

As Reich noted and taking into account the completion rates, no more than 25% of students really intend to finish online courses. This number is lower comparing with such a number related to the traditional face-to-face university courses (Reich, 2014). This is raising the question about combination of the traditional learning and MOOCs.

An increasing number of researchers and teachers have participated in integrating MOOCs into the traditional learning to support face-to-face learning (Bruff, Fisher, McEwen & Smith 2013; Caulfield, Collier, & Halawa 2013; Firmin, Schiorring, Whitmer, Willet, Collins & Sujitparapitaya 2014; Holotescu, Grosseck, Cretu & Naaji 2014).

This research presents our investigation of the ways of introducing MOOCs to the traditional learning in order to train future computer science teachers in Ukraine. The similar pedagogical approach has been considered by Holotescu et al. (2014). They have examined a combination of face-to-face and online activities and the integration of synchronous and asynchronous learning tools for providing an optimal possibility for the arrangement of effective learning processes.

The issues of integrating MOOCs into the traditional learning have been also considered by Israel (2015) in her study *“Effectiveness of Integrating MOOCs in Traditional Classrooms for Undergraduate Student”*.

According to this research, authors can conclude that the combination of the traditional learning and MOOCs exposes students to high quality materials created with the best educational technologies. This creates opportunities for students to collaborate in the global learning community and expand their experience. It is much more than only using of the university learning materials.

Research goal. This paper reviews the results of the recently completed study concerning introduction MOOCs to the traditional learning for training of future computer science teachers in Ukraine. It attempts to address the following questions:

- analysis of global trends in MOOCs development;
- analysis of problems and perspectives of using MOOCs in Ukraine;
- analysis of some experience of using MOOC in higher educational institutions (HEI) of the Netherlands and France;
- consideration of ways of introducing MOOCs to the traditional learning while the process of training of future computer science teachers in the Dragomanov National Pedagogical University.

Hypothesis: taking into account quick development of educational technologies, authors believe that update of the methodological approaches to the training of future computer science teachers by introducing MOOCs to the learning process will increase the level of training and efficiency of education in general.

1. RESEARCH METHODS

Authors have used the following research methods and tools for our investigation (during 2014-2016):

- questionnaire;
- survey and interview of the future computer science teachers;
- observation;
- documents and content analysis;
- research trip and visiting partner universities;
- meeting, conference, seminar, workshop, etc.;
- pedagogical experiment;
- analysis of research papers.

100 students of the Faculty of Informatics took part in this research. The Dragomanov National Pedagogical University in Kyiv and more than 100 students from partner universities (University of Montpellier 2 (France); University of Groningen (the Netherlands)) were involved in this process.

The questionnaire was created during this project which purposed to gain data on the students' opinions and attitudes towards online learning, blended learning, MOOCs and combination of the traditional learning and MOOCs.

2. ANALYSIS OF GLOBAL TRENDS IN MOOCs DEVELOPMENT

Massive Open Online Courses (MOOC or MOOCs) are free training courses with public access via the Internet. This is one of the newest forms of the distance learning, which is actively developing in the global education. Such sites are designed for students of different levels of prior training (both for beginners and experienced professionals), (Kaplan & Haenlein 2016).

Now owing to MOOCs, any disciplines (mathematics, medicine, art, business, psychology, etc.) are available for those who wish to study. MOOCs includes tens of areas and thousands of courses.

The world's best universities (Stanford, Harvard, MIT, Berkeley, Brown, Columbia University, University of London, École Polytechnique Fédérale de Lausanne, University of Edinburgh, Oxford, Cambridge, and many others) participate in the process of creating and implementing of MOOCs. Distance education initiatives are supported by large corporations and charitable organizations (Google, Microsoft, Bill and Melinda Gates Foundation, and others).

The idea of online learning is also realized on the platforms developed by universities. Major educational institutions such as Yale, Carnegie Mellon University, Berkeley, Duke University, Massachusetts Institute of Technology (MIT) create their own video tutorials that duplicate traditional off-line lectures. Fully identical courses can be counted as academic hours of the program course at the university.

MOOSs platforms can be used not only for educational programs but also for advanced training.

The growth of MOOCs is shown in Fig. 1:

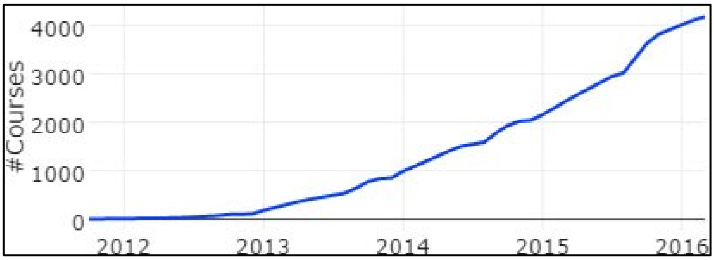


Figure 1. Growth of MOOCs

Source: Data retrieved from MOOC aggregator "Class Central" (https://www.class-central.com/report/moocs-2015-stats, accessed on 25 July 2016)

According to statistics from MOOC aggregator "Class Central" (https://plot.ly/alpha/workspace/?fid=dhawalhs:88), total number of MOOCs was 4180 courses in March 2016 (accessed on 25 July 2016).

The most popular MOOCs providers are Coursera, edX, Udacity, KhanAcademy, CanvasNetwork, FutureLearn, FUN, MyEducationKey, Udemy, and MIT OpenCourseware.

The distribution by MOOCs providers is shown in Fig. 2:

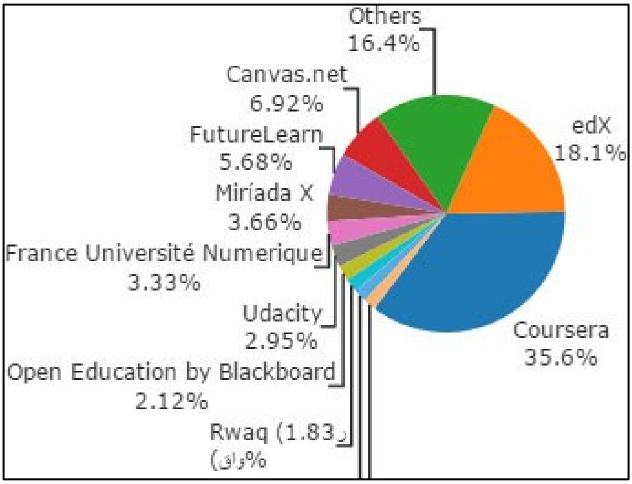


Figure 2.Course Distribution by Providers in 2015
Source: Data retrieved from MOOC aggregator "Class Central" (https://www.class-central.com/report/moocs-2015-stats, accessed on 25 July 2016)

Coursera is the largest online course provider in the world (MOOC or otherwise). Generally, it had 17 million students in 2015 (Shah, 2015).

Coursera, ***edX***, and ***Udacity*** are usually known as the big three. ***FutureLearn*** had a breakout year in 2015. Now it has more students than ***Udacity***. ***FutureLearn*** is the UK-based MOOCs provider (the Open University, United Kingdom (UK)). This makes ***FutureLearn*** the third largest MOOC provider in the world. It grew over to 275% in 2015. Now this is rapidly approaching the three million user mark. Also this launched perhaps the world's largest single session of a MOOC: 440,000 students signed up for one session of the *'Understanding IELTS: Techniques for English Language Tests course'*, which was taught by the British Council (Shah 2015).

Since October 2014 (under the European Union support), the project related to uniting of the MOOC courses of various European universities on one platform EMMA (European Multiple MOOC Aggregator) has been launched. This platform includes the online courses from the European universities (http://europeanmoocs.eu). These courses are in different languages. Pilot program of the project has launched in eight countries (England, Belgium, Spain, Italy, the Netherlands, Portugal, France and Estonia).

Participation in the program are Twelve universities and companies (in these eight European countries) participate in the program. EMMA operates with the support and financing of "Framework Programme of the European Union's competitiveness and innovation". Also, EMMA is presented to the public as a 30-month pilot project that provides the access to MOOC courses in multiple languages with automatic transcription.

According to the information of the project website, EMMA operates in two basic modes: as an aggregator and hosting of the courses developed by the European universities, as well as a system that allows students to build their own way of learning with using MOOC units as building blocks.

Thus, the analysis of the global trends in the field of creating and using MOOCs by leading universities of the world confirms the relevance and necessity of introducing this technology in Ukraine.

3. ANALYSIS OF PROBLEMS AND PERSPECTIVES OF THE USE OF MOOCs IN UKRAINE

The first MOOCs in Ukraine were in 2013 at the Taras Shevchenko Kyiv National University ("University online" (http://online.knu.ua). The first of them was related to brand management. This gathered over 9,000 participants. In September 2014 the Ukrainian Project ***Prometheus*** for developing of MOOCs has been launched (http://prometheus.org.ua/courses/).

The project Prometheus is based on the basis of the platform edX.

Prometheus operates in two formats: MOOCs and blended learning. MOOCs consist of video lectures, and interactive tasks that help to solidify knowledge and a forum where students can ask the teacher different questions and communicate with each other. Blended learning involves the integration of online learning and, in particular, MOOCs, in the educational process of universities and schools.

The first experiments with blended learning were conducted by the Massachusetts Institute of Technology (MIT). They have demonstrated growth of educational results by 35% (Primachenko, 2015). The experiments related of the implementation of online course elements to the traditional learning. MOOCs can be partly replaced with the traditional lectures. Typical tasks are replaced with interactive tasks by using of the network technologies. Students' questions are discussed on forums, but teachers also conduct seminars which are impossible to conduct via the Internet. Final control of students is performed on the face-to-face basis.

Blended learning is essential educational breakthrough, the introduction of which is actively performed by leading Western scientists (Breslowetal 2013; Bruffetal 2013; Bucketal 2013; Caulfieldetal 2013; Dazaetal 2013; Yuan & Powell 2013; Holotescuetal 2014; Firminetal 2014; Reich 2014;

Israel 2015). Start of the pilot project of blended learning with the use of ***Prometheus*** platform is planned in several Ukrainian universities in different cities of Ukraine in September 2016.

Now Prometheus offers 230,000 students 35 free MOOCs from the best teachers of Ukranian and foreign universities, top-companies and organizations. As an example, it is possible to consider the world's best course dubbed in Ukrainian related to programming ***CS50 Introduction to Computer Science***: http://courses.prometheus.org.ua/courses/Prometheus/CS50/2016_T1/info. This course is taught by Professor David Malan of Harvard to university students of the university in the fall semester of 2014-2015 (academic year). The course was accessible on the ***edX*** platform during the year 2015. (cs50.harvard.edu or https://www.edx.org/course/introduction-computer-science-harvardx-cs50x).

At the beginning of Project ***Prometheus*** launch, its authors had doubt concerning the necessity of creation of the Ukrainian MOOCs, taking into account the presence of lots of foreign courses. However, national platforms have certain advantages. They eliminate the language barrier and are based on the national specifics (Primachenko, 2015). In addition, there are areas for which it is advisable to develop the Ukrainian language courses such as "History of Ukraine", "Geography of Ukraine", and "Ukrainian language".

Kyiv National University, Kyiv-Mohyla Academy, National Technical University of Ukraine "Kyiv Polytechnic Institute", Dragomanov National Pedagogical University and "Microsoft" company can create their own MOOC courses and place them on the platform Prometheus.

So, now Ukraine has background for implementing MOOCs in the educational process of universities, colleges and schools to facilitate the access of Ukrainian students to high quality educational materials. In addition, each student will be able to study for free, listening to lectures of the best professors of leading universities.

Before the introduction of new educational technologies, it is necessary to find out all the pros and cons of the use.

The main advantages of MOOCs in the learning process are:

• accessibility (if you have access to the Internet);

• free-of-charge-basis;

• access to high quality educational materials (the ability to listen thematic lectures of the best specialists in the world);

• the opportunity to learn the experience of creating and using MOOCs in the educational process by the Ukrainian teachers on the basis of the foreign MOOCs;

• increase the rate of the growth of the knowledge.

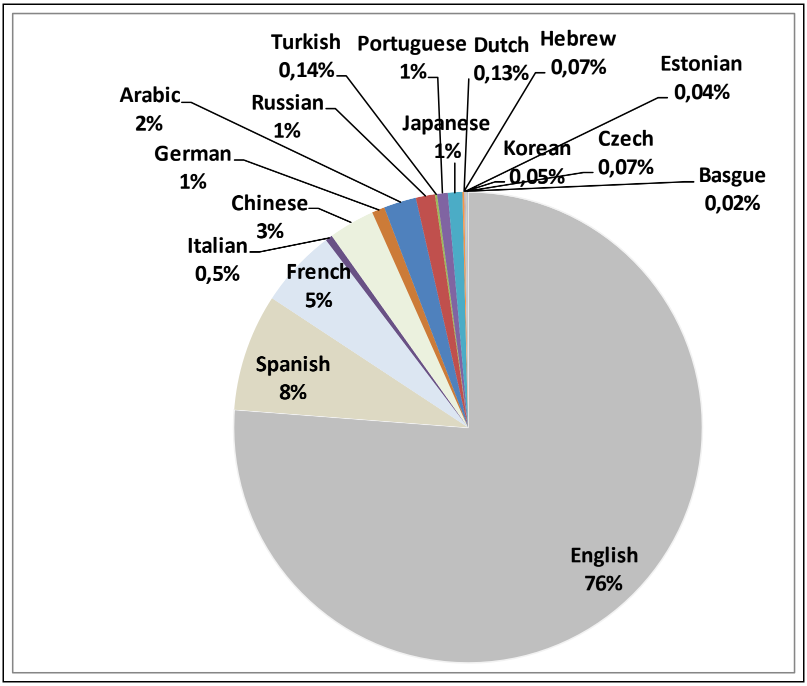


Figure3.Course Distribution by Languages

Source: Own work based on data retrieved from MOOC aggregator "Class Central" (www.class-central.com/languages, accessed on 28 July 2016)

The problems of implementation and use of MOOCs in Ukraine are:

• lack of state support in the implementation of such projects to create such public platforms of MOOCs as in France or China (Primachenko, 2015);

• limited hardware characteristics of the server, on which MEP platform is planned to install;

• lack of experimental studies to determine the sufficiency of control methods of learning for issuing specific Certificate of Completion;

• uncertainty concerning the quality of training materials for courses;

• lack of specialists to develop MOOCs;

•necessity of training of teachers and students for using MOOCs, especially for non-informatics specialties;

• time needed by teachers for the use of this technology;

• difference between personal experience of the student under conditions of full-time education and distance learning (students do not always have well-formed individual work skills and high motivation for educational activity);

• combination of a large volume of the total material for the discipline with a relatively small amount of material that can be placed in MOOC.

• a rather small number of MOOCs in the Ukrainian language;

• Ukrainian students need knowledge of the English language at the level required for the course.

The last problem relates to the fact that in most cases MOOSs training is conducted in English (MOOC has the American "origin"). The share of English language courses has slightly reduced from 80% in 2014 to 75% in 2015. But English still is the most popular language in which courses are offered (Shah, 2015).

Quite common courses are also in Spanish. Already established MOOSs are gradually translated into other languages (French, Chinese, Russian, Ukrainian, Turkish, German, etc.).

Now courses are currently being offered in 17 different languages. Course distribution by languages is shown in Fig. 3:

4. WAYS OF INTRODUCTION OF MOOCs TO SUPPORT OF COMPUTER SCIENCE TEACHERS TRAINING IN UKRAINE

Despite many drawbacks, authors believe that it is for the students to know about this educational technology. This issue is especially important for future computer science teachers. They should not only know about such existing projects and gain skills of work in these systems, but also know how to work with the MOOCs development technology. In future it will not only improve the qualification of future computer science teachers, but also it will contribute to using of the technology in their pedagogical activity own training future professionals for life but also the possibility of using this technology in their professional educational activity.

In this research authors propose such ways of using MOOCs in the Dragomanov National Pedagogical University for supporting face-to-face learning of the future computer science teachers as:

1. Pre-university preparing of students.
2. Additions to the traditional courses with MOOCs training elements.
3. Advanced training and retraining of specialists.

The article considers these trends in more detail with stating of specific examples of using MOOCs by the universities of Ukraine, the Netherlands and France.

4.1. PRE-UNIVERSITY PREPARING OF STUDENTS VIA MOOCs

Based on our own experience authors propose to use follows ways for pre-university preparing of students in Ukraine:

1. Recommended online courses for prospective students;
2. Pre-study courses;
3. Adapted courses of university professors for pupils to make them acquainted with the peculiarities of specialties and/or disciplines which pupils plan to study in future.

Online courses can be recommended for prospective students to pass training on propedeutics of certain field (e.g., Computer Science) planned to be studied by the students. Thus, while choosing courses teachers should take into account such factors as:

• insufficient knowledge and skills of students to study many MOOCs needed for understanding of the educational material;

• lack of motivation of pupils;

• low English level of Ukrainian students, because previously mentioned, today 76% of MOOCs are conducted in English (see Fig. 3).

In addition, MOOCs can be effectively used to prepare students for external evaluation (EIT, External Independent Testing). The results of EIT make possible the entry to universities in Ukraine. The Dragomanov National Pedagogical University conducts these courses in full-time and distance modes. However, the development of MOOCs to prepare for EIT will increase the effectiveness of training and motivation of students by the providing of opportunity to learn the appropriate material many times.

Such MOOCs are already starting to appear in Ukraine. Thus, the Ukrainian platform ***Prometheus*** can be used by applicants for free to take MOOCs for preparation to for the testing EIT of the Ukrainian language and literature, the English language, Mathematics, Physics, and Chemistry (in Ukrainian, see Table 1 below):

Table 1.

MOOCs recommended for pre-university preparing students in Ukraine

Name of MOOCs	Link of MOOCs
Preparation to EIT of the Ukrainian language and literature	http://courses.prometheus.org.ua/courses/OsvitaOnline/Ukr101/2015_T1/about
Preparation to EIT of Mathematics	http://courses.prometheus.org.ua/courses/Prometheus/101/2015_T1/about
Preparation of EIT of the English language	http://courses.prometheus.org.ua/courses/OsvitaOnline/Eng101/2015_T1/about
Preparation of EIT of Physics	http://courses.prometheus.org.ua/courses/Prometheus/102/2015_T1/about

Preparation of EIT of Chemistry	http://courses.prometheus.org.ua/courses/Prometheus/103/2015_T1/about

Source: Own work

In addition to the mentioned fields of training, preparing of prospective students can be made by creating adapted and simplified MOOCs. These MOOCs developed by the university professors for pupils to make them acquainted with the peculiarities of specialties and/or disciplines which pupils plan to study in future.

Authors have some experience in supervising MOOC "***Web Class Computing Science***" (in English) for preparing pre-university students at the University of Groningen (the Netherlands). It was short four weeks MOOC during March 2015 (screenshot of the course is in Fig. 4).

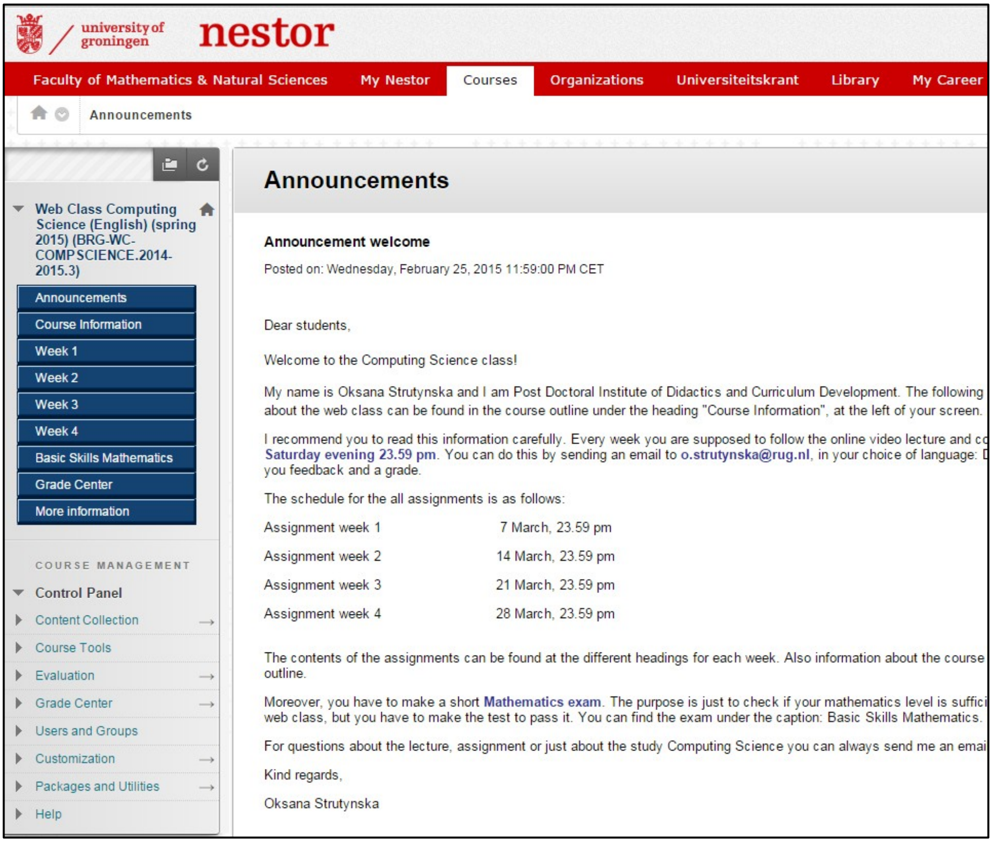
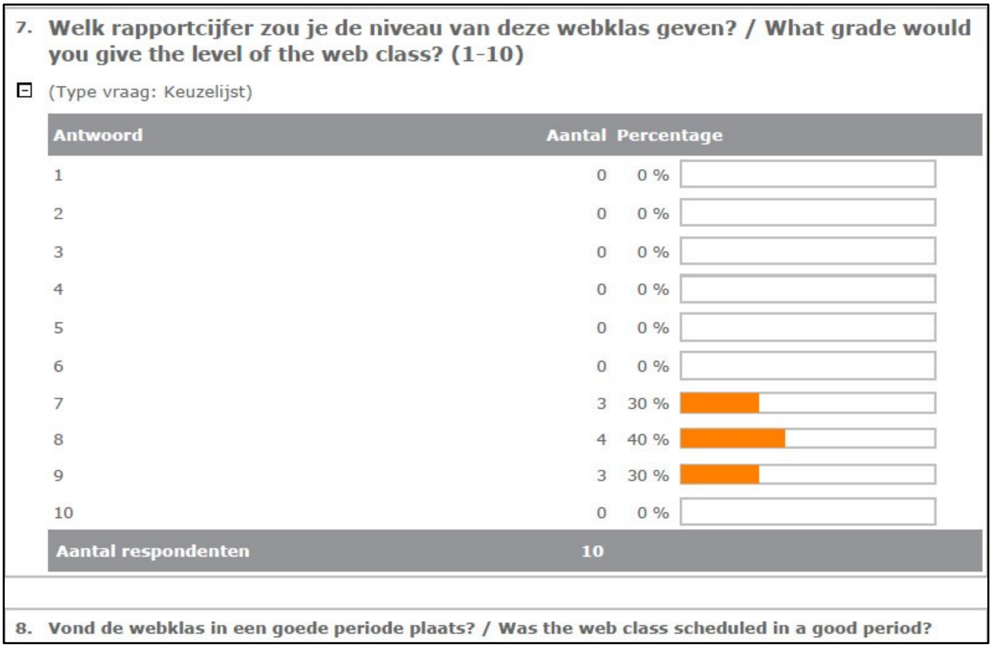


Figure 4. Announcement page of the MOOC "*Web Class Computing Science*"
Source: Own work

During this period authors had the following activities as supervising and evaluation assignments, and providing feedback; determining the use of ICT for preparing pre-university students (including digital learning environments, ICT applications, and innovative working methods).

28 students were registered for the MOOC course "***Web Class Computing Science***". 11 of them (39%) have fully passed the course, and only 5 (from the previously mentioned 11) have received certificates of successful completion of the course (18%).

These MOOCs are conducted in the University of Groningen twice a year (usually in November and March) and include more than 30 courses. Survey of participants (after the courses completion) show positive attitude of students to such activities. So, it shows the feasibility of using such MOOCs.


7. Welk rapportcijfer zou je de niveau van deze webklas geven? / What grade would you give the level of the web class? (1-10)

(Type vraag: Keuzelijst)

Antwoord	Aantal	Percentage
1	0	0 %
2	0	0 %
3	0	0 %
4	0	0 %
5	0	0 %
6	0	0 %
7	3	30 %
8	4	40 %
9	3	30 %
10	0	0 %
Aantal respondenten	10	

8. Vond de webklas in een goede periode plaats? / Was the web class scheduled in a good period?

Figure 5. Example of evaluation of MOOC "*Web Class Computing Science*" by students (March 2015)
Source: Own work

Authors also plan to introduce the MOOCs to prepare applicants for entry into the Dragomanov National Pedagogical University.

4.2. ADDING OF ONLINE COURSES TO THE TRADITIONAL LEARNING

Authors research how they could introduce MOOCs to face-to face learning for training of the future computer science teachers. For this authors have analyzed the Bachelor and Master curriculum (in Informatics, qualification "**Computer Science Teacher**").

The Bachelors of Informatics curriculum consists of three cycles:

1. Cycle of humanitarian and socioeconomic training.

2. Cycle of science and mathematics training.
3. Cycle of professional and practical training:
   - Cycle of professional pedagogical training.
   - Cycle of scientific subject oriented training and special courses and elective courses (depth level of training **Computer Science** and **Programming**).
   - Cycle of practical training.

Based on this plan, it should be noted that for studying of disciplines of professional and practical training in the field of ICT (**Computer Science, Programming**) is devoted 81 ECTS credits (from total 240 ECTS credits).

The Master of Informatics curriculum consists of three cycles:

1. Cycle of professional oriented humanitarian and socioeconomic training.
2. Cycle of natural sciences, professional and practical training.
3. Cycle of practical training.

According to the Master curriculum, for studying of disciplines of professional and practical training in the field of ICT (**Computer Science, Programming**) should be devoted 8 ECTS credits (from total 61 ECTS credits).

Authors believe that these hours are not enough for gaining high-quality ICT competences by students, future computer science teachers, because of the quick development in the ICT sector. That's why authors offer complementing the full-time study with the elements of MOOCs.

For this purpose authors have analyzed the number of **Computer Science** and **Programming** MOOCs (see in Fig. 6):

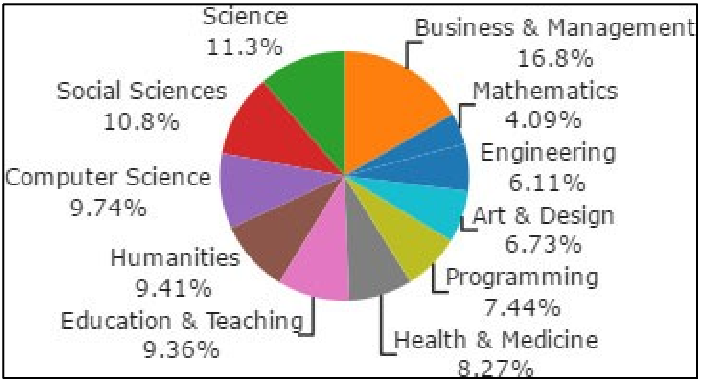


Figure 6. Course Distribution by Subjects in 2015

Source: Data retrieved from MOOC aggregator "Class Central" (https://www.class-central.com/report/moocs-2015-stats, accessed on 25 July 2016)

Last year saw an increase in the percentage of courses in the field of technology and business. The percentage of **Computer Science** and **Programming** courses grew by more than 10% (Shah, 2015).

As authors can see from Fig. 6 the number of **Computer Science** courses is 453 (9,74% from total). The number of **Programming** courses is 313 (7,44% out of the total). Thus, there are quite big number of the courses to make a choice between them for adding to full-time education curriculum of future Computer Science teacher.

As noted above, MOOCs are mainly conducted in English (see Fig. 3). Therefore, the relevance of learning English by the Ukrainian students is very important. According to the curriculum for future computer science teachers in the Dragomanov National Pedagogical University, students get 5 ECTS credits (Bachelor level) for learning English. This is not enough to gain the appropriate English knowledge required to pass the MOOCs.

4.2.1. MOOCs RECOMMENDED FOR THE 1st YEAR STUDENTS (BACHELOR LEVEL)

An important task of the 1st year students is to improve English knowledge as this is required for the initial introduction of MOOCs (at least **Intermediate level**).

Beside English MOOCs, authors also offer Mathematical MOOCs, because mathematical disciplines are fundamental for future computer science teachers and IT specialists (see Table 2). The courses are offered for passing during the students' individual work.

Table 2.

MOOCs recommended for 1st year students (Bachelor level)

Name of MOOCs	MOOC provider
Teach English Now! Foundational Principles	Coursera
Teach English Now! Theories of Second Language Acquisition	Coursera
Teach English Now! Lesson Design and Assessment	Coursera
Teach English Now! Second Language Listening, Speaking, and Pronunciation	Coursera
Understanding Language: Learning and Teaching	FutureLearn
Tell Your Story in English: Reading & Writing Skills for Language Learners	Canvas.net
Calculus One	Coursera
Mathematics: the Language of Nature	World Science U

Name of MOOCs	MOOC provider
Introduction to Mathematical Thinking	Coursera
Science Fiction/Science Fact: Predictions and Math (Lite)	Canvas.net
Introduction to Numerical Methods - Part 1 of 2	Canvas.net
Linear Algebra (in Russian)	Coursera

Source: Own work

4.2.2. MOOCs RECOMMENDED FOR 2nd YEAR STUDENTS (BACHELOR LEVEL)

The 2nd year students should be professionally oriented concerning the learning of the English language (see Table 3).

• Learning of the IT-specific terminology.

• Introduction to specialized English texts.

• Improving of English speaking skills.

• Review, discussion and analysis of relevant videos.

• Support for learning of basic math courses (probability theory, statistics, etc.).

Table 3.

MOOCs recommended for 2nd year students (Bachelor level)

Name of MOOCs	MOOC provider
English Conversational Skills	edX
Speak English Professionally: In Person, Online & On the Phone	Coursera
Differential Equations in Action	Udacity
Maths Puzzles: Cryptarithms, Symbologies and Secret Codes	FutureLearn
Bayesian Statistics: From Concept to Data Analysis	Coursera
Statistics: The Science of Decisions	Udacity
Introduction to Probability, Statistics, and Random Processes	Independent
Introduction to Computer Science	edX
MyCS: Computer Science for Beginners	edX

Source: Own work

4.2.3. MOOCs RECOMMENDED FOR 3rd AND 4th YEAR STUDENTS (BACHELOR LEVEL)

MOOCs for 3rd and 4th year students are recommended to be used in the following ways in order to prepare future computer science teachers (see Table 4):

• Introduction to the existing online courses of professional disciplines, free surfing on them.

• Advanced training of students of students by introducing of some parts of online courses to the learning process of certain disciplines (**Computer Science, Programming** and **Education & Teaching**).

• Use of MOOCs during within pedagogical practice in schools (to create educational videos, video lessons for pupils).

• Writing of term papers and theses.

Table 4.

MOOCs recommended for 3rd and 4th year students (Bachelor level)

Name of MOOCs	MOOC provider
Codecademy	http://www.codecademy.com
Teaching with Moodle	Independent
Introduction to Programming with Java – Part 1: Starting to Program in Java	edX
Programming in Scratch	edX
Data Structures	Coursera
Introduction to Computer Programming, Part 1	edX
Paradigms of Computer Programming - Fundamentals	edX
Programming Mobile Applications for Android Handheld Systems: Part 1	Coursera
How To Create a Website in a Weekend! (Project-Centered Course)	Coursera
Object Oriented Programming in Java	Coursera
Code Yourself! An Introduction to Programming	Coursera
HTML, CSS, and Javascript for Web Developers	Coursera
Java Programming Basics	Udacity
C++ For C Programmers, Part A	Coursera

Name of MOOCs	MOOC provider
C# Programming Basics (in Ukrainian)	Prometheus
Java Programming Basics (in Ukrainian)	Prometheus
Design and analysis of algorithms. Part 1 (in Ukrainian)	Prometheus
Programming Basics (in Ukrainian)	Prometheus

Source: Own work

For the last academic year (2015-2016) authors have implemented advanced training for students by introducing of certain parts of online courses to the learning process of 2nd and 3rd bachelors and future computer science teachers (“**Programming Technologies”** and **“Programming”**).

During the course “**Programming Technologies”** (http://www.moodle.fi.npu.edu.ua/course/view.php?id=92) students were performing the following:

- improving their own qualification by learning parts of courses within the discipline “Programming Technologies”. The MOOCs courses were asynchronized with the computer science classes at the university. Students were following the online materials chosen by teachers without completing assignments for them. The class-time was freed up by the MOOC, the teacher was focusing on in-class activities, projects, and assessments with the use of the distance course *“**Programming Technologies”***;
- using of the MOOCs during the preparing of term papers.

4.2.4. MOOCs RECOMMENDED FOR 1st and 2nd YEAR STUDENTS (MASTER LEVEL)

There are following ways of the use of MOOCs for preparing of masters of Computer Science (see Table 5):

• Training on methods of online courses developing.

• Advanced training of students of students by studying the online courses of the disciplines (**Computer Science, Programming** and **Education & Teaching**).

• Use of MOOCs during within pedagogical practice in schools and universities (to create educational videos, video lessons for pupils and students).

• Writing of term papers and theses.

Table 5.

MOOCs recommended for 1st and 2nd year students (Master level)

Name of MOOCs	MOOC provider
Understanding IELTS: Techniques for English Language Tests course	FutureLearn
How to create a Windows 8 App	Independent
Codecademy	http://www.codecademy.com
Python For Informatics	Independent
Design and Development of Educational Technology	edX
Cloud Computing Concepts, Part 1	Coursera
Introduction to the Internet of Things and Embedded Systems	Coursera
Java for Android	Coursera
Beginning Game Programming with C#	Coursera
English for Teaching Purposes	Coursera
Fundamentals of Online Education: Planning and Application	Coursera
Teaching Math Through Problem-Solving K-12	Canvas.net
How to create MOOC (in Ukrainian)	Prometheus

Source: Own work

For the last academic year (2015-2016) authors have introduced basics of methods of online course developing to the learning process of masters and future computer science teachers ("***Organization of Distance Learning***" and "***Social Informatics***").

During the course "***Organization of Distance Learning***" (http://www.moodle.fi.npu.edu.ua/course/view.php?id=205) students were performing the following:

- getting acquainted with the existing online courses of professional disciplines, free surfing on them;
- analyzing and choosing of the course for their own advanced training;
- improving their own qualification by learning one chosen online course within the discipline on the platform ***Codecademy*** (http://www.codecademy.com):

  - HTML & CSS (Learn how to create websites by structuring and styling your pages with HTML and CSS);
  - Make a Website (Explore HTML & CSS fundamentals how to build a website in this introductory course to web development).
- learning of certain elements of methods for creating of online courses (analyzing of the legal framework of Ukraine related to online training on information and copyright relationships; acquainting with the structures of online courses, methods of video lectures and tests).
- using of the MOOCs during the preparation of term papers and theses.

During the course “***Social Informatics***” (http://www.moodle.fi.npu.edu.ua/course/view.php?id=87) students were performing the following:

- analyzing of characteristics of MOOC providers;
- developing of the MOOC structure;
- working in pairs and developing of group projects to create MOOC elements (trailers, video lectures, and tests to video lectures).

After the end of the academic year authors offered our students a questionnaire regarding the advantages and disadvantages of using MOOCs in the educational process. According to the survey results, authors can draw conclusions about the positive attitude of students to the introduction of the technology to support of full-time education.

4.3 PROFESSIONAL IMPROVEMENT AND RETRAINING

MOOCs offer challenging opportunities for teachers to improve their knowledge in their own professional field and their competences and skills in adopting of new models of open educational practices (Holotescu et al., 2014). So, the third way of using MOOCs is professional improvement and retraining.

Some experience of such use of MOOCs has been taken from the Laboratory of Informatics, Robotics and Microelectronics of Montpellier (France), (http://www.lirmm.fr/). The platform FUN is used to improve the skills of scientists (free and open to all (https://www.fun-mooc.fr/)).

FUN platform delivers online courses such as MOOC (Massive Open Online Course) Free Online Courses open for all, proposed, designed and animated by the French higher education institutions and their partners.

For further information on FUN, please follow https://www.fun-mooc.fr/cours/.

Authors are planning to implement similar MOOCs in the Dragomanov National Pedagogical University as a required step of professional improvement and retraining.

4. DISCUSSION

So this paper addressed the following mentioned above questions: analysis of global trends in MOOCs development; analysis of problems and perspectives of using MOOCs in Ukraine; analysis of some experience of using MOOC in HEI of the Netherlands and France; consideration of ways of introducing MOOCs to the traditional learning during the process of training of future Computer Science Teachers in the National Pedagogical Dragomanov University.

Last research question about the ways of introducing MOOCs into traditional learning require more details explanation.

On one hand, after we had experience of using MOOCs in the National Pedagogical Dragomanov University for supporting face-to-face learning we gained some solutions, but on other hand, we still have unsolved problems.

According to the three stages of MOOC's introduction we can make follows conclusions as:

a. *in first one (pre-university preparing of students)* in the National Pedagogical Dragomanov University we have very low experience of using MOOCs yet.
   Regularly we pass online conference for pre-university preparing of students from remote regions of Ukraine. But it is online mode, and there is no possibility for applicants to re-study materials.
   So first step for future research is to create pre-study online courses for already existing materials of online conferences. Next step is to adapt courses of university professors for pupils to make them acquainted with the peculiarities of specialties and/or disciplines which pupils plan to study in future. It is helps future students to understand what exactly they are going to study.
   As we wrote above we have some experience of supervising pre-university students and we are planning to use this experience.

b. *in second one (additions to the traditional courses with MOOCs training elements)* in the National Pedagogical Dragomanov University we already have experience of using MOOCs for several courses. And how is mentioned above we prepared a list of MOOCs courses that we will use in face-to-face learning process. So this is another direction our research that is in process now.

   In this 20016-2017 academic year we started to introduction for 2nd year students of Master level the course "Creation and administration of distance educational resources" where students are training on methods of online courses developing. This can solve the problem of adapting courses of university professors using knowledge of this young scientific. Maybe this partly can help in third stage of introduction MOOCs that will mentioned below.

c. *in third one (advanced training and retraining of specialists)* like in first in the National Pedagogical Dragomanov University we have also very few experience of using MOOCs still.

   In this direction we have to prepare a list of existing MOOCs courses that we can use and have to create our own MOOCs courses in respect that specific our work using knowledge of young scientific that were trained by us.

Also it needs more detailed examination of hypothesis of research about increasing the level of training and efficiency of education in three stages of using MOOC. Today we have only examination of the second stage via pedagogical experiment.

5. CONCLUSIONS

Now, the use of MOOCs is a new important trend in the modern education. This is the transformation of the educational process inside and outside the educational institutions.

On the one hand, open learning with MOOCs is becoming a part of student's daily life as a form of informal learning (Selwyn, 2010). On the other hand, teachers will face with the following dilemma. Should face-to-face learning compete with MOOC-based curricula head-to-head, or should they begin to assimilate MOOCs into their traditional, residency-based curriculum?

Basing on the experience gained in this research and on the feedback received from students, authors are planning a more complex scenario for the next ways of using MOOCs for supporting face-to-face learning of the students:

1. Pre-university preparing of students.
2. Adding of online courses to the traditional learning.
3. Advanced training and retraining of specialists.

Even now researchers are discussing the issue concerning the necessity of creating of MOOC-oriented educational curricula and combining them with the traditional curricula.

Another important issue concerns modern teachers. As mentored above, MOOCs offer challenging opportunities for teachers to improve their knowledge, competences and skills for adopting of new models of open educational practices. So, the third way of using MOOCs is professional improvement and retraining. Solutions which could be beneficial in introduction of these three ways of using MOOCs were formulated.

REFERENCES

5 Free MOOC sources in Russian and Ukrainian. Educational online periodical "EduClub", [online] at http://educlub.com.ua/esli-anglijskij-podkachal-5-istochnikov/, (accessed on 14 October 2015), (in Russian)

Breslow, L., Pritchard, D.E., DeBoer, J., Stump, G.S., Ho, A.D., & Seaton, D.T., 2013: *Studying learning in the worldwide classroom: research into edX's first MOOC*. Research and Practice in Assessment, 8, 13-25 p.

Bruff, D.O., Fisher, D.H., McEwen, K.E., & Smith, B.E., 2013: *Wrapping a MOOC: Student perceptions of an experiment in blended learning*. Journal of Online Learning and Teaching, 9 (2), 2013, 187-199 p.,[online] available athttps://my.vanderbilt.edu/douglasfisher/files/2013/06/JOLTPaperFinal6-9-2013.pdf, (accessed on 28 July 2016)

Buck, T.E., 2013: *The massive effects of MOOCs in higher education*. EdTech Magazine: Focus on Higher Education, Winter 2013 issue, 2013, [online]available at http://www.edtechmagazine.com/higher/article/2013/01/massive-affect-moocs-higher-education, (accessed on 21 July 2016)

Caulfield, M., Collier, A., & Halawa, S., (2013, October 7): *Rethinking online community in MOOCs used for blended learning*, [Web log post] [online] at http://www.educause.edu/ero/article/rethinking-online-community-moocs-used-blended-learning, (accessed on 28 July 2016)

Class Central: Discover Free Online Courses & MOOCs, [online] at https://www.class-central.com/, (accessed on 25 July 2016)

Daza, V., Makriyannis, N. & Riera, C.R., 2013: *MOOC attack: closing the gap between pre-university and university mathematics*. Open Learning: The Journal of Open, Distance and e-Learning, Vol. 28, No 3, 2013, 227-238 p., DOI: 10.1080/02680513.2013.872558 [online] at athttp://dx.doi.org/10.1080/02680513.2013.872558, (accessed on 15 December 2014)

EMMA European MOOCs, [online] at https://platform.europeanmoocs.eu/, (accessed on 04 August 2016)

Firmin, R., Schiorring, E., Whitmer, J., Willett, T., Collins, E.D., & Sujitparapitaya, S., 2014: *Case study: Using MOOCs for conventional college coursework*. Distance Education, 35 (2), 2014, 178-201 p. DOI: 10.1080/01587919.2014.917707

Holotescu, C., Grosseck, G., Cretu, V., & Naaji, A., 2014: *Integrating MOOCs in blended courses*. Proceedings of the International Scientific Conference of eLearning and Software for Education, Bucharest, 2014, 243-250 p. DOI: 10.12753/2066-026X-14-034[online] [online] at https://www.researchgate.net/publication/260987116_Integrating_MOOCs_in_Blended_Courses, (accessed on 28 July 2016)

Israel, M.J., 2015: *Effectiveness of Integrating MOOCs in Traditional Classrooms for Undergraduate Students*. The International Review of Research in Open and Distributed Learning, Special Issue: OER and MOOCs, Volume 16, Number 5, 2015, [online] at http://www.irrodl.org/index.php/irrodl/article/view/2222/3402, (accessed on 21 July 2016)

Kaplan, A.M., & Haenlein, M., 2016: *Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster*. Business Horizons, vol. 59, issue 4, May 2016, 441-450 p. DOI: 10.1016/j.bushor.2016.03.008

MOOC Pan European aggregators are opening, [online] at http://osvita.ua/abroad/higher_school/distance-learning/42882/, (accessed on 28 July 2016), (in Russian)

Popular platforms of online courses (MOOC), [online] at http://osvita.ua/abroad/higher_school/distance-learning/37601/, (accessed on 28 July 2016), (in Russian)

Primachenko I., 2016: Prometheus: How online education influences affect the global economy, [online] at http://minfin.com.ua/2015/02/20/6119716/, (accessed on 05 August 2016), (in Russian)

Primachenko I., 2016: What online courses are needed in Ukraine? All! Educational online periodical "EduClub@, [online] at http://partyofregions.ks.ua/ua-news/kakie-onlayn-kursyi-nuzhnyi-v-ukraine.html (accessed on 05 August 2016), (in Russian)

Prometheus – Massive Open Online Courses, http://prometheus.org.ua/, (accessed on 04 August 2016), (in Ukrainian)

Prometheus: Revolution in education. Common funds - crowdfunding in Ukraine. Great idea, [online] at https://biggggidea.com/project/prometheus-revolyutsiya-v-osviti/ (accessed on 04 August 2016), (in Ukrainian)

Reich, J., 2014: *MOOC Completion and Retention in the Context of Student Intent*. Educause Review, 2014, [online] at http://er.educause.edu/articles/2014/12/mooc-completion-and-retention-in-the-context-of-student-intent, (accessed on 24 July 2016)

Selwyn, N., 2010: *Web 2.0 applications as alternative environments for Informal Learning – a Critical Review*. Paper for OECDKERIS Expert Meeting – Session 6 – Alternative Learning Environments in Practice Using ICT to Change Impact and Outcomes, [online] at http://www.oecd.org/dataoecd/32/3/39458556.pdf, (accessed on 27 July 2016)

Shah, D., 2015: *By The Numbers: MOOCS in 2015*, [online] at https://www.class-central.com/report/moocs-2015-stats/, (accessed on 25 July 2016)

Shah, D., 2015: *FutureLearn Closes 2015 on a High: Gains £13M Investment, Wins UX Award, Approaches 3M students*, [online] at https://www.class-central.com/report/futurelearn-13m-investment/, (accessed on 31 July 2016)

Yuan, L., & Powell, S., 2013: *MOOCs and Open Education: Implications for Higher Education*, JISC CETIS, 2013, 19 p., [online] at http://publications.cetis.ac.uk/2013/667, (accessed on 27 July 2016)

ROBOTS IN ELEMENTARY SCHOOL: SOME EDUCATIONAL, LEGAL AND TECHNICAL ASPECTS

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Abstract: *This article focuses on robots in elementary school. The authors present an analysis of a number of educational, legal and technical aspects. The article also includes an overview of literature on robotics in elementary school. In the second part a description is provided of more adequate equipment: LEGO Robotics and the LEGO MINDSTORMS RCX Intelligent Brick and Robotics Invention System, WeDo 2.0, Dash & Dot Pack: 2 companionable robots for teaching robotics to children. Next, the authors discuss selected legal regulations relating to school curricula, for example, proposals put forward by the Council for the Informatization of Education at the Ministry of National Education. One of the sections contains good examples of use of robotics in Polish schools. The position of the course of robotics (including elements of design, construction and programming of robots) in modern teaching in Polish schools is also presented,* *using as an example the experience of teachers working in Bielsko-Biala (Silesia region). Besides, research results of a study, conducted in Poland and in Ukraine, are discussed. Finally, the authors present their conclusions.*

Keywords: robotics in school, survey, 21st century competences, education.

INTRODUCTION

Twenty-first century education systems should create an environment wherein students encounter critical learning components (such as problem-solving, teamwork, and communication skills) and embrace lifelong learning. A review of literature demonstrates that new technologies, in general, and robotics, in particular, are well suited for this aim. (Khanlari 2016)

This article includes an overview of literature on robotics in elementary school. In the second part a description is provided of more adequate equipment. Next, the authors discuss selected legal and curriculum regulations. One of the sections contains good examples of use of robotics in Polish schools and some research results. Finally, the authors present their conclusions.

BACKGROUND

Arts & Bots combines intrinsically creative craft materials, common robotics components, a custom programming environment and teacher professional development to create a flexible robotics intervention for secondary school classrooms. In order to engage students underserved by other robotics programs, Arts & Bots is oriented to support the creation of collaborative expression-focused robots, as opposed to more commonly implemented competitive task-focused robot activities. Specifically, Arts & Bots targets integration into traditional nontechnical classes, such as literature and history, to reach a broader base of students than would be enrolled in elective technology programs. Study (Cross et al. 2015) describes three classroom implementations, including a secondary school poetry project. By including Arts & Bots in these core courses, we expose diverse students to engineering education activities such as hands-on experiences with computer programming, prototyping, and the engineering design process. Authors presents their outcomes grouped within two primary themes: first, in Technological Fluency, we present students' self-reporting of concepts learned, confidence with technology, and breaking of technology stereotypes; second, in Complementary Non-Technical Skills, they present other skills students learned by participating in the Arts & Bots program. (Cross et al. 2015)

Compared with other media, programmable bricks provide children with the opportunity to create their own product and, through this process, to express creative thinking. Studies (Demo et al. 2008) have found that learning robotics or integrating programming bricks into courses can help to develop students' problem-solving abilities and enhance their learning performance. This study attempted to develop a one-to-one Topobo robotics course for kindergarten children and to explore teacher-student interaction patterns. This study used a creative thinking spiral as the framework for the Topobo robotics course. The research sample included a five-year-old child and a preschool teacher. Topobo, the programmable bricks, was the main learning tool in this course, and the sequential analysis method was used to identify teacher-student interaction patterns. Based on the frequency of the teacher-student interactions, this study found that two behaviours, the student's "play" and the teacher's "guidance," appeared most frequently. Moreover, the results of sequential analysis and content analysis of the videotaped learning process indicated that the teacher's guidance helped the student to assemble or play with the Topobo bricks. The teacher's questions encouraged the student to express and share his ideas or identify and solve problems. This study proposes suggestions for future studies on this issue (Demo et al. 2008).

Learning to collaborate is an important educational goal. The concept of collaborative learning is differently defined by several authors. Problem solving and problem-based learning are also important in our educational framework. We shall situate and clarify here the instructional design concepts used in an educational setting based on a "collaborative and problem based learning environment" applied to educational robotics. Educational robotics activities are developed at several school levels (primary, secondary) and in adults' training contexts. The instructional design of such learning activities is based on a constructivist approach of learning. Their educational objectives are varied. In our approach, the goal is not only that the learners acquire specific skills (e.g. knowledge on electricity, electronics, robotics...), but also and mainly demultiplicative, strategic and dynamic skills. The methodology focuses on collaboration to design and develop common projects and on problem solving skills development. The pupils work in small groups (2-4). In the reported research, some learners' interactions have been observed during the activity in a primary school with an observation grid. The analysis of the verbalisations between the learners and their actions on the computers and the robotics materials coming from those observations offer the opportunity to study the way the learners are collaborating (Denis, Hubert 2001)

Recently, Wonder Workshop, creators of the Dash & Dot robots, released 21 comprehensive lesson plans made to help K-5 educators approach coding with young students while generating an interest in the subject. These lesson plans are made with Dash & Dot robots in mind. These smart robots help teach students the basics of coding, while providing an enriching process that creates both an interest and foundation in its basic concepts. (Papallo 2015)

EQUIPMENT FOR SCHOOLS. SOME EXAMPLES.

History of LEGO Robotics and some examples

Since its introduction in 1998, the LEGO MINDSTORMS build and program robotics tool set has become the best-selling product in the LEGO Group's history. Garnering worldwide acclaim, the Robotics Invention System™ fueled the imaginations and satisfied the inner tinkerer of generations of LEGO and robotics enthusiasts alike, leading to the development of a global community of users and students of all ages over the last 15 years who create and command robots the LEGO way.

The first-computer controlled LEGO products are released in 1986.

In 1988 collaboration between The LEGO Group and Massachusetts Institute of Technology begins on development of an "intelligent brick" that will bring LEGO creations to life via computer programming.

In January 1998 the LEGO MINDSTORMS RCX Intelligent Brick and Robotics Invention System are unveiled to the press at The Museum of Modern Art in London.

In January 2013 the 15th anniversary of LEGO MINDSTORMS is celebrated and the next generation platform – LEGO MINDSTORMS EV3 – is unveiled at the International Consumer Electronics Show; in September 2013 the third incarnation of LEGO robotics, LEGO MINDSTORMS EV3, is launched worldwide. (History – Mindstorms LEGO.com, http://www.lego.com/en-us/mindstorms/history)

Key learning values (LEGO MINDSTORMS Education EV3, 10+ yrs)

The LEGO MINDSTORMS Education EV3 lets students design and build programmable robots using high quality motors, sensors, gears, wheels, axles, and other technical components. By using hands-on robotics, students will gain a better understanding of how technology works in real world applications.

The solution enables students to understand and interpret two-dimensional drawings to create three-dimensional models; build, test troubleshoot and revise designs to improve robot performance; gain practical, hands-on experience using mathematical concepts such as estimating and measuring distance, time and speed. (LEGO MINDSTORMS Education EV3 Core Set, https://education.lego.com/en-us/products/lego-mindstorms-education-ev3-core-set-/5003400)

Key learning values (WeDo 2.0, 7+ yrs)

WeDo 2.0 strengthens students' understanding of the eight science and engineering practices, including asking questions and solving problems, modelling, prototyping, investigating, analysing and interpreting data, computational thinking, creating evidence based arguments, and obtaining, evaluating, and communicating information.

Develop your students' competencies through hands-on projects covering key science topics such as physical-, life-, earth- and space sciences, engineering and technology. Improve problem solving, critical thinking, communication, collaboration and integrate the use of relevant digital tools to improve computational thinking skills. (WeDo 2.0 Core Set, Software and Get Started Project, https://education.lego.com/en-us/products/wedo-2-0-core-set-software-and-get-started-project/45300)

Dash & Dot robots are being implemented in schools to help teach 21st-century skills, such as creative problem-solving and computational thinking. Coding experience is quickly becoming a differentiator in today's workforce. Data from the U.S. Bureau of Labor Statistics project there will be 1.4 million computer science jobs available by 2020 with only 400,000 computer science graduates qualified to apply for them (Papallo 2015). Other projections from the Bureau of Labor Statistics show 1 million high-paying computer science jobs likely going unfilled over the next five years due to the current lack of qualified graduates.

Dash & Dot Pack: 2 companionable robots for teaching robotics to children. Dash & Dot are the 2 mobile, interactive and programmable robots designed by Make Wonder. Their job? To serve as a truly useful and fun educational tool as part of a first robotics workshop for children from the age of 5.

- Dash is the adventurer in the team. It can detect objects and obstacles and perform actions accordingly. It has a 360° head and three wheels to move around both easily and smoothly.
  It also comes with various accessories, allowing it to lift and pick up objects, draw or play music, plus much more besides!
- Dot is its little friend. With just one wheel and perfectly round, it can detect when it's been caught, lifted or shaken. And it's also a very clever sidekick, able to pass orders on to Dash,
  or to tell stories while flashing and emitting sounds.
  (http://www.generationrobots.com/en/402097-dash-dot-pack.html)

SELECTED LEGAL REGULATIONS

The Council for the Informatization of Education at the Ministry of National Education (Poland), on 18 June 2015, presented proposed changes to the current core informatics curriculum.

The Council adopted the final form of its proposal at its meeting on 10 December 2015. Account was taken off all the opinions submitted during the consultation and raised at several meetings with teachers across Poland and at meetings of experts abroad.

According to the Council for the Informatization of Education, one of the goals of universal informatics education is to improve the relevance and importance of computer science as an independent discipline as perceived by students and society (...). Early contact at school with computer science and programming should give learners the idea of richness of this field and its applications in other subjects and areas, and to stimulate interest and motivate the choice of future education and a future career in this direction.

The most important skills acquired by a student in the course of general education in primary school should also be the ability to solve problems creatively with various objects methods derived from computer science. This new proposed provision indirectly also points to robotics and the ability to solve problems of border technology and computer science.

Members of the Council are proposing to replace certain specific requirements (relating to computer classes) for the first stage of the current educational curriculum with their proposal, which (among other things) includes provisions favouring classroom robotics.

For example, the proposal states that the student:

- creates a command (command sequence) for a specific plan of action and to achieve the objective; in particular, performs or programmes these commands in a computer application;
- programmes visually simple situations (...) according to her/his own ideas and the ideas developed together with other students;
- uses programming for robot control (...) in the physical world outside the computer;
- observes other students as they work, exchanges with them ideas and experiences, competes with other students.

Furthermore, the Council proposes changes to the curriculum, which relate to computer classes in grades 4-6 of elementary school. Among these proposals there are suggestions in favour of “invasion” of robots to schools. The student at this stage:

- formulates, in the form of algorithms (...) commands that make up the (...) to control a robot or other device;
- in algorithmic problem solving distinguishes basic steps: defining goal to achieve, finding a solution to the problem for sample data, developing a solution, programming solutions and testing the correctness of program examples;
- designs, creates and saves in a visual programming language (...) solutions to problems and simple algorithms using sequential commands, iterative and conditional and simultaneous events;

- tests, on the computer, programs in terms of compliance with the assumptions about the effects of their actions, explaining how programs operate;
- creates a control program for a robot or other device (...);
- identifies and recognizes the benefits of cooperation on joint problem-solving, as well as benefits from healthy competition.

The entry into force of these proposals would be a direct indication that robotics and visual programming of robots as a student activity is highly recommended (desirable) in the educational process, at the stage of primary school. What would also be significant would be the team nature of work during the implementation of projects in robotics.

So solid anchoring of classes with the use of robots in the core curriculum of general education could help learners to overcome barriers which sometimes involve the perception of learning and fun as two completely separate worlds of children's activities.

The proposals of the Council for the Informatization of Education confirmed the advisability of the use of robots (more broadly, creative toys) in the teaching process.

GOOD EXAMPLES OF THE USE OF ROBOTICS IN POLISH SCHOOLS

Workshops, using kits to build and program robots, are a modern form of interdisciplinary education of children and youth.

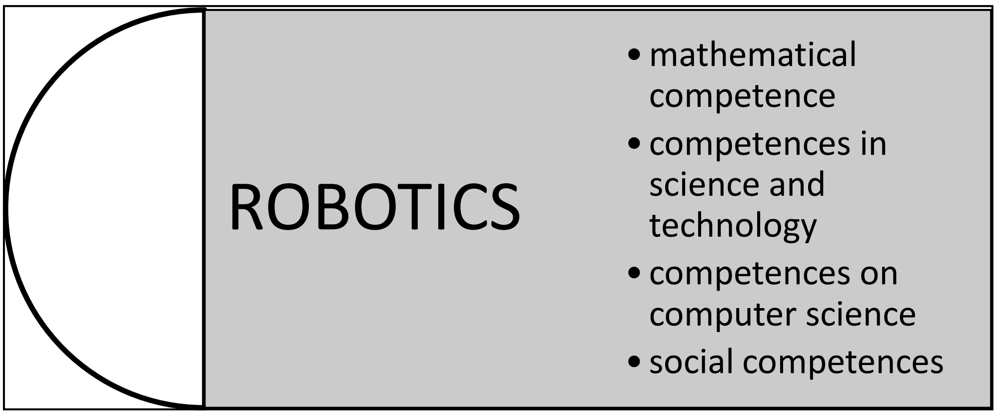

Figure 1. Robotics and training on key competences.
Source: Own work

The rationale for conducting such activities in schools is found in the European reference framework in the context of training of key competences.

Classes in robotics – properly taught – will have an impact on the development of mathematical literacy and scientific-technical information and social competences (see Figure 1). At the same time competence is understood to mean a combination of knowledge, skills and attitudes appropriate to the situation.

The position of the course of robotics (including elements of design, construction and programming of robots) in modern teaching in Polish schools will be presented, using as an example the experience of teachers working in Bielsko-Biala (Silesia region).

Lessons (mandatory)

In elementary school, you can use robots:

- during design and technology classes – models of equipment and vehicles,
- during computer classes – elements of visual programming – controlling a robot,
- during science classes – e.g. sensory perception and sensory reception, construction of simple electric circuits.

Due to the specific nature of individual subjects the scope of the proposed use of robots in class will be varied: (see Table 1)

Table 1.

Evaluation of the possibility of implementation of selected activities while working with robots in class in primary school.

Item	Activity (action) in class	Design and technology classes	Computer classes	Science classes
1.	presentation of activities of robots already built (robot's interaction with the environment)	possible	possible	possible
2.	construction work according to the plan	possible	possible to some extent – simple structures	almost impossible – lack of time, other learning content
3.	construction work according to one's wishes	possible and recommended	more difficult (lack of time for the test phase and design	almost impossible – lack of time, other learning content

			modifications, other teaching content)	
4.	design changes	possible and recommended	possible to a certain extent – simple modifications	almost impossible – lack of time, other learning content
5.	design changes – using other sensors (e.g. mobile robots)	possible and recommended	possible and recommended	almost impossible – lack of time, other learning content
6.	creation and testing of a simple input-output systems (sensor-display, sensor-motor)	possible and recommended	possible and recommended	possible and recommended
7.	programming simple input-output systems (sensor- display, sensor-motor)	possible, although it is not the main objective of the course	possible and recommended	possible, although it is not the main objective of the course
8.	programming a robot already built	possible	possible and recommended	practically impossible – lack of time, other learning content
9.	designing a robot in a 3D environment	possible and recommended	possible and recommended	practically impossible – lack of time, other learning content

Source: Own work

Lessons (mandatory) in lower secondary (middle) schools can be taught with the use of robots in two school subjects:

- design and technology classes,
- informatics (computer science).

In both cases, students are actively involved in classes - working with robots individually or in teams. Due to the specific nature of the subject (including the number of hours of instruction in in the curriculum) the range of student activities will be varied.

Proposals of activities are presented in Table 2.

Table 2.

Evaluation of the possibility of implementation of selected activities while working with robots in class in lower secondary (middle) school.

Item	Activity (action) in class	Design and technology classes	Computer science
1.	presentation of activities of robots already built (robot's interaction with the environment)	possible	possible
2.	construction work according to the plan	possible	possible to some extent – simple structures (models)
3.	construction work according to your wishes	possible and recommended	more difficult (lack of time for the test phase and design modifications, other teaching content)
4.	design changes	possible and recommended	possible to a certain extent – simple modifications
5.	design changes – using other sensors (e.g. mobile robots)	possible and recommended	possible and recommended
6.	creation and testing of a simple input-output systems (sensor-display, sensor-motor)	possible and recommended	possible and recommended
7.	programming simple input-output systems (sensor-display, sensor-motor)	possible, although it is not the main objective of the course	possible and recommended
8.	programming a robot built before	possible, although it is not the main objective of the course	possible and recommended

9.	design a robot in a 3D environment	possible and recommended	possible and recommended

Source: Own work

The currently applicable core curriculum for D&T classes at middle school contains the following learning objectives (general requirements) for the subject:

I. Recognition of items of technical equipment and understanding how they work.

II. Developing the concept of solutions to common technical problems and examples of design solutions.

III. Planning work of varying complexity, with different forms of work organization.

IV. Safe use of tools and devices.

The core curriculum does not lay down specific teaching content (specific requirements). There is, therefore, the opportunity for teachers to create their own curriculum for example, in robotics and computer-aided design.

Extra-curricular activities (optional)

Extra-curricular activities in elementary school or high school may take the form of robotics workshops run by student interest clubs (computer / computer or technical clubs). Such activities are characterized by strong interdisciplinary nature, which is sometimes difficult to achieve in a class of an individual subject.

Kits for the design, construction and programming of robots will also prove their worth when students work using the method of a group project of research nature. Full exploitation of this method involves the creation of new knowledge by students (on the basis of findings from the conducted experiments, own work) and sharing it through the public presentation of the results.

Classes with robots can contribute to the development of students' new interests, in the context of organization of their leisure time. They are also an opportunity to learn about the specifics of the jobs of tomorrow, such as a mechatronics engineer and an IT specialist.

Open classes (demonstration)

In elementary school, one can consider running extracurricular workshops with robots for teams made up of a parent and child or parent and 2 children. In this formula there is a chance for active participation in classes of younger children, working under the care of a parent.

Lower secondary (middle) school students can help teachers in teaching classes for pupils of local primary schools (e.g. during the Open Day). These activities contribute to the promotion of a given school in the local community, helping to shape the image of an open school, sharing knowledge and experience with others.

THE METHODOLOGY AND SELECTED RESULTS

The study was carried out with the participation of 91 primary school teachers and future teachers in the province of Silesia and the University of Silesia Poland and Ukraine, and Borys Grinchenko Kiyv University. The survey contained 15 questions about the pedagogical research "Robotics and children". The study was carried out to determine the needs of modern education to introduce the basics of robotics in the educational process of primary school.

Question 1. At what age should children learn the basics of robotics?

Respondents were allowed to choose one or more options.

A. before the age of 5

B. aged 5 to 7 years

C. ranging in age from 7 to 10 years

D. aged 10 to 15 years

E. over 15 years of age

The research results of this question are presented in Figure 2.

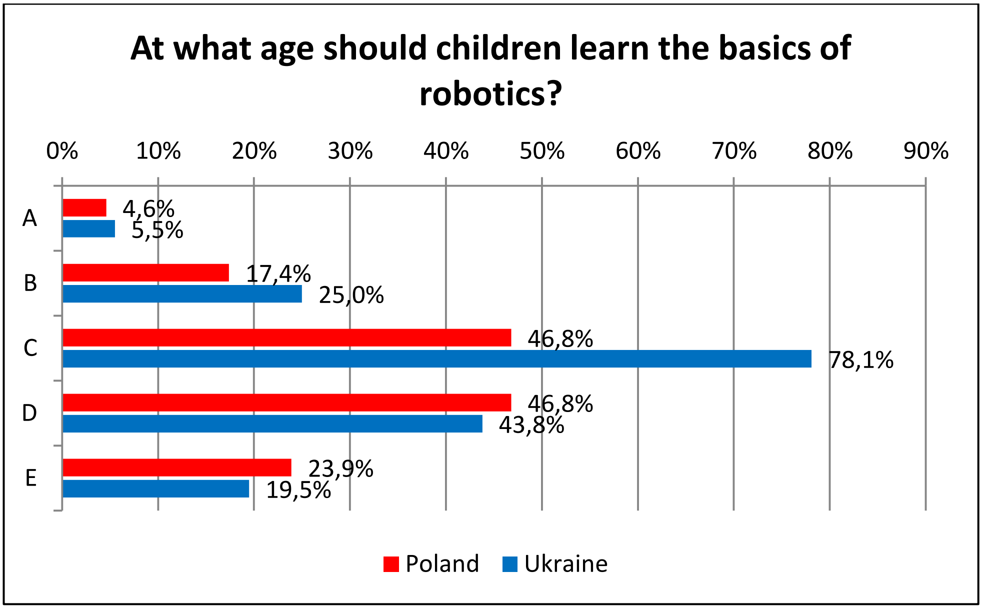

Figure 2. The results of responses on Question 1
Source: Own work

Almost half of the respondents in Poland chose the range of 7 to 10 years (C), and from 10 to 15 years (D), which corresponds to the current elementary school and current junior high school, or planned eight-year primary school.

The interval from 7 to 10 years (C) was selected by almost 8 in 10 respondents in Ukraine.

Question 2. Do you think it is possible to teach students robotics in class at school or is it a more of out-of-school education process?

Respondents were allowed to choose one answer.

A. Robotics can be taught in the classroom, as a mandatory part of the curriculum
B. You can implement robotics classes in school if the school provides appropriate conditions and equipment
C. You can implement robotics classes in selected schools or for selected students
D. It is rather a process of school education, including some students

Research Results of answers on this question presented on Figure 3 and 4.

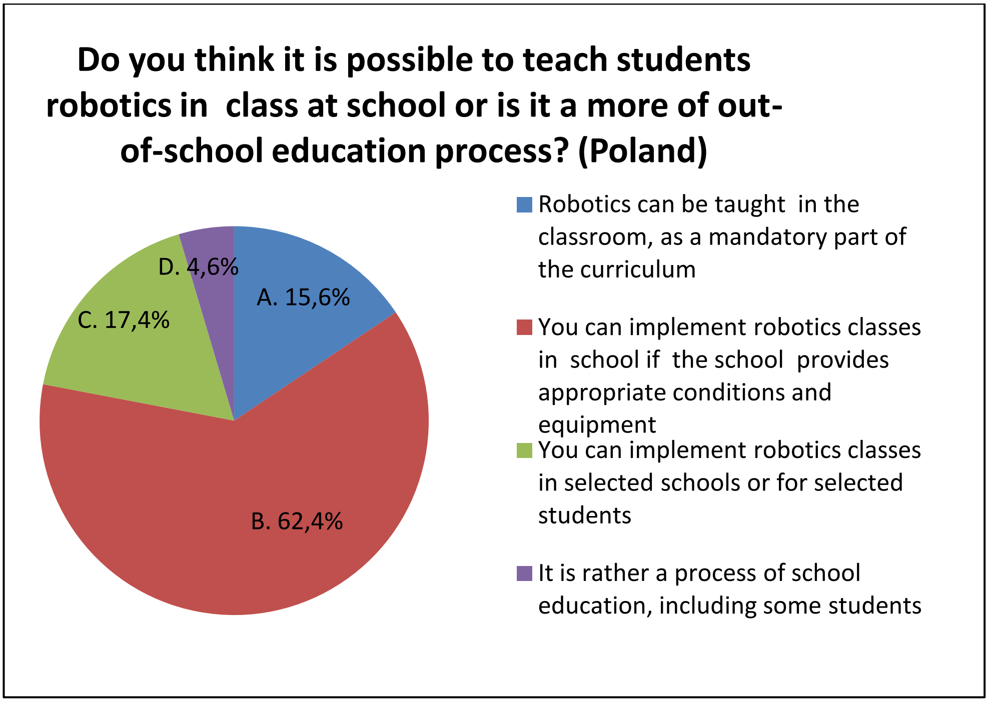

Figure 3. The results of responses on Question 2 (Poland)
Source: Own work

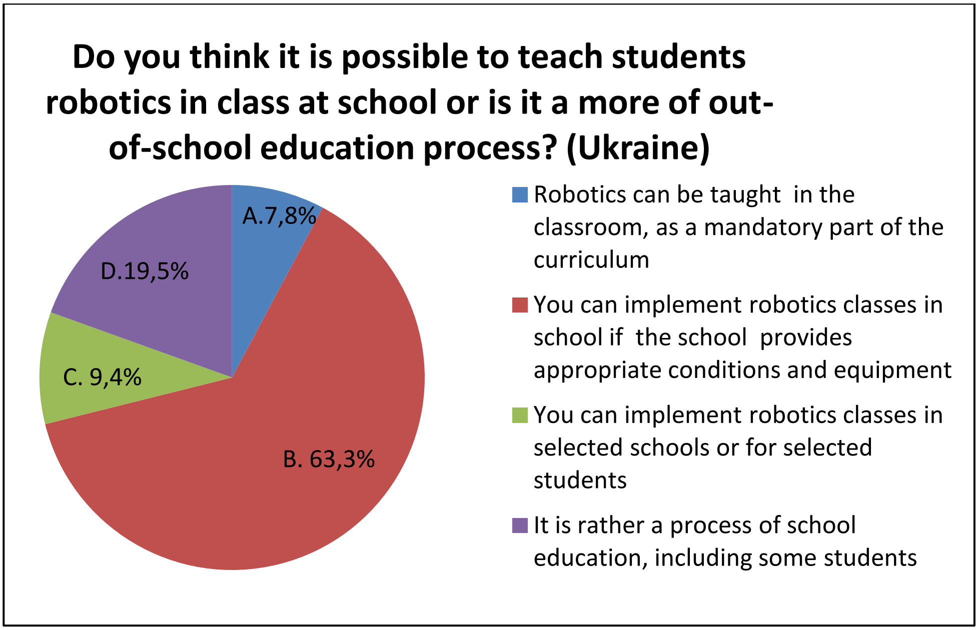

Figure 4. The results of responses on Question 2 (Ukraine)
Source: Own work

Over 62% of respondents in Poland said that robotics classes can be taught in school when the school provides appropriate conditions and equipment.

Only one in 20 of those polled sees robotics as a process of school education, covering only some of the students.

More than 63% of respondents in Ukraine (as in Poland) said that robotics can be taught in school when the school provides appropriate conditions and equipment.

Almost 20% thought that robotics is a process of school education, covering only some of the students. That is almost 15 percentage points more than among the respondents in Poland.

Question 3. How many hours of classes in robotics should be included in the primary school curriculum?

Respondents were allowed to choose one answer; they were allowed to provide their own answer - by selecting “another answer”.

A. 1 lesson per week
B. 1-2 lessons per week
C. more than 2 lessons per week
D. as separate topics in computer science (computer classes) and in design and technology classes

E. as a matter of combining elements of computer science (computer classes), activities of technical design (modelling)

F. another answer

The results of this question are shown in Figures 5 and 6.

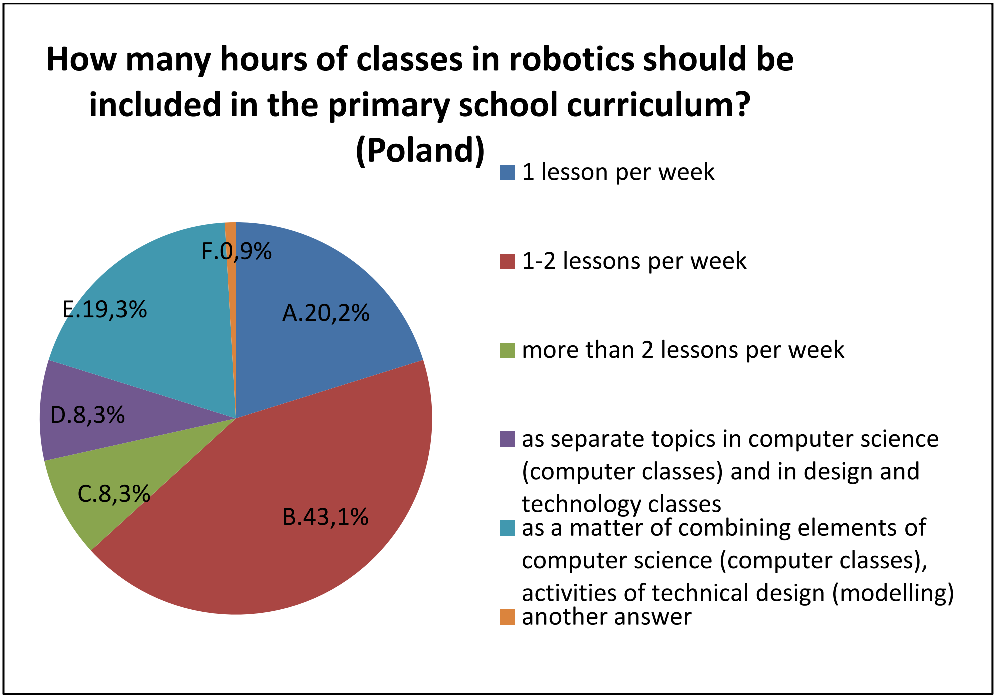

Figure 5. The results of responses on Question 3 (Poland)
Source: Own work

Respondents in Poland usually chose 1-2 hours per week of classes win robotics.

The only “other answer”: This should be extra-curricular activity, free-of-charge.

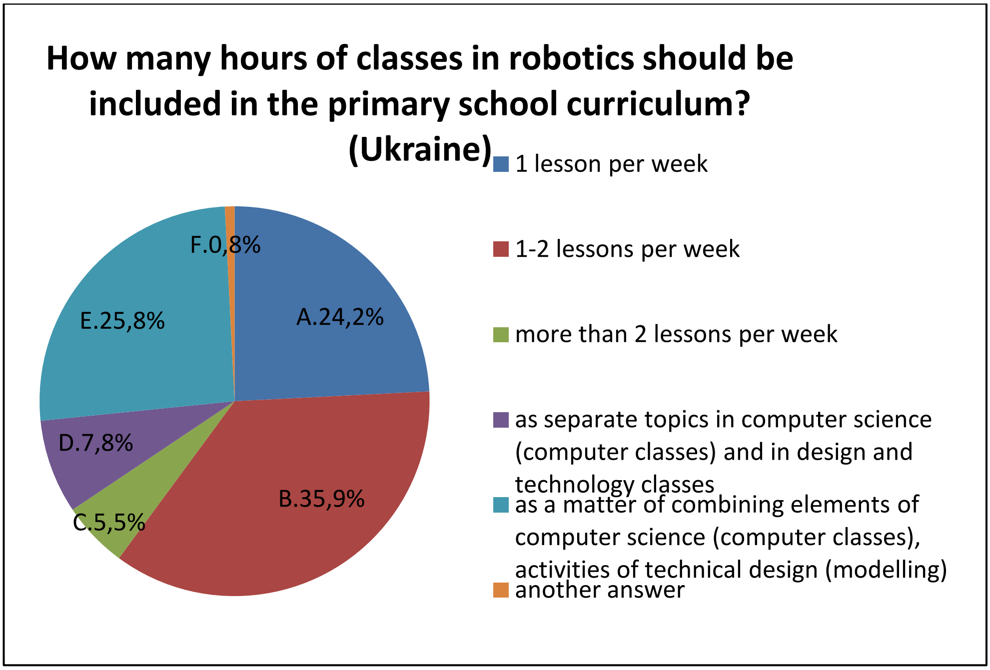

Figure 6. The results of responses on Question 3 (Ukraine)
Source: Own work

The respondents in Ukraine (as in Poland) usually chose 1-2 hours per week of robotics classes.

Question 4. Do you want to learn the basics of robotics?

A. With pleasure
B. No, I think it is inappropriate
C. Another answer

Respondents were allowed to choose one answer. Results of answers on this question presented on Figure 7 and 8.

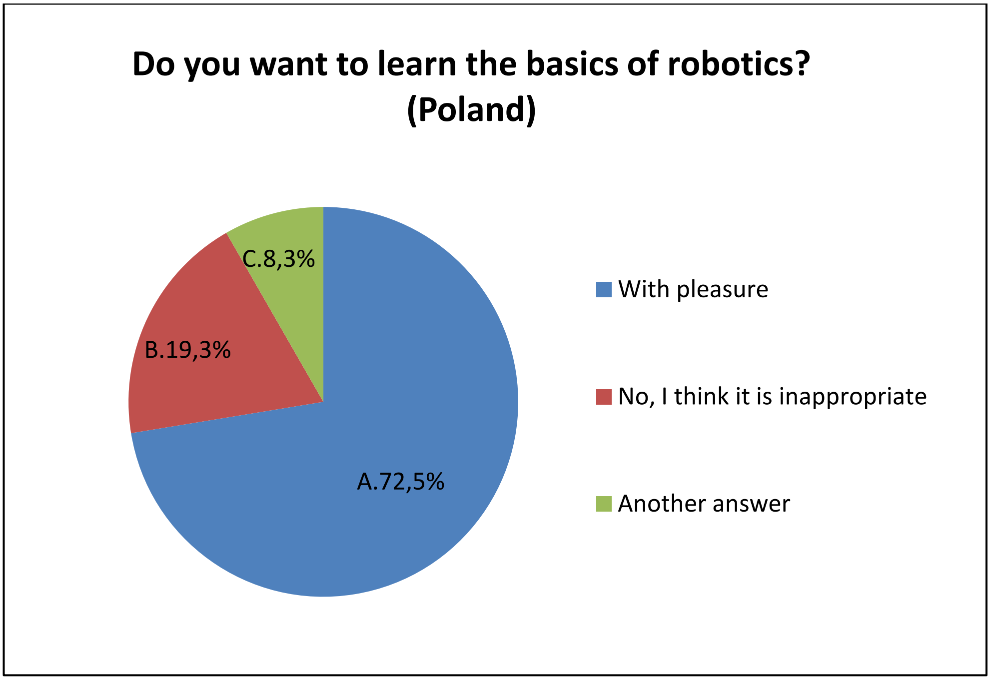

Figure 7. Do you want to learn the basics of robotics? (Poland)
Source: Own work

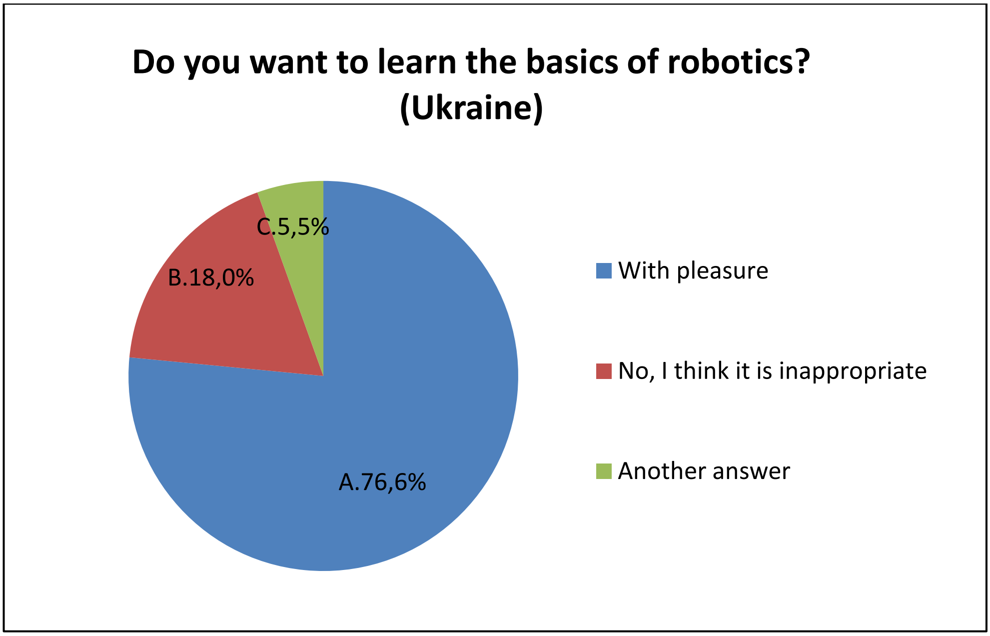

Figure 8. Do you want to learn the basics of robotics? (Ukraine)
Source: Own work

CONCLUSIONS

The article describes a number of aspects concerning the use of robots in primary school as an object and subject of learning. The authors conclude, based on an analysis of earlier research and literature as well as their own study that educational robots can stimulate learners' learning motivation. Compared with other media, programmable bricks provide children with the opportunity to create their own product and, through this process, to express creative thinking. Studies have found that learning robotics or integrating programming bricks into courses can help to develop students' problem-solving abilities and enhance their learning performance. Smart robots helps teach students the basics of coding, while providing an enriching process that creates both an interest and foundation in its basic concepts. In elementary school, one can use robots during design and technology classes, computer classes and science classes.

Besides, an analysis is presented of basic legal regulations in this matter, primary school curriculum as well as some results of a survey conducted in Poland and Ukraine among in-service teachers and prospective teachers. In respect of Question 3 "How many hours of classes in robotics should be included in the primary school curriculum?", the majority of responses were 1-2 hours per week. As for the question “Do you think it is possible to teach students robotics in class at school, or is it a more of out-of-school education process?", the vast majority of respondents in Poland chose the answer "You can implement robotics classes in school if the school provides appropriate conditions and equipment". In respect of the question: Do you want to learn the basics of robotics? - "With pleasure" accounted for 72,5% of Polish responses and 76,6% of Ukrainian ones.

The authors will continue research in the area of developing key and other competences in learners during robotics education, and increasing of effectiveness of learning and teaching young learners in conditions of the 21st century.

Acknowledgments

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REFERENCES

Campbell, B. R.; Voelker, J. J.; Kremer, C. S. (2015) An Analysis of Engineering Educational Standards and Outcomes Achieved by a Robotics Summer Camp Experience INTERNATIONAL JOURNAL OF ENGINEERING PEDAGOGY Vol.5 Issue: 4 Pages: 12-16. 2015

Cross, J.L., Hamner, E., Bartley, C., Nourbakhsh, I. (2015). Arts & Bots: Application and Outcomes of a Secondary School Robotics Program. Book Group Author(s):IEEE FRONTIERS IN EDUCATION CONFERENCE (FIE), 2015 Book Series: Frontiers in Education Conference Pages: 2159-2167 2015 45th Annual Frontiers in Education Conference (FIE) OCT 21-24, 2015 El Paso, TX

Demo, G.B., Marciano, G., Siega, S. (2008) Concrete programming: Using small robots in primary schools 8TH IEEE INTERNATIONAL CONFERENCE ON ADVANCED LEARNING TECHNOLOGIES, PROCEEDINGS Edited by:Diaz, P; Ignacio, A; Mora, E. Santander, SPAIN Pages: 301-302

Denis, B., Hubert, S. (2001) Collaborative learning in an educational robotics environment COMPUTERS IN HUMAN BEHAVIOR Volume: 17 Issue: 5-6 Pages: 465-480 Conference: Workshop on Computer Supported Collaborative Learning BARCELONA, SPAIN JUL, 2000

Diaz, Javier; Queiruga, Claudia; Banchoff Tzancoff, Claudia; et al. (2015) Educational Robotics and Videogames in the Classroom Edited by: Rocha, A; Dias, GP; Martins, A; et al. Conference: 10th Iberian Conference on Information Systems and Technologies (CISTI) Location: Univ Aveiro, Sch Technol & Agueda Management, Agueda, PORTUGAL Date: JUN 17-20, 2015 PROCEEDINGS OF THE 2015 10TH IBERIAN CONFERENCE ON INFORMATION SYSTEMS AND TECHNOLOGIES (CISTI 2015) 2015

Generation robots, [on-line] at http://www.generationrobots.com/en/402097-dash-dot-pack.html (accessed 10 July, 2016)

History – Mindstorms LEGO.com, [on-line] at http://www.lego.com/en-us/mindstorms/history (accessed 10 July, 2016)

Hung, I-Chun, Chao, Kuo-Jen, Lee, Ling, Chen, Nian-Shing (2013) TI Designing a Robot Teaching Assistant for Enhancing and Sustaining Learning Motivation I*nteractive Learning Environments*, v21 n2 p156-171

Jang H. (2016). Identifying 21st Century STEM Competencies Using Workplace Data JOURNAL OF SCIENCE EDUCATION AND TECHNOLOGY Vol. 25, Issue: 2, PP. 284-301

Kalakos, Nikos, Papantoniou, Agis, Angelis, CT, Fotiadis, D., Tzallas, AT (2013) Pervasiveness in Real-World Educational Games: A Case of Lego Mindstorms and MIT App Inventor SO AMBIENT MEDIA AND SYSTEMS SE Lecture Notes of the Institute for Computer Sciences Social Informatics and Telecommunications Engineering VL 118. 23-30. 2013

Khanlari, A. (2016) Teachers' perceptions of the benefits and the challenges of integrating educational robots into primary/elementary curricula. *European Journal of Engineering Education* Volume 41, 2016 - Issue 3

Kim, CM., Kim, D., Yuan, JM; Hill, RB, Doshi, P., Thai, CN. (2015) Robotics to promote elementary education pre-service teachers' STEM engagement, learning, and teaching COMPUTERS & EDUCATION Volume: 91 Pages: 14-31

Lean in STEM, Conference [on-line] at http://www.leaninstem.pl/konferencja#program (accessed 30 June 2016)

LEGO MINDSTORMS Education EV3 Core Set, https://education.lego.com/en-us/products/lego-mindstorms-education-ev3-core-set-/5003400

LIN, June (2016). How Robotics is Transforming STEM in Elementary Schools. *Getting Smart* [online] at http://gettingsmart.com/2016/01/how-robotics-is-transforming-stem-education-in-elementary-schools/ (accessed 30 July 2016)

Maciej M. Sysło *Outreach to Prospective Informatics and Computer Engineering Students* [on-line] at http://www.ims.mii.lt/bebras/ievos/Bebras2011/Prezentacijos/ MaciejSyslo.ppt (accessed 30 June 2016)

Maciej M. Sysło SZKOŁY A NOWE TECHNOLOGIE I NOWE KSZTAŁCENIE [on-line] at www.ciz.walbrzych.pl/download/12.doc (accessed 30 June 2015)

MAKEWONDER.COM, Meet Dash and Dot [on-line] at http://www.makewonder.com (accessed 30 July 2016)

Miguel Garcia, Jose (2015) Educational Robotics. Programming as part of an educational process. RED-REVISTA DE EDUCACION A DISTANCIA Issue: 46 2015

Papallo J. (2015) A TechCHAT On Dash & Dot Coding With CEO of Wonder Workshop Vikas Gupta [on-line] at http://www.educationworld.com/a_news/techchat-dash-dot-coding-ceo-wonder-workshop-vikas-gupta-9206 79740 (accessed 30 July 2016)

Podstawa programowa kształcenia ogólnego dla szkół podstawowych. Załącznik nr 2 do Rozporządzenia Ministra Edukacji Narodowej z dnia 30 maja 2014 r. zmieniającego rozporządzenie w sprawie podstawy programowej wychowania przedszkolnego oraz kształcenia ogólnego w poszczególnych typach szkół (Dz.U. 2014 poz. 803), [on-line] at https://men.gov.pl/wp-content/uploads/2014/08/zalacznik_2.pdf, s. 12-15. (accessed 30 July 2016)

Rada ds. Informatyzacji Edukacji przy Ministrze Edukacji Narodowej, Wprowadzenie do propozycji zmian w obowiązującej podstawie programowej z przedmiotów informatycznych, 17 grudnia 2015, [on-line] at https://men.gov.pl/wp-content/uploads/2016/05/propozycje-zmian-do-projektu-nowej-podstawy-programowej.pdf (Accessed 12 June 2016)

Rany! Rety! Robot w szkole! (2015) [on-line] at http://www.edulandia.pl/edukacja/1,101865,19275559,rany-rety-robot-w-szkole.html (accessed 12 June 2016)

Równość płci a innowacyjność w gospodarce. Diagnoza sytuacji kobiet w sferze edukacji w obszarze STEM oraz w sferze przedsiębiorczości / Gender Equality and Innovation in Economy By: Maj, Jolanta. In: Studia Ekonomiczne / Uniwersytet Ekonomiczny w Katowicach, 2013, nr 161, s. 184-192

Schmidt, M., Fulton, L. (2016). Transforming a Traditional Inquiry-Based Science Unit into a STEM Unit for Elementary Pre-service Teachers: A View from the Trenches JOURNAL OF SCIENCE EDUCATION AND TECHNOLOGY Vol. 25. Issue: 2 Pages: 302-315

Todd R. Kelley, J. Geoff Knowles (2016) A conceptual framework for integrated STEM education. International Journal of STEM Education 2016 3:11 [on-line] at https://stemeducationjournal.springeropen.com/articles/10.1186/s40594-016-0046-z (accessed 12 June 2016)

Uttal David H. and Cheryl A. Cohen (2012). Spatial Thinking and STEM Education: When, Why, and How? Psychology of Learning and Motivation, Volume 57: .147-181. 2012

WeDo 2.0 Core Set, Software and Get Started Project, [on-line] at https://education.lego.com/en-us/products/wedo-2-0-core-set-software-and-get-started-project/45300 (accessed 12 June 2016)

Yamamoto, Satoshi; Tetsui, Toshiro; Naganuma, Mitsuru; et al. (2006) Trial of using robotic pet as human interface of multimedia education system for pre-school aged child in kindergarten IEEE Conference: SICE-ICASE International Joint Conference Location: Busan, SOUTH KOREA Date: OCT 18-21, 2006 SICE-ICASE International Joint Conference, Vols 1-13 Pages: 1555-1560 Published: 2006

Załącznik *Kompetencje kluczowe w uczeniu się przez całe życie – Europejskie ramy odniesienia* do Zalecenia Parlamentu Europejskiego i Rady z dnia 18 grudnia 2006 r. w sprawie kompetencji kluczowych w procesie uczenia się przez całe życie.

Zhi-Feng LIU, Eric; Chun-Hung LIN; Pey-Yan LIOU; Han-Chuan FENG; Huei-Tse Hou (2013) AN ANALYSIS OF TEACHER-STUDENT INTERACTION PATTERNS IN A ROBOTICS COURSE FOR KINDERGARTEN CHILDREN: A PILOT STUDY Turkish Online Journal of Educational Technology;Jan2013, Vol. 12 Issue 1, p.9

INDIVIDUALIZED TEACHING PROCESS FOR PUPILS WITH MODERATE MENTAL DISABILITY

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Abstract: *An individualized teaching process for pupils with moderate mental disabilities with the help of using mobile touch devices may be one of the forms of teaching to achieve better development of these students during the teaching process. Didactics of ICT for special primary schools, where pupils with moderate mental retardation are educated within the Czech Republic, is not precisely and clearly defined. Still, General educational program for elementary school contains a special educational area of Information and Communication technology, in which the work and content area is focused on work with the classic desktop, and it is not always acceptable in the case of students with moderate mental disabilities.*

Touch screen technologies can be a very useful tool, and in many ways they even exceed, compensate and replace freely available printed educational material that is rather outdated.

The first results obtained from the case studies suggest that this form of teaching may be also beneficial for pupils with moderate mental disabilities.

Keywords: Individualized teaching, mobile touch technology, iPads, moderate mental disability, special education needs.

INTRODUCTION

The concept of “information technology has become widely known, well-established and comprehensible.” (Opatřilová, Vítková 2013). No matter whether we talk about a star among ICT – a desktop computer – or about a newcomer – a mobile touch screen device which is looking for its position among the final users – teachers, pupils, parents – it tries to clarify, consolidate its position, explain. We shall come to a conclusion that within the Czech school system there exists no well-defined didactics of ICT work in conjunction with mentally disabled pupils – light level (practical primary school) or medium level (special primary school). Krahulová (2010) states that as mobile phones have become an integral part of almost every household, same ICT becomes a necessity of a modern family. Studying internet resources we can find a few methodological recommendations processed by some special primary schools within the scope of European projects; we can also find the information in the Framework Education Programme for Special Primary Schools but they apply only to content of the taught educational sphere of Information and Communication Technology. The European Agency for Special Needs and Inclusive Education published in 2013 the so called Report on Information and Communication Technologies for Inclusion (ICT for inclusion) „Developments and Opportunities for European Countries“, which says that within the present information society and knowledge society the pupils with a handicap and special educational needs become one of the groups which faces the most obstacles concerning access and use of ICT.

ICT didactics at a special primary school should comply with certain principles and norms by virtue of which use of such ICT becomes effective within the teaching process. These principles and norms should comply with teaching strategies or, more precisely with fulfilment of key competencies of the Framework Education Programme for Special Primary Schools.

ICT viewed by the Framework Education Programme for Special Primary Schools in the Czech Republic - special pedagogical literature, for example Valenta, Müller (2009) describes didactics of persons with a mental handicap as the one which tries to answer two basic questions which are fundamental for every teacher, i.e. what to teach and how to teach.

1. WHAT TO TEACH AND HOW TO TEACH

Educational sphere of Information and Communication Technology upon Framework Educational Programme for special primary schools includes in accordance with valid wording from the year 2008 basics of work with PC and selected programme equipment, mainly a text editor, special teaching and educational programmes. Within this sphere, work with a web browser and with a mail client can be considered as above standard teaching material. (RVP ZŠS, 2008). Educational sphere focuses on creation and development of key competencies by leading the pupil to:

- cognition of ICT possibilities, acquiring of basic knowledge and abilities while working with a computer;
- acquiring of basic abilities within the sphere of information literacy;
- development of thinking, perception and concentration of one´s attention;
- development and improvement of fine motor skills;
- integration of more senses for development of aesthetic perception;
- use of necessary information;

- communication via ICT;
- awareness of inappropriate content while using the Internet.

Müler, Valenta (2003) state that it is important to facilitate learning to such a level which becomes effective and helpful for the pupils at the special primary school.

To simplify recognition of the significant features – firstly, we highlight the features and important content, we emphasize them until fixed sufficiently. The mobile touch screen device has become a suitable tool. Once it is set or made accessible, it enables zooming and highlighting of the device workplace within which the subject matter is displayed. It is useful to give mentally handicapped pupils more time during the teaching process than the common time limit. That is why it is very important to focus on individual approach. To simplify encoding of information to a child – generally, a principle of cognition multiplicity becomes valid during teaching of mentally handicapped persons – the more analyzers and feedbacks used to make the specific information accessible for a pupil, the easier and more permanently the pupil remembers it. To enable lining-up of terms into logical structures – no term exists on its own but it is a part of a certain system. The child gets acquainted with the term "round" in the sense education, during his first reading, during the first writing etc. If we want to fulfil key competencies positively in compliance with Framework Education Programme for Special Primary Schools, i.e. if we want to meet „what to teach" and „how to teach", then we can use the most up-to-date ICT no matter what type of disabled pupils we work with. Majority of the most modern ICT can be effectively adapted to a certain disability type.

2. ICT AND DISABILITIES

Pančocha, Vrubel et al. (2014) state that ICT term can be described as general term which includes all the categories as for example an interactive board. In the education sphere the targeted use of information technologies and e-learning can make the teaching process more effective, „suitable technologies can be found helpful in compensating for handicaps within pupils and students with special educational needs (Pančocha, Vrubel et al., 2014). The National Council of Teacher of English (NCTE, 2016) states that it is very important for the teachers to decide at the beginning what ICT they will use before they purchase it for their pupils with special educational needs.

As regards the use of ICT to match the pupils with special educational needs, foreign resources (comparison of ICT for Children With Special Needs, online, 2016; ICT Training for Teachers, online, 2016; BECTA, online 2016; Zikl et al., 2011; Opatřilová, Vítková, 2012; Bartoňová, Vítková, 2013) agreed identically on the following pros.

Table 1.

From the pupil´s point of view:

communication (text to speech conversion, speech to text conversion);	suitable for students with heavy and multiple disorders;
adapting of school activities;	ICT can compensate many defects;
tool to develop social sphere abilities;	pupils with learning disorders can communicate easier;
high motivation for pupils;	increased confidence in ICT motivates the students to use the Internet at home, not just for doing the homework, but it can be used in the pupils´ free time as well;
it makes the pupils feel successful;	having fun while educating;
it makes the subject matter of the majority accessible;	development of spatial visualization skills;
it brings interactivity with possibility of fixation, revising and feedback,	computer literacy;
it enables the pupils to work at their own pace on tasks which suit their specific needs;	diagnostics.
computers can improve independency;	along with the students without visual impairments, students with visual impairments use Internet as an access to needed information;

Table 2.

From the teacher´s point of view:

getting ready for the teaching process;	increasing one´s ICT professional development;
teaching process;	sharing of electronic teaching materials;
storing of results;	maximum development of his pupils.

3. ICT AND PUPILS WITH MENTAL DISORDERS

Although the Framework Education Programme for the Special Primary Schools does not state using of mobile touch screen devices in the teaching process at the special primary school, we, have decided to incorporate such technologies into the teaching process. Foreign study TABLET COMPUTERS AND LEARNERS WITH SPECIAL EDUCATIONAL NEEDS from the year 2014 states clearly In this section evidence of the benefits of using tablets for SEN students and some related challenges are summarized. Reference is made, where available, to existing papers and reports. In other instances, interesting findings from articles, blog entries etc. are highlighted (in this case, also the month of the publication is referenced in the text). (Special Education Needs Network, 2014). This study was carried out in selected European countries (Austria, Belgium, Flanders, Denmark, Estonia, Italy, Portugal, Turkey) at selected special schools and it describes that two particular benefits of tablets for students with special needs are emerging: they motivate to learn (as of course do other technologies) and they enable more personalized learning, as it is easier to individualize instruction and track progress and to erase, change, customize content to suit individual students' needs. (Special Education Needs Network, 2014).

But not just this study. Flewit, Kucirkova and Messer at their case study state that writing on the iPad requires less grapho-motor control and facilitates visual and sensory learning. Vygotsky's notion of gesture being "writing in the air" is pertinent here as we consider the iPad to be a new cultural tool that offers a different kind of engagement space for literacy. (Flewit, Kucirkova, Messer, in Australian Journal of Language and Literacy, 2014).

4. MOBILE TOUCH SCREEN DEVICE

4.1 Implementation

Once implementing of iPad mobile touch screen devices, the pupils learnt how to work on one common device; however, very soon we have managed upon the intuitive environment of the tablet same as upon the positive feedback from the pupils to implement device at the ratio 1:1, i.e. 1 iPad = 1 pupil. The following partial goals were stated at the beginning of the whole research:

- as for the device, to verify feedbacks of the pupils;
- to map applications suitable for individual pupils upon their capabilities and to test them at the lessons;
- to fill in the missing portfolio of the teaching materials by creation of our own worksheets for individual pupils;
- to set this iPad as a personal teaching aid of each individual pupil; i.e. to teach the pupils systematically how to use some of its functions as for

example downloading of the worksheet from email, sending of the work to the teacher´s email address to be checked and stored after words etc.;

- to test interconnection of the existing paper form worksheets and textbooks with applications as a teaching feature which will support prolonging of the pupils´ attention;
- to use some of the creative applications for executing of the pupils´ electronic outputs which could replace the teaching materials.

4.2 Participated observing

Pupils feedback - on the intervention of the device into the teaching process was positive only. There was no need to use any special applications as for the first contact, no pupil had any problem with touch or control gestures while working with this device. On the contrary, as time passed by, the teacher had to limit the time spent by the pupils on the device due to certain psychological dependence caused by over-use of the device. Niemann states that Tablets can offer so many things which other devices just cannot do. Since they are small and lightweight, they can be used anywhere. (Renn 2016).

Application - many applications were tested nevertheless, not all of them suited specifics of individual pupils. Gradually, a portfolio of the most suitable applications was created within each single pupil and such a portfolio is available to each pupil in his own iPad. This portfolio is continuously filled upon one´s needs same as upon focus of the work and content of the subject matter. Still, we monitor and test interesting teaching applications along with our pupils. As added by Techknowledge (2016) use these apps to track progress across everything from language learning through to nutritional goals.

Worksheets - in the course of implementaion of mobile touch screen devices we created a portfolio of our own worksheets, mainly in Move&Match, Bitsboard and Book Creator applications. These electronic worksheets are suitable for younger pupils of primary schools or special primary schools, throughout the subjects, and have been offered to further users to be downloaded and used successfully.

Personal aid - implementation of this device in ratio 1:1 proved good as every pupil has his own signed iPad in his classroom, he works with it every day and he bears the responsibility for it. The pupils created new work habits and they learnt how to take care of their school aid. All pupils managed basic service of iPad as for gestures, work with applications and, furthermore, we succeeded in development of skills in the sphere of sending of executed worksheets to the email address of the teacher in order to be stored. As for two pupils, the iPad proved to be an aid which by its built-in functions – assessment – compensates directly for their partial deficits.

Interconnection of standard aids with applications - during the monitoring period, interconnection of existing worksheets and textbooks with relevant teaching applications proved itself the most suitable form of school work within the sphere of trivia (reading, writing, calculating). This alternation of activities led to higher effectiveness of the teaching process due to significantly prolonged concentration of the pupils. As for the sphere of the remaining subjects focused on the bases of the knowledge of natural and social science – the subjects which lack the adequate teaching materials – there was interconnected via the adequate applications the subject matter with the intersubject connections followed by the group work outputs. At the same time, these outputs have served as a feedback for the teachers. As for the education subjects, – P.E., Art etc. - an iPad with suitably focused applications was used to make the lesson much more entertaining.

Creative applications and working with them - by systematic acquiring of some creative applications, mainly of Book Creator, the subject matter was interconnected within the intersubject connections. Own teaching electronic materials were created. The given curriculum was always taught carefully and in an interesting way, the pupils cooperated on output of the common work, they enjoyed the work even when it was demanding on time and they had to overcome some of their personal obstacles as for example feeling ashamed of recording the texts. Final works were always offered to be downloaded on the class web page or as teaching material. The pupils themselves have these outputs at their iPads in electronic form and they can get back to them at any time.

ANALYSIS OF RESEARCH DATA

In view of possibility to compare the teaching before and after intervention of iPad into education, we may say that this device influenced all participated persons including the teachers. All process focused on intervention of iPad tablet into the teaching process was highly dynamic since the very beginning; from use of individual applications within the teaching subjects up to the creation of bigger and more sophisticated outputs. Lack of adequate printed teaching materials corresponding to the teaching content of the Framework Education Programme for the Special Primary Schools led the educators to continuous testing of applications in an effort to introduce the subject matter included in curriculum documents closer and go through it carefully with the help of iPad tablet applications. With the help of so called creative applications the teachers started to make their own simple worksheets for the pupils followed by the pupils being motivated to create their own materials. The teacher naturally got engaged in creation of the electronic outputs and his position and a role within the classroom shifted. Spontaneously, there was a new friendly and creative environment which is the best described by Kyriaca (1991) as teaching in entrepreneurial spirit. Such business atmposphere has led to creation of many successful works we all are proud of. A great benefit for the teacher´s work is, in practice, the possibility to adjust the content of the same application to individual pupils; to adjust difficulty or choice of tasks to their individual specifications. The further benefit is the possibility for faster pupils to work on iPad as an extra work or on the contrary, as a bonus for their well-done work. Teaching with iPads motivated the teachers as well in the way they could work on their own skills and shift the possibilities of their pupils further on. Subject matter was interconnected within unexpected intersubject connections, we utilized the power of brainstorming and critical thinking during our teaching process as for example in the form of mind maps.

CONCLUSION

As for this mobile touch screen device, conclusions of this class project are clearly positive. IPad has become a real multifunction aid and it has significant emotional impact on the pupils. Nevertheless, exploiting of its potential is closely linked to the teacher´s personality, his creativity, willingness to learn new things, trying and integrating new features and methods into his work so that he could move the knowledge closer to his pupils and help them to exploit such assist technologies to their advantage. Detailed results of the case studies shall be developed in one of the practical part of the thesis.

REFERENCES

AQUILONIS. *ICT for children with special needs*. [online] at: http://www.aquilonis.hr/SNEP/index.html

Bartoňová, M., Vítková, M. 2013: *Vzdělávání se zaměřením na inkluzivní didaktiku a vyučování žáků se speciálními vzdělávacími potřebami ve škole hlavního vzdělávacího proudu*. Brno: PdF MU, 2013. ISBN 978-80-210-6678-6

BECTA. *Teaching.* [online] at: http://webarchive.nationalarchives.gov.uk/20110125093552/ http://schools.becta.org.uk/

EUROPEAN AGENCY FOR SPECIAL NEEDS AND INCLUSIVE EDUCATION. *Informační a komunikační technologie pro inkluzi*. Odense, Dánsko. 2013. ISBN 978-87-7110-468-4

Flewitt, Kucirkova & Messer**.** 2014: *New directions for early literacy in a digital age: The iPad. Journal of Early Childhood Literacy* published online 20 May 2014 DOI: 10.1177/1468798414533560

Flewitt, Kucirkova & Messer. 2014: *Touching the virtual, touching the real: iPads and enabling literacy for students experiencing disability*. Australian Journal of Language and Literacy, Vol. 37, No. 2, 2014, ISBN 978-80-7320-137-1

Krahulová, J. 2010: *Negativní a pozitivní působení informačních a komunikačních techologií na mládež.* 1st edition. Brno: PdF MU, 2010. Head of thesis: doc. Ing. Jiří Strach, CSc.

Kyriacou, CH. 2004: Klícové dovednosti učitele. 2. vyd. Praha: Portál, 2004, 155s. ISBN 80-7178-965-8.

Müller, O., Valenta M. 2003: *Psychopedie*. 1st edition. Praha: Parta, 2003.

Nagyová, I. 2013: *Podstatné aspekty didaktiky jako vědního oboru*. Ostrava: The University of Ostrava. 2013. ISBN 978-80-7464-378-1

NCTE. National council of Teahers of English. Available online at: http://www.ncte.ie/documents/advicesheets/

Opatřilová, D., Vítková, M. 2012: *Faktory úspěchu ve vztahu k inkluzivnímu vzdělávání u žáků se speciálními vzdělávacími potřebami*. Brno: PdF MU, 2012. ISBN 978-80-210-5996-2

Pančocha, K., Vrubel, M. 2014: *Inkluzivní vzdělávání v přehledových studiích*. Brno: PdF MU, 2014. ISBN 978-80-210-7541-2

Renotiérová, M. a Ludíková, L. 2006: *Speciální pedagogika. 4. vyd.* Olomouc: Univerzita Palackého v Olomouci, 2006. ISBN 80-244-1475-9.

SENnet. *Special needs and ICT in manistream schools: trends and innovative approaches.* [online] at: http://sennet.eun.org/c/document_library/get_file?uuid=746a358e-6fb9-46fe-a4c3-da48f9d3aad1&groupId=32059

UNESCO. *ICTs in education for people with special needs.* [online] at: http://ru.iite.unesco.org/img/upload/SPECIAL_NEEDS_1.qxd.pdf

Zikl, P. a kolektiv. 2011: *Vyuzití ICT u detí se speciálními potrebami.* 1. vyd. Praha: Grada, 2011. ISBN 978-80-247-3852-9.

V. E-LEARNING – GOOD PRACTICE OF EFFECTIVE USE IN EDUCATION

COLLABORATION IN RESEARCH ACTIVITIES: ICT TOOLS ASSESSMENT

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Abstract: *The article describes some results of implementation of WorkPackage 4 (WP4) "Selection and testing new IT tools" in the framework of international research network IRNet and researchers from partner institution from Ukraine, Poland, other countries. These results concern analyzing and studying some category of ICT-tools for Research their assessment. The first part of the article includes the theoretical aspects of research as an activity: Research: activity profile, analysis of challenges of research collaboration, research collaboration quality requirement, forms of research collaboration and other items.*

The second part of the paper described some research conducted in the framework of Module 008 WP4 and includes: Research ICT tools typology according to education activities, Mixed features of Research collaboration Tools, Efficiency trend for top rated Research collaboration ICT tools. Model 1, Sample expert card, Sample tool expert rating, Final expert ranking of Research collaboration tools (all package period which has been divided on several main stages 1-5). The final part of the manuscript contains some conclusions and comment.

Keywords: research, innovation**,** *research collaboration* work, education, ICT tools, assessment, e-learning.

1. INTRODUCTION

Within the modern educational paradigm, the 21st century skills concept (Abbott 2013) is motivated by the belief that teaching students the most relevant, useful, in-demand, and universally applicable skills should be prioritized in today's schools, and by the related belief that many schools may not sufficiently prioritize such skills or effectively teach them to students.

The basic idea is that students, who will come of age in the 21st century, need to be taught different skills than those learned by students in the 20th century, and that the skills they learn should reflect the specific demands that will place them in a complex, competitive, knowledge-based, information-age, technology-driven economy and society.

While the specific skills deemed to be "21st century skills" may be defined, categorized, and determined differently the term does reflect a general-if somewhat loose and shifting-consensus. The following list (ibid) provides a brief illustrative overview of the knowledge, skills, work habits, and character traits commonly associated with 21st century skills:

- Critical thinking, problem solving, reasoning, analysis, interpretation, synthesizing information;
- Research skills and practices, interrogative questioning;
- Creativity, artistry, curiosity, imagination, innovation, personal expression;
- Perseverance, self-direction, planning, self-discipline, adaptability, initiative;
- Oral and written communication, public speaking and presenting, listening;
- Leadership, teamwork, collaboration, cooperation, facility in using virtual workspaces
- Information and communication technology (ICT) literacy, media and internet literacy, data interpretation and analysis, computer programming;
- Civic, ethical, and social-justice literacy;
- Economic and financial literacy, entrepreneurialism;
- Global awareness, multicultural literacy, humanitarianism;
- Scientific literacy and reasoning, the scientific method;
- Environmental and conservation literacy, ecosystems understanding;
- Health and wellness literacy, including nutrition, diet, exercise, and public health and safety.

While many individuals and organizations have proposed definitions of 21st century skills, and most states have adopted learning standards that include or address cross-disciplinary skills, the following are three popular models that can serve to illustrate the concept and its applications in education (Abbott 2013):

- *Framework for 21st Century Learning* (The Partnership for 21st Century Skills);
- *Four Keys to College and Career Readiness* (David T. Conley and the Educational Policy Improvement Center);
- *Seven Survival Skills* (Tony Wagner and the Change Leadership Group at the Harvard Graduate School of Education) (Suto 2013).

In lieu of the fact that leadership, teamwork, collaboration, cooperation is considered an integral part of the 21st century marketable skills scope, **the objective** of this paper is to consider the placement of research activities and skills across a comprehensive expertise of required ICT tools in education.

2. RESEARCH: ACTIVITY PROFILE.

Innovation is generically defined as a "new idea, device, or method" (MWED). However, innovation is often also viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs (Maryville 1992). The term "innovation" can also be disambiguated as something original and more effective and, as a consequence, new, that "breaks into" the market or society. (Frankelius 2009).

According to Peter F. Drucker, the general sources of innovations are different changes in industry structure, in market structure, in local and global demographics, in human perception, mood and meaning, in the amount of already available scientific knowledge, etc. (HBR 2002).

On the other hand, according to Joseph F. Engelberger innovations require only three things:

1. A recognized need,
2. Competent people with relevant technology, and
3. Financial support.

Innovation processes usually involve: identifying customer needs, macro and meso trends, developing competences through education and finding financial support.

As a vehicle of innovation, research in education is commonly defined as creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications (OED 2015 (WTID 1993). It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. There are several forms of research: scientific, humanities, artistic, economic, social, business, marketing, practitioner research, etc. (OD 2015), (OED 2015 (WTID 1993)

The major steps in conducting research (Creswell 2008) are:

- Identification of research problem
- Literature review
- Specifying the purpose of research
- Determine specific research questions
- Specification of a Conceptual framework –
- Choice of a methodology (for data collection)
- Data collection
- Verify Data
- Analyzing and interpreting the data
- Reporting and evaluating research
- Communicating the research findings and, possibly, recommendations.

Every step of research procedure requires a use of specific ICT tools and an engagement into collaborative activities.

In education and research collaboration is referred to as two or more people working together to accomplish some objective, to achieve shared goals (Boston KM 2014)

It is a recursive (Martinez-Moyano 2006) process where two or more people or organizations work together to realize shared goals, (this is more than the intersection of common goals seen in co-operative ventures, but a deep, collective determination to reach an identical objective) by sharing knowledge, learning and building consensus. Structured methods of collaboration encourage introspection of behavior and communication (Spence 2006). These methods *specifically* aim to increase the success of teams as they engage in collaborative *problem solving or research*.

It exists in two main forms:

- *Synchronous*, comprising of Same Place <-> Same Time, and Different Place <-> Same Time models;
- *Asynchronous*, comprising of Same Place <-> Different Time, and Different Place <-> Different Time models (Boston KM, 2014);

Principle models and corresponding features of research collaboration are:

1. Same Time, Same Place: Discussion, Brain storm, Communicative skills, Access to documents, Access to educator, Polling, Project/task management, Rosters of multiple types, Calendaring/scheduling

2. Same Time, Different Place: Lecture, Discussion, Workshop, Research, Tutoring, Conference, File sharing, Resources.

3. Different Time, Same Place: Resources, Control.

4. Different Time, Different Place: Message exchange, Review, Assessment, Resources.

Among the *indicators of effective research collaboration* are: group work, shared responsibility, shared decision making, co- depended work (Townsend, DeMarie and Hendrickson 2015). The given indicators are traced across educational paradigms.

The essential collaborative approach within the constructivist paradigm was derived by Lev Vygotsky, known for his theory of social constructivism, who believed that learning and development is a collaborative activity and that children are cognitively developed in the context of socialization and education (Greener 2015). The perceptual, attention, and memory capacities of children are transformed by vital cognitive tools provided by culture, such as history, social context, traditions, language, and religion. For learning to occur, the student first makes contact with the social environment on an interpersonal level and then internalizes this experience (Morze et al. 2015).

In terms of this approach, Research collaboration at the conceptual level, involves the following traits and features:

- awareness
- motivation
- self-synchronization
- participation
- mediation
- reciprocity
- reflection
- engagement

Of all the educational paradigms, e-learning and u-learning (Crowe 2007: 129) relies almost exclusively on collaboration as an educational template, skills formation and assessment tool and ultimate objective.

Forms of research collaboration at a means of critical thinking skills formation comprise of 2 groups:

(1) Relationship oriented: Affinity networks, Learning communities

(2) Task oriented: Communities of Practice, Project Communities

Needs and challenges of research collaboration in an open e-learning environment comprise of the following issues:

- sharing information and documents
- collaboration across physical locations
- sharing creation and access to work products
- identifying and accessing external experts and resources
- classroom with easy-to-use tools
- document repository
- management tools, including scheduling and task management
- lists, tables, rosters, tasks, score cards
- communication tools, including e-mail, discussions, conferencing, voting.

<u>Participants of research are</u>: Universities, Educators, Students

Hence, a **student's <u>research environment</u> includes**:

- Learning materials
- Manuals
- Video
- Words
- Corpora
- Audio
- Multimedia
- Text
- Visuals
- Maps
- Online libraries and databases
- Professional software
- For translation
- For statistics
- For polling
- For computation

- Specific (virtual labs)
    - o Enterprises
    - Employment
    - Formal, informal and unformal education
    - o Open sources
    - Wiki
    - MOOC
    - Corpus
    - Repositories
    - E-journals,
    - E-conferences
    - o People
    - Peers
    - Experts
    - Supervisors

3. RESEARCH ICT TOOLS ASSESSMENT

Online or ICT enhanced research is the practice of using Internet information, especially free information on the World Wide Web, in research. It is:

- focused and purposeful (so not recreational browsing),
- uses Internet information or Internet-based resources (like Internet discussion forum)
- tends towards the immediate (drawing answers from information you can access without delay)
- and tends to access information without a purchase price (Aouil 2007).

The most popular search tools for finding information on the Internet include Web search engines, meta search engines, Web directories, and specialty search services. A Web search engine uses software known as a Web crawler to follow the hyperlinks connecting the pages on the World Wide Web. The information on these Web pages is indexed and stored by the search engine. To access this information, a user enters keywords in a search form and the search engine queries its algorithms, which take into consideration the location and frequency of keywords on a Web page, along with the quality and number of external hyperlinks pointing at the Web page (MacDonald 2016).

According to the authors' estimations and expert assessment, *needs and goals* of ICT research collaboration include the following groups of issues (Figure 1):

- key word search in search engines, Google, Bing
- metadata search
- wiki search
- social networks search
- library search
- blog search
- articles search
- book search
- MOOC search

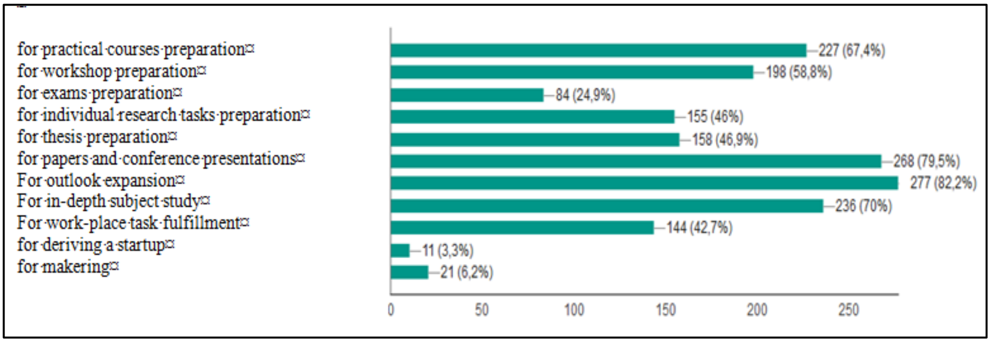

Figure 1. Distribution of ICT enhanced Research goals

Research ICT tools requirements, according to the authors' expert group estimation, comprise:

1. Type of communication (verbal)
2. Simple interface
3. Scheduling feature
4. File sharing
5. Timing
6. Environment
7. Technical architecture
8. Viewing information
9. Seeking information
10. Subscribing to information

11. Comparison of information
12. Networking
13. Writing

Among the requirements, the following features have been identified:

- ➢ Type of communication (verbal)
  - common
  - conference
  - private
- ➢ Simple and friendly interface
  - Intuitive
  - Voice oriented
  - Object oriented
- ➢ Scheduling feature
  - Long term project (Gantt chart)
  - workflow
  - Kahnban chart (crucial stages)
  - Brainstorm
- ➢ File sharing
  - Video
  - Audio
  - picture
  - Text
- ➢ Timing
  - Real time
  - Off-line
- ➢ Environment
  - Centralized
  - Decentralized

The research collaboration tools, identified for analysis (Hart 2015) have been subjected to typology according to the featured activity profile.

Thus, selected research collaboration tools have been identified according to collaboration models:

Same place, different time

Cloud, wiki, Academia.edu, Google Search, Pinterest, Khan Academy, Google Scholar, SharePoint, Schoology, Blackboard Collaborate, PaperRater, Google Classroom, Schoology, Poll Everywhere, Udemy

Same place, same time

mural.ly, http://www.draftboardapp.com/, MindMeister https://www.mindmeister.com/ru, Socrative, Adobe Connect, Diigo, SharePoint, Evernote, Cloud, wiki, Google Classroom, Lectora Inspire, Wordle

Different place, same time

blogs (blogspot, twitter, tumblr), social networks, Trello, WordPress, Scribblar, LinkedIn, Kahoot, Yammer, Blackboard Collaborate, writing.com, Red Pen (Criticism) https://Redpen.Io/, Google Doc, WordPress, Kahoot, Scoopit

Different place, different time

Cloud, wiki, Academia.edu, Google Search, Pinterest, Khan Academy, Google Scholar, SharePoint, Schoology, Blackboard Collaborate, PaperRater, Google Classroom, Schoology, Poll Everywhere, Udemy

A total number of 242 Research collaboration ICT tools have been analyzed by the expert group, chosen out of the Top 100 Efficient Learning Tools ratings (Hart 2015).

Of them 47% prove to be of the mixed type, featuring indicators of Communication and Collaboration activity tools (Cf. Figure 2):

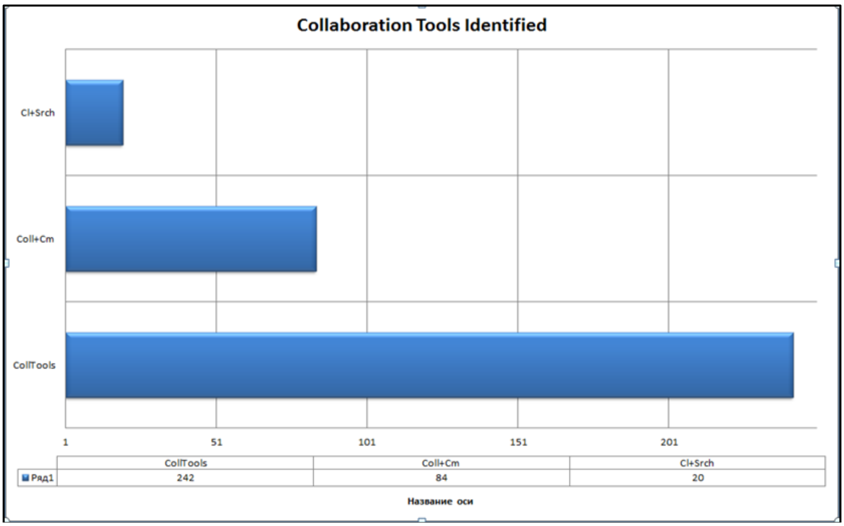

Figure 2. Mixed features of Collaboration Research Tools

The identified Research tools have been subsequently subjected to expert evaluation (Dos Reis 2015), featuring the efficiency per education activity as a main criterion (Cf. Figure 3)

Research ACTIVITIES	Research TOOLS															
	Google	Adobe Connect	Google Classroom	Google Doc	Google presentation	Google search	You Tube	Evernote	Writing.com	Scribblar	Trello	Mind Miester	Social networks	Blogs	Red Pen	PaperRater
Discussion, Workshop, Brain storm, Lecture, Control	4	1	5	1	1	3	3	2	1	3	3	2	1	1	2	3
Access to educator, Tutoring	4	2	5	3	1	5	2	2	1	3	5	5	4	1	3	5
Conference	3	2	3	4	1	5	1	3	3	3	3	3	2	1	3	5
File sharing, resources	3	4	4	5	5	3	5	2	4	1	1	1	3	3	3	4
Project/task management	4	5	5	4	5	4	5	4	4	4	2	4	4	4	3	3
Peer review/evaluation	5	5	5	3	4	3	5	4	4	3	2	4	1	4	4	1
problem solving, argumentation	2	5	2	3	5	5	4	5	3	5	3	1	2	4	2	4
Role fulfillment	4	4	3	2	4	1	5	2	2	3	5	5	5	3	5	4

Figure 3. Sample expert card

The total number of 7 anonymous independent experts have been featured in Research Collaboration tools assessment. Each tool has been rated by all seven experts according to each activity efficiency estimation (see Figure 4):

No		**Experts opinion Classify 1-5**									
	Social networks	**1**	**2**	**3**	**4**	**5**	**6**	7	**Sum 1-..**	**coefficient**	**Toal sum x coeff**
1	**Discussion, Workshop, Brain storm, Lecture, Control**	5	5	5	2	5	5	5	32	0,91	29,26
2	Access to educator, Tutoring	2	3	5	2	4	5	5	26	0,74	19,31
3	Conference	4	4	5	1	5	3	3	25	0,71	17,86
4	File sharing, resources	3	4	5	4	4	4	4	28	0,80	22,40

5	Project/task management	2	2	4	2	4	5	5	24	0,69	16,46
6	Rosters of multiple types	5	4	5	1	4	5	5	29	0,83	24,03
7	Assessment, Control	4	4	5	4	4	5	5	31	0,89	27,46
8	Tutoring	1	1	4	1	3	4	4	18	0,51	9,26
9	Message exchange	5	5	5	5	5	5	5	35	1,00	35,00
10	Research task	4	4	5	5	5	5	5	33	0,94	31,11

Total nº of points	23,21

Figure 4. Sample tool expert rating

The rating coefficient has been calculated as a ∑ of points per activity divided by 35 = (7x5) => 7 experts, 5 points total per each activity.

The final expert ranking of Research Collaboration tools under consideration is as follows (Table 1):

Table 1.

Final expert ranking of Research Collaboration ICT tools

No	**Tools**	Points
1	Social networks	23,21
2	Google search (search engines)	21,05
3	Blogs	17,61
4	wiki	17,41
5	Mindmeister (mind maps)	16,81
6	Scribblar	16,74
7	Google Doc	15,75
8	Google presentation	14,55
9	Writing.com	13,8
10	Red Pen	11,86
11	Evernote	11,04
12	Cloud	11,01
13	PaperRater	9,48

CONCLUSION

According to expert model assessment – the top ranking research collaborative tool falls into the *social media* category (23,21 points) and search engine category (21,05). The *social network* engines are designed to store, share, promote, reference and review academic output. The network type interface is designed to facilitate students' and researchers 'personal collaboration, navigation through the thematic span of academic output, uploaded into public domain.

The major purposes of this research collaboration tool include:

- store
- share
- interact / network
- review
- disseminate
- upgrade
- rate
- learn
- charter a comprehensive, customized reference stock of one's research and/or education interests

A social network interface comprises of the following elements:

- a personal profile (photo, basic personal data, interests, CV)
- an upload service to store one's work by type (books, papers, drafts, pictures)
- a newsfeed featuring recent uploads filtered by stated interests complete with bookmark service

REFERENCES

Abbott S. (Ed.) 2013: The glossary of education reform. [on-line] at http://edglossary.org/hidden-curriculum (accessed 10 August 2016)

Aouil B., Kajdasz-Aouil M. 2007: '*Internet as a communication environment'* In: *Culture and language media*. Sc. Editor M.Tanaś. Cracow: Ed. "Impuls", 350 p., pp.74-75

Boston KM Forum Working Sessions (2004) [on-line] at http://www.kmforum.org/ ((accessed 15 August 2016)

Creswell, J.W. 2008: Educational research: Planning, conducting, and evaluating quantitative and qualitative research (3rd). Upper Saddle River, NJ: Prentice Hall. 2008 ISBN 0-13-613550-1 . - pp 8-9

Crowe, A. R. 2007: Learning to teach with mobile technology: A teacher educator's journey. In: M. Van't Hooft & K. Swan (Eds.), *Ubiquitous computing in education* (pp. 127-144). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Frankelius, P. 2009: "Questioning two myths in innovation literature". *Journal of High Technology Management Research*. Vol. 20, No. 1, pp. 40–51.

Greener S., Wakefield C. 2015: Developing confidence in the use of digital tools in teaching Electronic Journal of E-Learning, 13 (4).

Hart J. 2015: Learning & Performance Tools [on-line] at http://www.c4lpt.co.uk/blog/2015/12/07/the-updated-c4lpt-directory-of-learning-performance-tools-services/ (accessed 12 August 2016)

MacDonald B., June Seel 2016: Research Using the Internet [on-line] at http://www.writing.utoronto.ca/advice/reading-and-researching/research-using-internet (accessed 10 August 2016)

Martinez-Moyano, I. J. 2006: Exploring the Dynamics of Collaboration in Interorganizational Settings, Ch. 4., in Schuman (Ed.). Creating a Culture of Collaboration. Jossey-bass.

Maryville, S 1992: "Entrepreneurship in the Business Curriculum". *Journal of Education for Business*. Vol. 68 No. 1, pp. 27-31.

Merriam-Webster's Online Dictionary 2015: [on-line] at http://www.merriam-webster.com/ (accessed 01 August 2016)

Morze, N., Varchenko, L., Smyrnova-Trybulska, E. 2015: 'Ways of formation of effective students' collaboration skills based upon the usage of WBT', Int. J. Web-Based Communities, 2015 Vol. 11 No.1, pp.25-41.

Oxford Dictionaries Online 2105: [on-line] athttp://www.oxforddictionaries.com,

Oxford English Dictionary, Second Edition, 1989: (Eds.) J. A. Simpson & E. S. C. Weiner. Oxford: Oxford University Press.

Reis A. 2015: School of the Future: Methods, Technologies. [on-line] at https://plus.google.com/u/0/communities/114108209221659023662?cfem=1 (accessed 10 August 2016)

Spence, Muneera U. 2006: Graphic Design: Collaborative Processes = Understanding Self and Others. (lecture) Art 325: Collaborative Processes. Fairbanks Hall, Oregon State University, Corvallis, Oregon. 13 April.

Suto I. 2013: 21st Century skills: Ancient, ubiquitous, enigmatic? Research Matters: A Cambridge Assessment Publication. [on-line] at http://www.cambridgeassessment.org.uk/ (accessed 10 August 2016)

The Discipline of Innovation || Harvard Business Review. *August 2002*. [on-line] at (accessed 13 October 2013)

Townsend Anthony M., Samuel M. DeMarie and Anthony R. Hendrickson 1998: Virtual Teams: Technology and the Workplace of the Future // The Academy of Management Executive (1993-2005) . Vol. 12, No. 3 (Aug., 1998), pp. 17-29

TRANSLATOR EDUCATION IN THE CLOUD: STUDENTS' PERCEPTIONS OF TELECOLLABORATIVE EXPERIENCES

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Abstract: *Research results indicate that the ability to perform Computer Assisted Translation (CAT) in a telecollaborative mode is one of the sought-after qualities which translation agencies seek in prospective employees (Bondarenko, 2015). In response to that, a survey study, conducted on postgraduate student translators in an MA blended programme, explored their perceptions of: potential learning gains from telecollaboration, means of reflection on the work performed and the teamwork skills developed, self-assessment modes and the role of a face-to-face introduction to a telecollaboration project. This paper aims to shed light on the issues investigated through the afore-mentioned survey with a view to informing telecollaboration project design in translation courses.*

Keywords: translator education, telecollaboration, cloud computing, CAT

INTRODUCTION

Effective translator education should meet the requirements of the present-day translation market, but, at the same time, it should also be in line with the current educational standards, at large. In other words, contemporary university courses in translation are supposed to respond to two realities: the professional reality in which translators function today and the reality which students are likely to face in present day educational settings.

The international translation market is experiencing growth at an annual rate ranging between 6.23% (DePalma, Hedge & Pielmeier, 2014) and 10% (Pym, 2016). As a matter of fact, this growth rate may be subject to a particular degree of year-to-year fluctuation as reported by the Common Sense Advisory researchers and analysts but, overall, a steady expansion has been observed over at least the past nine years (DePalma, Hedge & Pielmeier, 2014).

As a result, it is necessary to implement solutions that would help translators cope with an increased amount of work, which can be achieved in two major ways. One is to use tools which permit teams of translators operating from different locations oftentimes over long distances (Gil & Pym, 2006) to collaborate and handle large volumes of documents in the most convenient manner possible (Choudhury & McConnell, 2013). The other way is to automate the translation process (TAUS, 2013), with the aim to reduce the workload on individuals involved in it.

The above-cited realities of the professional translation market can be catered for thanks to the availability of translation technologies, which do not only automate translation at least to a certain extent but also enable multiple parties involved in it, e.g. project managers, translators, reviewers, editors, proofreaders, field experts and clients, to perform effective collaboration (Choudhury & McConnell, 2013), or telecollaboration, i.e. computer-enhanced online teamwork, based on cloud computing solutions, which facilitates the accessibility and usability of translation tools (Acar, 2015). When one combines that with the fact that one of the most sought-after qualities in prospective translators is the ability "(…) to perform computer-assisted translation with the help of translation tools" (Bondarenko, 2015: 34), it is plain to see that translation is clearly shifting towards the use of mobile computer technology, i.e. server-side translation services, and telecollaboration (Mrochen, 2015).

Interestingly enough, trends in translation seem to nicely tie in with those in contemporary education, which also attempts to benefit from the affordances offered by Information and Communication Technology (ICT). The utilisation of ICT for the purpose of education has long been supported by scholars (cf. Prensky, 2001; 2012; Tapscott, 2008), who maintain that digital education not only responds to the needs of learners but also permits learning modes which result in additional learning gains. As a matter of fact, the impact of ICT on educational practices has been so serious that it has led to the emergence of a new discipline named *digital humanities pedagogy* (Spiro, 2012), which, on the one hand, investigates the ICT-enhanced teaching of humanities, while on the other explores how research in humanistic disciplines themselves has been altered, or augmented, by computer technology. As Zappa (2012) envisages, digital education is a trend which is to be maintained at least until the 2040s, with extensive changes predicted as an outcome of the rapid development of ICT.

All in all, both the reality of the professional translation market and that of contemporary education undeniably share the common denominator of the implementation of digital technologies. Consequently, it seems to be only a natural conclusion that if translator education is to be effective in preparing students for the job market, it must involve the technologies and work modes which are most likely to be required in their professional practices, i.e. cloud computing, translation technologies and telecollaboration, respectively.

That kind of learning is perfectly congruent with Piotrowska's (2005) reflection upon the shape of translator education in Poland, which according to her observations has been gradually diverting from literary translation in favour of interpreting, acknowledging, at the same time, a greater role of technology in order to prepare translators for the demands and challenges of contemporary markets. Piotrowska (ibid.) argues that translator teaching methods need to encompass such techniques and media as modern CAT solutions, online symposia, distance learning, e-learning, virtual learning environments, translation-related forums as well as CAT tools discussion lists. She argues that their introduction into translation didactics is, on the one hand, an inevitable step in the progress of methodological tools, and on the other a necessity in modernising translation teaching. In addition, such training is a realisation of Klimkowski's (2015) postulate that translator education is supposed to simulate real-work conditions through project work, which, in turn, embodies Kiraly's (2000) social constructivist approach. According to Kiraly (ibid.), by building professional competence in a genuine social context of actual translation jobs makes trainee translators more autonomous and empowered, while might be the most effective form of professional development.

1. TELECOLLABORATION AND CLOUD COMPUTING IN TRANSLATOR EDUCATION: LITERATURE REVIEW

1.1 Telecollaboration: definition and learning gains

Telecollaboration is a learning mode which in many ways is a practical albeit modified by the use of online technology reflection of sociocultural learning, a concept advocated as early as in the 1960s/70s by Vygotsky and Cole (1978), as well as the idea of contextualised learning, consisting in hands-on experience and collaboration, which was promoted by Dewey (1966).

Therefore, a telecollaboration project or an online intercultural exchange (Dooly &O'Dowd, 2012) involves the use of Web-based communication tools through which learners engage in collaboration in social contexts and critical reflection, with the support of scaffolding from the teacher (Guth & Helm, 2012). Again, one can observe that, through its work modes, telecollaboration incorporates Vygotsky's concept of the Zone of Proximal Development (ZPD) (Vygotsky & Cole, 1978), according to which an aided learner is believed to be able to learn more than an unaided one. In telecollaboration, as in the case of its sister work mode, collaboration, learners are aided either by their more experienced peers (expert learners) or the teacher, who provides support adjusted to the level of the learners' current performance, and the latter form of support must not be overlooked. As it has been reported by Picciano (2002) and Bangert (2008), the teacher's presence is critical to the quality of online learning and apparently translates into student satisfaction. In fact, telecollaboration has the potential to overcome the concern expressed by Gil and Pym (2006) that in badly structured ICT-based learning environments learners interact with the screen, not the teacher or their peers.

Another dimension of telecollaboration is "(...) the interconnectedness of psychological, social, and environmental process in SLA" (Lam & Kramsch, 2003: 144), which telecollaborative projects usually involve. Although Lam and Kramsch (ibid.) discuss this conceptualisation of learning which relies on the notion of ecological constructivism (Wells, 1994) in relation to second language acquisition, there is no reason for which the interplay of individual, social and environmental factors cannot contribute to the development of competences beyond linguistic ones, e.g. translator competences (cf. PACTE, 2003; 2011). In this manner student translators' learning benefits derive not only from the very electronic tools which they use but also from the social interactions in which they engage with the use of the tools.

At the same time, as Siemens (2008) posits in his theory of connectivism, at the crux of the learners' interaction with the environment lies their decision making process through which they need to skilfully search for information available and distinguish between primary and extraneous data an ability which is essential in the knowledge society of today.

Telecollaboration is a highly flexible concept, denoting a broad area of applications and a multitude of instructional designs. It relies on three major forms of computer-mediated communication (CMC): synchronous/asynchronous, oral/written, and media sharing (Guth & Helm, 2011). Synchronous communication consists in interaction in real time, e.g. via Web chat or online communicators, while asynchronous communication can be practised through email, Web forums, blogs or vlogs, and involves a time delay in information exchange. Both synchronous and asynchronous types of communication may be text- or voice-based, and in addition, they may be enhanced by an easy exchange of multimedia through audio/video file sharing services.

As O'Dowd and Ware (2009) posit, depending on the nature of the tasks that learners perform, telecollaboration projects fall into the main three types: (i) information exchange, (ii) comparison and analysis, and (iii) collaboration and product creation. All of them are universally applicable in that they all equally lend themselves not only to intercultural language learning, for which telecollaboration is conventionally used (Guth & Helm, 2010), but also to translator education. Information exchange is a work mode which is already part of the professional reality; so is collaboration and product creation, as it has been demonstrated; while comparison and analysis can be easily implemented in order to develop student translators' intercultural competence.

Out of the afore-mentioned three types of telecollaboration, product-based learning seems to be the most comprehensive in that it may easily comprise the other two, that is why it merits a little more attention. It is worth noticing that for Lamy and Goodfellow (2010), telecollaboration is by deafult, as it were an exchange that always has to lead to a collaboratively created tangible product, including all those frameworks in which conceptual or attitudinal change in learners' minds, learning repertoires or outlooks are actually accomplished in the process. Guth et al. (2012) add that it is important participants share professional, or *transversal*, interests as that creates a natural desire to use the language of the project and work on common products.

Since telecollaborative projects rely on the utilisation of online technology, rather than locally-based desktop resources, they permit learners to involve in mobile learning, for which they can use small, portable devices such as netbooks, tablets or smartphones, at least for part of what they do, e.g. instant communication. That, in turn, may enable learners to take advantage of the characteristics of mobile education, as proposed by Kukulska-Hulme et al. (2009): portability, individualisation of learning, unobtrusiveness, availability, adaptability, persistence, usefulness and ease of use.

Portability means that learning is possible in out-of-school contexts, irrespective of the students' whereabouts. Individualisation permits the application of learning modes which correspond to individual students' abilities, cognitive resources and learning styles. Unobtrusiveness is helpful in placing situational context and knowledge at the core of the learning experience, without interference from the technological means used for the purpose. Availability denotes the ability to easily communicate with project partners, teachers, and experts, whenever and wherever it is possible. Adaptability refers to the fact that mobile technologies can be adjusted to the learning context, learners' knowledge and skills. Persistency regards the support which mobile technology provides to life-long learning by enabling individuals to access resources and knowledge accumulated over a lifetime, regardless of changes to technology. Usefulness reflects the fact that mobile technology meets people's daily communication, professional, reference and learning needs, and, finally, mobile tools are easy to use even for those with no experience in ICT.

Lankshear and Knobel (2006) credit online learning with the potential to further the development of operational, cultural and critical literacies, which complement the kind of language-based literacy that has traditionally underpinned language learning. Operational literacy operates at the level of procedural knowledge, i.e. it involves the skills of e.g. using online tools, information searching, resource/information sharing and multitasking. Cultural literacy regards declarative knowledge of the principles of communication, including the knowledge of the netiquette and copyright issues, as well as the knowledge of the context of communication, which facilitates information exchanges in particular settings. Critical literacy is affective in nature, and refers to one's awareness of less tangible phenomena involved in online communication, e.g. the power relations beyond the tools utilised.

The degree to which these, and other, literacies are developed depends on task design (for task-based telecollaboration principles, cf. Mueller-Hartmann, 2007). Those other literacies, desirable in the 21st century, are for instance: collaboration, critical consumption of information, learning, unlearning, and relearning (Davidson, 2012), and they overlap with what others (Herk, 2015; Szulc, n.d.) refer to as soft skills, or employability skills, which include: communication skills, new media skills, teamwork, interpersonal skills, cultural awareness, flexibility, strategic planning, self-organisation, creativity, analytical and critical thinking skills and leadership skills. Soft skills are indispensable today as they appear to be even more imporant than professional skills, which finds confirmation in the results of research by the National Association of Colleges and Employers (NACE) from the USA. On examining the list of the key skills sought in prospective employees, which was compiled by NACE (2012), one will be struck by the fact the top six positons are occupied by generic employablity skills, such as: (i) the ability to work in a team structure; (ii) verbal communication skills; (iii) decision taking and problem solving; (iv) information processing; (v) planning, organising and prioritising work; and (vi) analyzing quantitative data.

1.2 Cloud computing: configurations and learning affordances

Cloud computing (CC) and telecollaboration are hard to seperate, and their mutual relation stems from the fact that while telecollaboration is a work mode, cloud computing constitutes its technological underpinning the environment in which the work mode can be practised.

The National Institute of Standards and Technology (NIST) defines cloud computing as: "(…) a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011: 2).

Cloud computing is, therefore, what makes telecollaboration possible in that it provides Web-based infrastructure, online resources and tools which facilitate collaboration between actors operating from distant locations.

CC is characterised by the following five features: on-demand self-service, broad network access, resource pooling, and rapid elasticity. The term *on-demand self-service* reflects the fact that CC offers users automated access to online storage resources and server time whenever necessary, without the need to interact with human providers. *Broad network access* means that resources are provided over the

Web and are accessible through a range of desktop and mobile devices, including workstations, laptops, tablets and smartphones. *Resource pooling* expresses the idea that the computing resources pooled online can serve various purposes and user groups, and they can be flexibly assigned on demand. *Rapid elasticity* regards the possibility of quickly providing CC solutions tailored to users' needs, with no apparent limitations, while *measured service* is the feature of CC which concerns automatic resource control and optimisation as well as the capacity to measure, monitor and report the use of the services utilised (Mell & Grance, 2011).

As the infrastructure and applications which CC is capable of providing can be offered in different configurations, three CC service models may be distinguished: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

The service model of SaaS denotes the user's ability to access and use applications provided in the cloud on a variety of desktop or mobile devices, as discussed above, yet without being able to exert control over the infrastructure through which the CC service is maintained and delivered. Platform as a Service (PaaS) is a model in which the user can manage the infrastructure provided in the cloud in order to run custom-made or acquired applications. Finally, the Infrastructure as a Service (IaaS) model enables the user to utilise computing resources, such as processing and network resources, to run independent operating systems and applications, while also being in control of the software, and to a limited degree of selected elements of the networked environment in which the software functions (Mell & Grance, 2011).

Overall, the afore-mentioned characteristics and service models of cloud computing indicate the flexibility of server-side, online technology in meeting the user's requirements in both professional as well as educational settings. Irrespective of how it is utilised, it is the technology which in combination with telecollaborative work modes lies at the core of in the Information Age, which - as Marquis (2012) proposes creates demands towards students which pertain to four major areas:

(i) ways of thinking, i.e. creative and critical thinking, problem solving and decision making;

(ii) work modes involving CMC and telecollaboration skills;

(iii) working tools, i.e. the ability to use ICT tools and information literacy,

(iv) life skills, e.g. personal and career skills, personal and social responsilibility.

Cloud-based translator training can exhibit different forms or modes of telecollaboration, most notably: communication, cooperation and collaboration. While synonymous for many, these three processes are clearly separated by some researchers (cf. An et al., 2008; Beatty & Nunan, 2004). With communication as the aim of the project, as Lee et al. (2006) have it, the essence is message exchange and information delivery. According to Beatty and Nunan (2004), cooperation requires that students work together, with each getting a part of a task to do, however, the aspect of negotiation of the outcome is not essential for successful task completion. Finally, as the finest and most sophisticated form of online work, and the one most difficult to arrive at, collaborative learning implies "(…) working in a group of two or more to achieve a common goal, while respecting each individual's contribution to the whole" (McInnerney & Robert, 2004: 205).

In the light of the above, it may be stated that cloud-based telecollaborative work involves the tools, skills and work modes which perfectly meet the requirements of contemporary translator education programmes, given it is adapted to the pedagogical purposes which it is supposed to serve.

2. THE STUDY

2.1. The telecollaboration project as the research context

A telecollaboration project in terminology was conducted between October 2015 and January 2016 with 18 student translators, who collaborated online in 3 groups of three, a group of four and a pair, for the duration of 5 weeks. The purpose of the project was to produce an online/offline termbase comprising vocabulary relating to the field of Computer Assisted Translation as a scholarly discipline or CAT tools. Prior to the telecollaboration the students were instructed in the face-to-face mode in theoretical issues indispensable for the completion of the project, including special purpose language, terminology, terminology tools and the role of terminology in translation; they also practised using computerised terminology tools. In the course of the telecollaboration project per sé the students needed to perform a number of operations, including the following: searching reference texts online, aligning parallel reference texts, searching and extracting terminology, using of CAT tools, e.g. *memoQ* or *PlusTools,* exploring the terms extracted, collecting elaborate data on them, entering data into an electronic database in a CAT tool, and exporting data as a printed document by using the *Mail Merge* function of *Microsoft Word*.

The project work was performed exclusively through telecollaboration and was supervised by a group leader, who was responsible for coordinating group and individual task performance, as well as contacting the course teacher in case of problems. The Web tools utilised were selected by the students themselves, at their own discretion, and fell into four major categories:

- social networking sites (e.g. *Facebook*)
- online text editors (e.g. *TitanPad, PrimaryPad, Google Docs*)
- resource sharing services (e.g. *Wallwisher, OneDrive, Dropbox, Google Docs*)

- Web communication tools (e.g. chatrooms, *FB Messenger, Skype*)

The project work was evidenced through records of online communication and students' actions, e.g. videos of telecollaborative text processing or screenprints; and on completing the telecollaboration the students submitted the final product, together with raw data files.

2.2. Research questions and instruments

A survey study was conducted in January 2016 with the aim to answer two research questions:

1. What are the student translators' perceptions of their participation in the telecollaboration project with regard to the following:
    - the benefits and learning gains as outcomes of the telecollaboration project;
    - the students' ability to learn about their own collaboration skills;
    - the nature/nurture origins of collaboration skills;
    - reflection on collaboration;
    - self-assessment of teamwork skills;
    - importance of a face-to-face component preceding a telecollaboration project;
    - the translator's most essential soft skills?
2. Which soft skills do the students perceive as most essential for the translator?

The two main research questions were operationalised as follows:

1. Did the telecollaboration project bring you any learning gains?
2. If so, what were they? If not, why did you fail to benefit?
3. What did the telecollaboration project help you realise about your ability to collaborate?
4. Do you believe that collaboration skills can be developed through practice or they are a consequence of an individual's inherent personality traits?
5. Did you reflect on your ability to collaborate with others during or after the project?
6. What is the best means of self-assessing your own teamwork skills?
7. To what extent is it important that a telecollaboration project is preceded by a phase involving face-to-face communication?

8. Which soft skills are the most important for a translator, given his/her professional needs?

In effect, the research instrument was an online survey comprising 8 questions, in all: 4 open-ended (Q2, Q3, Q6, Q7), 3 close-ended ones (Q1, Q4, Q5), 2 of which featured a write-in response option, and 1 ranking question (Q8).

The survey was designed and administered via the *Survey Monkey* service on a convenience sample of 18 university students (N=18) in their first year of an MA programme in Translation Studies. Quantitative data collected through the online survey were analysed with the use of the *Analyse results* tool provided by the *Survey Monkey* purveyors, while qualitative data were quantified manually by identifying response categories within them and ascribing particular responses to the emergent categories.

2.3. Research sample

Prior to the online survey a pen-and-paper questionnaire was run in order to establish the profile of the research sample in terms of gender, the duration of study, the university degree obtained, formal ICT qualifications and the usage of CAT and Web-based tools. Data obtained in this case were processed with the open-source statistical package PSPP, v. 0.10.1-g1082b8.

The results revealed that the research sample was composed of 17 female students and 1 male student. All the participants had completed a BA course and 2 had already obtained a Master's degree. Overall, the subjects had had 5 years' experience in study at university level and 100% claimed to have been using ICT for study purposes. Only 3 students possessed formal ICT qualifications; 2 students held a certificate of participation in a *MB Capgemini* Excel workshop and one had obtained a *Microsoft* certificate. However, all the students used desktop CAT software, such as *Wordfast Pro* or *memoQ*, with nearly 72% using it fairly frequently (often and sometimes) (Table 1). Most of them (67%) also used cloud CAT tools, e.g. *Systran,* fairly frequently (often and sometimes), while 13% used them rarely or never (Table 2).

Table 1.

Percentage distribution of students using desktop CAT tools

Frequency	Value	No. of Ss	Percent	Valid Percent	Mean	SD
Always	1	1	5.56	5.56		
Often	2	12	66.67	66.67	2.22	.55
Sometimes	3	5	27.78	27.78		
Total		18	100.0	100.0		

Source: Own work

Table 2.

Percentage distribution of students using cloud CAT tools

Value label	Value	No. of Ss	Percent	Valid Percent	Mean	SD
Often	2	4	22.22	22.22		
Sometimes	3	8	44.44	44.44		
Rarely	4	3	16.67	16.67	3.28	1.02
Never	5	3	16.67	16.67		
Total		18	100.0	100.0		

Source: Own work

An additional 61% of the participants used online concordancers fairly frequently (often and sometimes), whereas 39% used them rarely (Table 3). Finally, 39% used online termbases, such as *IATE*, fairly frequently, while another 39% used them rarely (Table 4).

Table 3.

Percentage distribution of students using online concordancers

Value label	Value	No. of Ss	Percent	Valid Percent	Mean	SD
Often	2	6	33.33	33.33		
Sometimes	3	5	27.78	27.78	3.06	.87
Rarely	4	7	38.89	38.89		
Total		18	100.0	100.0		

Source: Own work

Table 4.

Percentage distribution of students using online termbases

Value label	Value	No. of Ss	Percent	Valid Percent	Mean	SD
Often	2	3	16.67	16.67		
Sometimes	3	4	22.22	22.22		
Rarely	4	7	38.89	38.89	3.67	1.03
Never	5	4	22.22	22.22		
Total		18	100.0	100.0		

Source: Own work

All in all, it turned out that the sample consisted of students who were not only familiar with desktop and cloud CAT tools and other online resources useful in translation, but also used the tools, at least to a certain degree.

2.4. Survey findings

All the respondents declared that they had benefited from participation in the telecollaboration project (Q1). When answering question 2 (Figure 1), they elaborated on the issue, with the largest proportions of students viewing the major benefits as the opportunity to practise and learn about the nature of teamwork (50%), learn to use CMC tools (44%) and CAT tools (22%), but they also learnt how to manage time effectively (22%) and how to restrain emotions (17%). In addition, 17% of the students claimed to have increased their knowledge of self (17%).

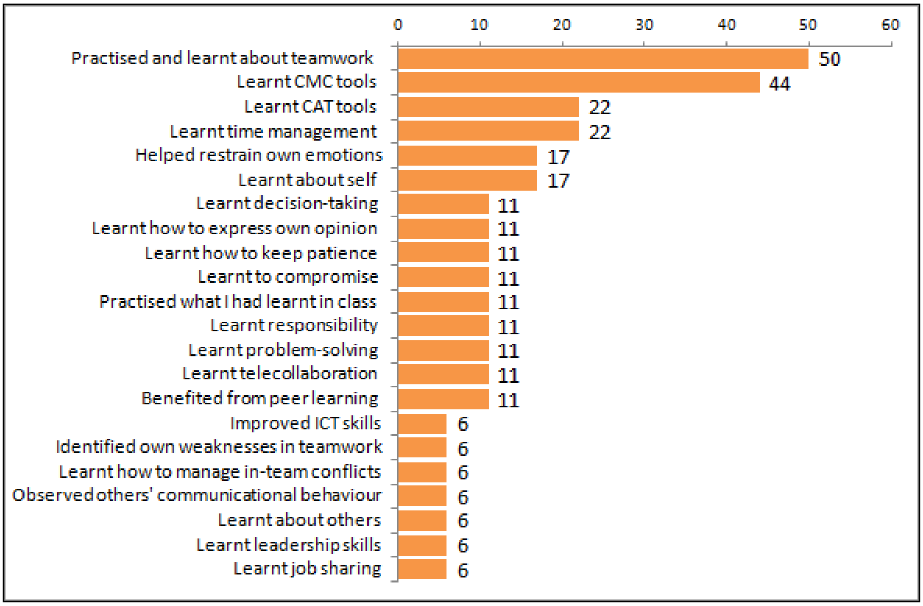

Figure 1. Percentage distribution of students listing particular benefits of telecollaboration

Source: Own work

Question 3 revealed what the participants of the project realised about their ability to telecollaborate. The largest proportion of students gained awareness of the fact that teamwork may be more challenging than individual work (44%), but they can cope with it (22%). They also realised that they are able to assertively lead the team (11%). The remainder of realisations cited by smaller proportions of the students are presented below (Figure 2).

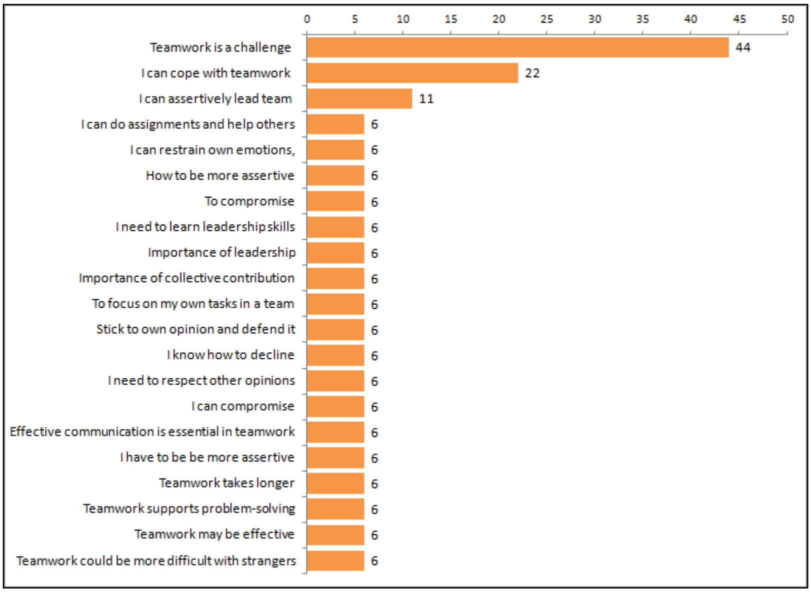

Figure 2. Percentage distribution of students listing own realisations about their ability to telecollaborate as an outcome of the project
Source: Own work

The nature/nurture origins of teamwork skills were tackled in question 4 (Q4), where the majority of the respondents (61%) expressed the belief that teamwork skills can be developed through training. Only 6% stated that the skills derive from a person's natural personality traits, while 33% maintained that teamwork skills are an outcome of interplay between nature and nurture. In consequence, training is necessary to all, even those seemingly naturally predisposed to telecollaborate as there is always room for improvement. At the same time, as the students observed, negative personality traits may obstruct successful collaboration, despite training.

A vast majority of the respondents (96%) claimed that reflections on their own telecollaborative experience appeared automatically in the course of the project. Only 6% did not reflect without stimulation (Q5).

In question 6 (Q6) the respondents proposed the means through which the participants of telecollaboration projects could most effectively reflect on their experience. The largest proportion of students (39%) suggested a questionnaire as a follow-up to the telecollaborative experience, 28% believed that self-reflection would be an effective solution, 22% mentioned a group discussion session with the teacher, 6% opted for student interviews, while another 6% expressed the opinion that reflection would be best evoked through the very participation in telecollaboration.

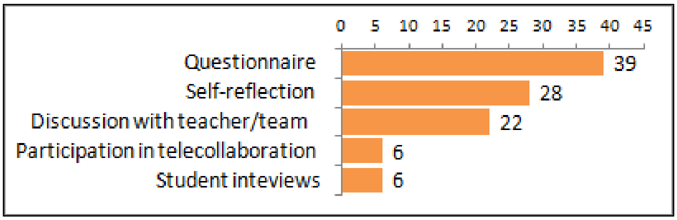

Figure 3. Percentage distribution of students listing means of reflection in telecollaboration projects
Source: Own work

Question 7 (Q7) examined the students' views on the need to incorporate a face-to-face component into a course involving telecollaboration. A vast majority (89%) admitted that face-to-face contact is important in that it has certain advantages over online work (Figure 4). 11% stated that f2f communication is not so essential as online interaction can easily replace it.

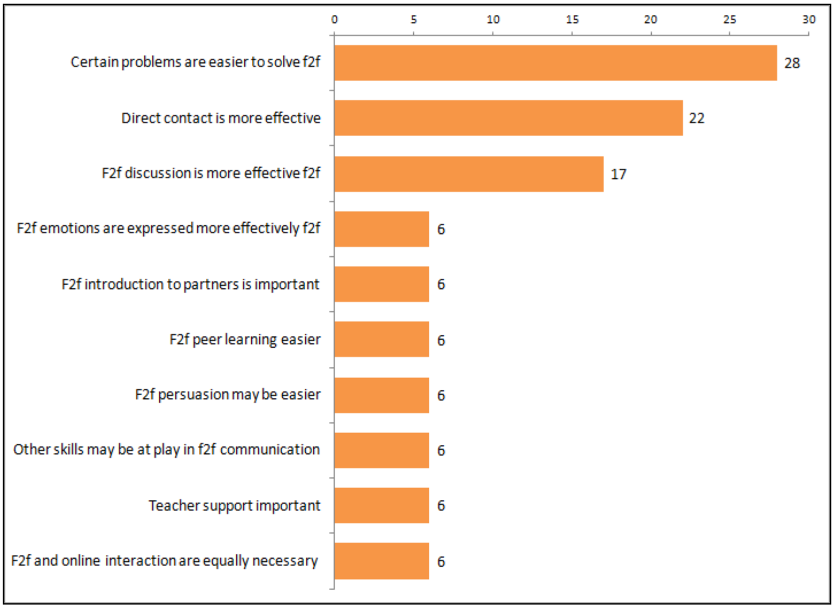

Figure 4. Percentage distribution of students listing means of reflection in telecollaboration projects
Source: Own work

In the final question (Q8) the respondents ranked a group of 27 soft skills in the order of importance for the translator. The 6 topmost skills, arranged according to their weighted average ranks, were communication skills (21), stress management (20), skills in dealing with difficult situations (20), self-confidence (19), teamwork skills (19), emotion regulation (18) and patience (18). The skills considered the least useful were as follows: skills to forgive (12), networking skills (12), self-promotion skills (11), being savvy in handling office politics (11), facilitating skills (8) and selling skills (6). A full ranking is presented below (Figure 5).

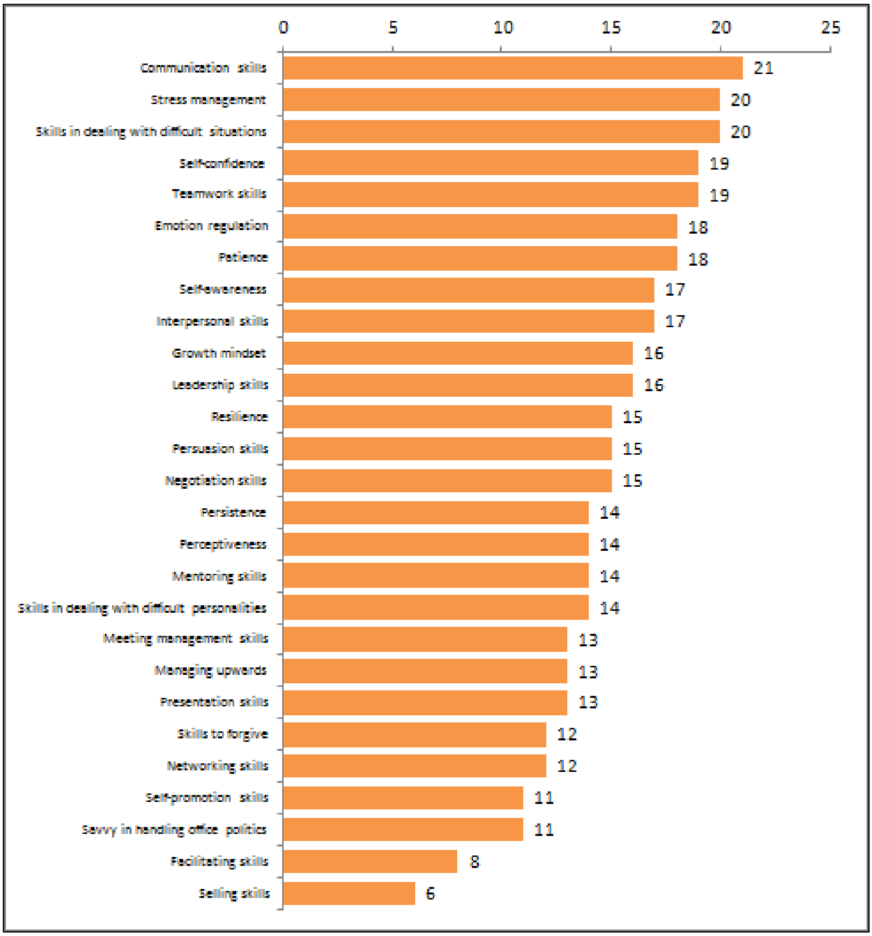

Figure 5. Percentage distribution of students listing means of reflection in telecollaboration projects
Source: Own work

CONCLUSION

In the light of the research findings, it may be concluded that all the participants considered the telecollaboration project beneficial, and for the largest proportions of students the benefits were of both procedural and affective nature. On the one hand, the students learnt teamwork skills, useful cloud-based/local CMC and CAT resources as well as time management; on the other, they had to control their own emotions and had the opportunity to reflect on their own personality.

They also realised that teamwork may be more challenging than individual work, but, at the same time, they gained confidence in their ability to cope with the challenge successfully and take on particular roles in telecollaboration, e.g. that of group leaders.

What draws attention is the fact that the range of benefits and realisations listed by the students is extensive, yet most of them were named by smaller proportions of the respondents, e.g. 6%, which amounted to a single student. What follows logically is that potential benefits and realisations may not be salient enough for the participants of telecollaboration projects to notice automatically, and that, in turn, seems to underline the need for explicit reflection on a telecollaborative experience. Although a vast majority of the students testified to the claim that reflection inherently accompanied their telecollaboration work, the findings demonstrate that such reflection may be superficial, and it requires focusing if certain benefits are not to be overlooked.

As the respondents themselves indicated, reflection could be performed with the use of questionnaires, guided self-reflection techniques and group discussion. Among the less cited means of reflection were student interviews; perhaps, because students may find them stressful and time-consuming. They may, nevertheless, be worth considering as an effective solution as they permit in-depth analysis of the telecollaborative experience.

In the students' view, telecollaboration also requires a face-to-face introductory stage, which could involve a combination of theoretical and practical work, as was the case in the project examined. The theoretical component could involve the study of professional literature in a field relevant to the theme of the telecollaboration project to be conducted, while the practice could introduce students to relevant cloud-based/local CMC and CAT resources.

At the same time, on examining the survey responses closely, one will also notice that some students would simply appreciate face-to-face collaboration instead of telecollaboration as certain problems are easier to solve in that mode, while direct contact may be more effective. However, in recognition of the relevance of telecollaborative practice to contemporary translation, translator educators should not treat the preference as an argument against telecollaboration, but rather as one more reason for which telecollaboration, i.e. cloud-based work, needs to be guaranteed a place in translator education programmes.

The part of the study which did not relate directly to the telecollaboration project in which the students participated but may inform telecollaboration project design concerned the soft skills which they considered most useful for translators. The skills which topped the list were procedural and emotive in nature as the students were aware that success in telecollaboration requires not only communication and teamwork skills but also e.g. resourcefulness in difficult situations, the ability to control emotions and self-confidence. The skills considered the least useful, e.g. networking skills, being savvy in handling office politics or selling skills, may have simply appeared most abstract to the students, although among them were self-promotion skills, which are instrumental in professional life. Consequently, on the one hand, translator educators could treat the list as an indicator of which skills their students are most likely to be motivated to develop. On the other, the list demonstrates with regard to which skills students' awareness may need to be developed.

To sum up, optimalised practice in cloud-based telecollaborative translation is a necessity, which finds confirmation in the students' belief that telecollaboration/teamwork skills are not inborn and require training, even when students appear naturally predisposed to it. However, it must be meticulously planned and methodologically sound, taking into consideration *inter alia* issues highlighted by the current study.

REFERENCES

Acar,Ç., 2015: *Redefining translation courses with cloud-based technologies*. MultiLingual, Vol. 26, Issue 8 2015, pages 41-44. ISSN: 1512-0309.

An, H., Kim, S., & Kim, B., 2008: *Teacher perspectives on online collaborative learning: Factors perceived as facilitating and impeding successful online group work*. Contemporary Issues in Technology and Teacher Education, Vol. 8, Issue 1 2008, pages 65-83, ISSN: 1528-5804.

Beatty, K., & Nunan, D., 2004: *Computer-mediated collaborative learning*. System, Vol. 32, pages 165-183, ISSN: 0346-251X.

Bangert, A., 2008: *The influence of social presence and teaching presence on the quality of online critical inquiry*. Journal of Computing in Higher Education, Vol. 20, Issue 1 2008, pages 34-61.

Bondarenko,O., 2015: *Academia expectations versus industry reality*. MultiLingual, Vol. 26, Issue 8 2015, pages 31-34. ISSN: 1512-0309.

Dewey, J., 1966: *Democracy and Education.* Free Press, New York, 1966, ISBN: 0029073707.

Dooly, M., & O'Dowd, R., 2012: *Researching online foreign language interaction and exchange: Theories, methods and challenges*, Peter Lang Publishing, New York, 2012, ISBN: 978-3034311557.

Gil, J.R.B., & Pym, A., 2006: *Technology and translation (a pedagogical overview)*. In A. Pym, A. Perekrestenko, & B. Starink (eds.), Translation Technology and its Teaching. Intercultural Studies Group, Universitat Rovira i Virgili, Tarragona, 2006, 5-19, ISBN-13: 978-84-611-1132-9, ISBN-10: 84-611-1132-X.

Guth, S. and Helm, F., 2010: *Introduction.* In S. Guth and F. Helm (eds.), Telecollaboration 2.0: Language, Literacy and Intercultural Learning in the 21st Century. Peter Lang, Bern, 2010, 13-38, ISBN: 978-3-0343-0440-5.

Guth, S., & Helm, F., 2011: *Developing multiliteracies in ELT through telecollaboration*. ELT Journal, Vol. 66, Issue 1, January 2011, pages 42-51, doi:10.1093/elt/ccr027.

Guth, S., Helm, F., & O'Dowd, R., 2012: *University Language Classes Collaborating Online. A Report on the Integration of Telecollaborative Networks in European Universities*, [online] at http://www.intent-project.eu/sites/default/files/Telecollaboration_report_Final_Oct2012.pdf (accessed 25 August 2013).

Herk , M., 2015: *The Skills Gap and the Seven Skill Sets that Employers Want: Building the Ideal New Hire*. Committee for Economic Development, [online] at https://www.ced.org/blog/entry/the-skills-gap-and-the-seven-skill-sets-that-employers-want-building-the-id (accessed 25 July 2016).

Kiraly, D.C. 2000: *A social constructivist approach to translator education*. St. Jerome Publishing, Manchester, Northampton, MA, 2000, ISBN: 1900650339.

Klimkowski, K. 2015: *Towards a Shared Curriculum in Translator and Interpreter Education.* Wyższa Szkoła Filologiczna, Wrocław, 2015, ISBN: 978-3-8471-0495-7.

Kukulska-Hulme, A., Sharples, M., Milrad, M., Arnedillo-Sanchez, I., & Vavoula, G., 2009: *Innovation in Mobile Learning: A European Perspective*. International Journal of Mobile and Blended Learning, Vol. 1, Issue 1 2009, pages 13–35, ISSN: 1941-8647.

Lam, W.S.E., & Kramsch, C., 2003: *The ecology of an SLA community in a computer-mediated environment*. In J. Leather, & J. Van Dam (eds.), Ecology of language acquisition. Kluwer Academic, Dordrecht, 2003, 141–158, ISBN: 978-94-017-0341-3.

Lamy, M-N., & Goodfellow, R. 2010: *Telecollaboration and Learning 2.0* In S. Guth & F. Helm (Eds.), Telecollaboration 2.0: language, literacies and intercultural learning in the 21st century. Peter Lang, Bern, 2010, 107-138, ISBN: 978-3-0343-0440-5.

Lee, S., Magjuka, R., Liu, X., & Bonk, C. J., 2006: *Interactive technologies for collaborative learning*. International Journal of Instructional Technology & Distance Learning, Vol. 3, Issue 6 2006, pages 17-32, ISSN: 1550-6908.

Marquis, J., 2012: *Building the Ideal Skill Set for 21st Century Employment*, [online] at http://www.onlineuniversities.com/blog/2013/07/building-the-ideal-skill-set-for-21st-century-employment/ (accessed 26 July 2016).

McInnerney, J., & Robert, T.S., 2004: *Collaborative or cooperative learning?* In T. S. Roberts (Ed.), Online collaborative learning: Theory and practice, Information Science Publishing, Hershey, PA, 2004, 203-214, ISBN: 1-59140-227-1.

Mell, P., & Grance, T., 2011: *The NIST Definition of Cloud Computing. Recommendations of the National Institute of Standards and Technology*. National Institute of Standards and Technology, Gaithersburg, MD, 2011, [online] at http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf.

Mrochen, I. , 2014: *Translating in the Cloud: New Digital Skills and the Open Source Movement*. In Smyrnova-Trybulska, E. (ed.), E-learning and Intercultural Competences Development in Different Countries. University of Silesia, Katowice-Cieszyn, 2014, 279-298, ISBN: 978-83-60071-76-2.

Mueller-Hartmann, A., 2007: *Teacher role in telecollaboration: setting up and managing exchanges* In R. O'Dowd (ed.), Online Intercultural Exchange. An Introduction for Foreign Language Teachers. Multilingual Matters, Clevedon, 2007, 167-192, ISBN: 13: 978-1-84769-008-1.

NACE, 2012: *Job Outlook: The Candidate Skills/Qualities Employers Want,* [online] at http://www.naceweb.org/s10262011/candidate_skills_employer_qualities (accessed 15 May 2014).

O'Dowd, R., Ware, P., 2009: *Critical issues in telecollaborative task design*. CALL Journal, Vol. 22, Issue 2, 173–88, ISSN: 0958-8221 (print).

PACTE, 2003: *Building a translation competence model*. In F. Alves (ed.), Triangulating translation: perspectives in process oriented research, John Benjamins, Amsterdam, 2003, 43-66, ISBN: 90 272 1651 7.

PACTE, 2011: *Results of the validation of the PACTE translation competence model: translation project and dynamic translation index*. In S. O'Brien (ed.), Cognitive Explorations of Translation, Bloomsbury, London, 2011, 30-53, ISBN: 9781441172686.

Picciano, A.G., 2002: *Beyond student perceptions: Issues of interaction, presence, and performance in an online course*. Journal of Asynchronous Learning Networks, Vol. 6, Issue 1 2002, pages 21-38.

Piotrowska, M., 2005: *Translation teaching at the crossroads (Polish methodology for translator training in response to contemporary market demands)*. In M. Misztal and M. Trawiński (Eds.), Studies in Teacher Education. Language, Literature, and Culture, Wydawnictwo Naukowe Akademii Pedagogicznej, Kraków, 2005, 192-198, ISBN: 83-7271-354-5.

Prensky, M., 2001: *Digital Natives, Digital Immigrants*. On the Horizon Vol. 9, Issue 5 2001, pages 1-6, ISSN: 1074-8121.

Prensky, M., 2012: *From Digital Natives to Digital Wisdom: Hopeful Essays for 21st Century Education*. Corwin, California, 2012, ISBN: 1452230099.

Pym, A., 2016: Asymmetries in the teaching of translation technology, [online] at http://usuaris.tinet.cat/apym/on-line/training/Pym_TeachingAsymmetries.pdf (accessed 26 July 2016).

Pym, A., 2016: *Teaching what you don't know: the challenge of future technologies.* An unpublished plenary paper delivered at a conference entitled *Inspirations for Translation Pedagogy. 1st CTER Congress* on 14th March, 2016 in Cracow, Poland.

Siemens, G., 2008: *About: Description of connectivism. Connectivism: A learning theory for today's learner, website*, [online] at http://www.connectivism.ca/about.html.

Spiro, L., 2012: *Defining Digital Pedagogy*, [online] at https://digitalscholarship.files.wordpress.com/2013/03/gettysburgintrodigitalpedagogyfinal.pdf (accessed 25 July 2016).

Szulc, W., n.d.: *Kompetencje miękkie Jak je rozwinąć i wykorzystać na rynku pracy?* Akademickie Biuro Karier Zawodowych Uniwersytetu Łódzkiego, [online] at http://www.postawnarozwoj.uni.lodz.pl/admin/zdjecia/file/ebooks/KOMPETENCJE%20MI%C4%98KKIE.pdf (accessed 20 January 2016).

Tapscott, D., 2008: *Grown up Digital: How the Net Generation Is Changing Your World*. McGraw-Hill, New York, 2008, ISBN: 0071508635.

Vygotsky, L.S., Cole, M. 1978: *Mind in Society*. Harvard University Press, Cambridge, MA, 1978, ISBN: 0674076680.

Wells, G., 1994: *The complementary contributions of Halliday and Vygotsky to a 'language-based theory of learning'*. Linguistics and Education, Vol. 6, Issue 1 1994, pages 41-90, ISSN: 0898-5898.

Zappa, M., 2012: *Envisioning the future of education technology*. [online] at http://envisioning.io/education/ (accessed 25 July 2016).

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ENSURING QUALITY IN THE CLASSROOM: EVALUATING TECHNOLOGY ENHANCED LEARNING

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Abstract: *Web 2.0 and 3.0 tools can be incredibly successful in teaching and learning at the tertiary level when they are used to support traditional in-class activities. Providing students with the chance to use technologies pervasive in their non-academic lives can result in better educational outcomes. Technology-enhanced programmes can also better prepare students for self-directed lifelong learning that will enlarge their opportunities in their future workplace. Thus, it can be assumed that designing academic classes not only around participants' preferences, needs and interests, but also around useful technologies will improve the quality of education. The ideas presented above will be supported by students' opinions and attitudes expressed in surveys.*

Keywords: web-enhanced learning, Web 2.0 tools, student-centred teaching, e-learning

INTRODUCTION

With a traditional approach to teaching through lecturing structured around teacher-centred pedagogies and formal, behaviourist tests, universities offer courses which can be perceived by 21st century students as monotonous, boring and uninteresting. Different preliminary studies show that such education is ineffective particularly in the case of learners who are accustomed to using varied sources of knowledge, and who can easily get distracted. In a world where books, papers, written documentations were the main source of learning, traditional teaching was very successful. However, over the last decades students have been exposed to an entirely different environment, rich in visual stimuli, interactive activities, and social sharing of information and knowledge. What is more, university classrooms in many countries are now populated with a large number of students, and lectures constitute the core part of many university programmes, the main reason being the lower cost of such education. Unfortunately, that means that teaching has become more impersonal and relies too much on passive transmission of knowledge, i.e., on presenting important ideas verbally or visually by means of slide shows. Only very few students, mostly those sitting in front rows, have the opportunity to interact with the teacher by asking simple questions, and engaging in discussions over unclear or interesting aspects. Additionally, traditional lecturing in order for it to be effective involves a high degree of concentration on the part of the participants, who have to focus their attention on the presented topic for the whole duration of the lecture, i.e., for sixty minutes or more. Recent studies have shown that average attention span seems to range from eight to ten minutes (Statistics Brain Research Institute 2015, Richardson 2010, Wilson and Korn 2007: 85–89), some present even more shocking data, claiming that is can be as low as eight seconds (National Center for Biotechnology Information 2014).

To satisfy the needs of the new generation of learners, teachers are trying to incorporate not only interesting topics into the subject curricula, but are also looking for innovative ways of structuring the learning and teaching environment. Blending face-to-face methods with e-learning technologies, i.e., Web 2.0 tools can lead to a successful outcome if the blend of approaches, activities and media is carefully thought out by course developers and tutors (Mokwa-Tarnowska 2015a).

The paper aims to show how to enhance university classes with web-based e-learning, how to create simple e-learning modules that can raise students' interest, concentration and satisfaction, and thus effectively engage them in developing their knowledge and skills; and what is more, how to prepare undergraduates to increase their professional competence by learning online (Roszak et al. 2015). The presented hypotheses are supported by survey results, observation of students' behaviour in class and during online activities, as well as comments made by students and teachers participating in web-enhanced and online programmes (Wilczyńska and Michońska-Stadnik 2010: 145-174).

1. NEW GENERATION OF STUDENTS

A number of researchers claim that young people who nowadays enrol on university courses are a new generation of learners (Jones and Shao 2011, Huang and Yang 2014: ch.1). The main reason why educators and theoreticians perceive them to be unlike their parents is that today's students have been raised in a different way. Since early childhood they have been immersed in the word of technology, which has substantially influenced the way they gain information, develop knowledge and acquire skills. Although generally they are thought to rely greatly on various Internet tools, mostly communicative and social, and to be good at multitasking, they lack the ability to concentrate while receiving highly-structured information passed on in verbal communication. Therefore, they seem to prefer active rather that passive learning (Freeman et al. 2014), e.g., task-based learning rather than lecturing.

Several different terms have been coined to refer to the new generation of learners. All of them show a change in their generational characteristics, which mostly has resulted from technological advances. First, people born between 1982 and 2004 were described by Howe and Strauss (1991, 2000, 2003) as Millennials, that is people who easily adjusted to IT technologies and who readily performed computer-based tasks. Another term first appeared in 1997. Its author Don Tapscott (1998, 1999, 2009) referred to young people, born approximately in the same period, as the Net Generation, because they had lived all their lives being surrounded by digital media. Then Marc Prensky (2001a, 2001b) named them Digital Natives. He compared them to native language speakers who did not necessarily possess the same competence, but could use their language in a natural manner. According to him young learners born in the digital world, interacting with technology at an early age, living in a media-rich environment, can use IT tools like native speakers use language: on instinct, fluently and productively. He contrasted them with digital immigrants who would never see IT technologies as natural tools. They will always have to adapt to using them no matter how professional their competence is.

The new generation is understood by the researchers to require a new learning environment. The changes brought about by the latest technological advances have had a direct impact on ways of teaching. According to Tapscott they must influence the model of pedagogy and force a change, from a ‘teacher-focused approach based on instruction to a student-focused model based on collaboration’ (2009: 11). This will result in higher education institutions introducing redesigned programmes, adapted to the needs of the new generation of learners. They will be more likely to do it if the teaching practice of their educators is incompatible with the students’ expectations.

Today’s students, with low attention span, and with the inability to self-direct their learning, exposed to IT technologies and the razzmatazz of the Internet in everyday lives, will require more guidance and more stimuli to be able to benefit from mass education offered by universities. Their teachers, mostly digital immigrants, will definitely face the challenge posed by institutional changes colleges and universities will probably have to introduce. Changing the educational environment from strictly instructive to collaboratively active, enhanced by web-technologies, may contribute to raising the quality of teaching and learning. It is worth stressing that decisions about the use of online technologies should be based on students’ and teachers’ understanding of their educational value, and how they could improve the learning environment. If course participants are satisfied with the way online technologies have been incorporated into university education, they are more likely to better engage in learning, which can lead to anticipated outcomes. Thus, student satisfaction can be a factor that affects the quality of the education process.

2. WEB 2.0 AND 3.0 TOOLS

A number of online tools can be used to support academic education in order to satisfy the needs, expectations, learning styles of the new generation, who seem to gather and retain information in a different way from those born before the 1980s. Even if not every student is a digital native, every one in the cohort should benefit most from the opportunities offered by the university. By adding variety to the curriculum, by creating a web-enhanced environment, educators can develop a programme that will better motivate, and thus engage, students in learning difficult professional subjects. Whether cohort members are digital natives or digital immigrants largely depends on the way they have been raised by their family or guardians, the community in which they have lived, social interactions in which they have participated and many other factors. No matter what their competence is, all students are now immersed in technologies that can improve the way they obtain knowledge and skills.

The term Web 2.0 was coined by DiNucci (1999), and then popularized by O'Reilly at the *Web 2.0 Conference* in San Francisco in 2004 (O'Reilly 2005). It refers to the new possibilities that the traditional World Wide Web offers in the second stage of its development. Originally, the interaction that took place between users and web content was quite static, which means that data which were posted on websites could be viewed and downloaded to the user's computer. Average people were simply readers, and could not add content to the Internet, only specialists possessed the necessary skills to create webpages. Over the last ten years World Wide Web has undergone a number of changes that have transferred its nature and scope.

Web 2.0 is now not only a vast source of different data, but it is also a highly interactive environment. It allows users to share information, communicate, create a multi-purpose content and collaborate. That is why, it is often referred to as user-generated web, read-write web or social web. The services it offers foster a variety of social interactions. Now users are encouraged to contribute through social networking sites such as Facebook, Twitter and LinkedIn. Their collaborative efforts to share content can be seen on social curation sites, e.g., Pinterest and Instagram. Cloud computing allows storing large quantities of data that can be accessed by users from distant locations. User-generated content, made freely available online by its developers, supports learning and teaching, both formal, non-formal and informal. These and many other services offer a range of opportunities to meet varied users' demands that are rapidly emerging in the modern world. At least some of them could be used to redevelop or support university lectures and other classes.

There are many different categorizations of Web 2.0 tools. According to Crook (2008), who takes into consideration human dispositions, they fall into four categories, some being in more than one as they serve different purposes:

- expressive tools: tools for creating, including editing and mixing, and sharing as well as for storing and publishing,
- reflective tools: tools for commenting, blogging, collaborating and social networking,
- exploratory tools: tools for social bookmarking, for delivering regularly changing web content such as news, and for tagging information,
- playful tools: tools for educational gaming and using virtual worlds.

A more comprehensive taxonomy is provided by Bower (2015), who, having identified 212 current Web 2.0 technologies, proposes 37 types arranged into 14 groups. His clusters are as follows:

- text based tools: tools for synchronous text discussion, discussion forums, note-taking and document creation,
- image based tools: tools for image sharing, image creation and editing, drawing, online whiteboarding, diagramming, mindmapping, mapping and word clouds,
- audio tools: tools for audio sharing, audio creation and editing,
- video tools: tools for video sharing, video creation and editing and video streaming,
- multimodal production tools; tools for digital pinboards, presenting, lesson authoring,
- digital storytelling tools: tools for online book and comic strip creation, animated videos,
- website creation tools: tools for creating individual websites, wikis, blogs,
- knowledge organization and sharing tools: tools for sharing files, social bookmarking, aggregating, republishing,
- data publishing tools: tools for conducting surveys, collaborative spreadsheets, infographics,
- timeline tools: tools for organising text and images according to timelines,
- 3D modelling tools: tools for designing, storing, manipulating and sharing 3D objects,
- assessment tools: tools for creating online quizzes with automatic grading and performance tracking,
- social networking systems: tools for sharing pictures, video and text and polls via personal profile pages,
- synchronous collaboration tools: tools for sharing text chats and audio and video by means of webcams via browsers.

No matter what typology one prefers, one thing is certain, Web 2.0 tools allow users to produce highly interactive, multi-purpose, multi-format content, which can be used to satisfy individual and collaborative needs.

The emergence of new technologies can cause online education to be even more versatile, and thus more useful for a redeveloped learning and teaching process. Machine-facilitated understanding of information, i.e., data-mining, artificial intelligence can at least in some fields help educators create an environment which will enhance the professional development of their students. The next step in the evolution of the Internet, called Web 3.0 or the intelligent web, can be seen in the way information about users is gathered and passed on to them. Today search engines are able to search for actual individual preferences and interests, and display a range of suitable options. As some researchers say, in the future the Web 3.0 browser will act like a personal assistant that helps to find answers to complicated questions phrased in a natural language, and provides excellent outcomes. This and other opportunities can substantially transform learning and teaching and move the classroom beyond the four walls into completely new territories.

3. STUDENTS' OPINIONS ON WEB-BASED ENHANCED CLASSES

Web 2.0 that support collaboration, communication, productivity and sharing such as image based tools, assessment tools and multimodal production tools can serve a number of purposes in a face-to-face classroom enhanced with online components. They can help in the shift from an instructivist paradigm to a constructivist one, which, among other things, changes the role of the teacher, who passes control to students in order for them to demonstrate understanding and better engagement in the learning process. Moreover, with their various functionalities, Web 2.0 tools can stimulate students' interest through learning by doing.

3.1 West college scotland

West College Scotland is a further education institution, which offers a wide range of full-time, part-time, evening and distance learning courses to accommodate the needs of its diverse learners. The college was created in 2013 from Clydebank College, Reid Kerr College in Paisley and James Watt College in Greenock. In the early 2000s Reid Kerr College in Paisley started offering a variety of e-learning courses. Since then many classes have been supplemented with top quality short e-learning modules, designed by very experienced college staff and JISC specialists. Some online courses have also been offered, including an optional course on Health and Safety at Work Regulations; and compulsory introductory courses such as Copyright Law, Online Searching, Study Skills and Touch Typing Tutor.

In 2015 the authorities conducted a survey which targeted students from the college's three campuses. The questionnaire was completed by 685 course participants, females constituted 70% and males 30%. The questions covered various topics related to technology and innovation. The respondents expressed their opinions regarding the type of equipment they would like to use in class and outside, the activities and amount of their course-work they want to be technology supported, as well the type of courses they would like to attend.

Table 1.

How important is it that you are able to do the following activities from a handheld mobile device (e.g., smartphone or tablet)?

Activity type	Not at all important	Not very important	Moderately important	Very important	Extremely important	Total
Access library resources	**14.73%** 90	**15.22%** 93	**28.31%** 173	**22.42%** 137	**19.31%** 118	611
Check grades	**9.17%** 56	**8.02%** 49	**23.73%** 145	**31.75%** 194	**27.33%** 167	611
Register for courses	**7.86%** 48	**6.71%** 41	**19.31%** 118	**34.21%** 209	**31.91%** 195	611
Use Moodle	**11.13%** 68	**10.15%** 62	**17.68%** 108	**31.26%** 191	**29.79%** 182	611
Access information about events /activities	**9.66%** 59	**11.29%** 69	**27.50%** 168	**30.11%** 184	**21.44%** 131	611
Communicate about class-related matters	**8.51%** 52	**8.18%** 50	**16.86%** 103	**32.90%** 201	**33.55%** 205	611
Look up information while in class	**9.82%** 60	**10.64%** 65	**19.64%** 120	**30.11%** 184	**29.79%** 182	611
Capture images of course activities	**10.64%** 65	**14.24%** 87	**24.55%** 150	**27.33%** 167	**23.24%** 142	611

Record audio/video of course activities	**18.00%** 110	**20.46%** 125	**20.95%** 128	**21.44%** 131	**19.15%** 117	611
Participate in interactive class activities	**15.55%** 95	**14.24%** 87	**26.68%** 163	**24.55%** 150	**18.99%** 116	611
Other	**62.19%** 380	**8.35%** 51	**10.64%** 65	**8.51%** 52	**10.31%** 63	611

Source: table courtesy of George Johnson, Director Technology and Innovation, West College Scotland

The analysis of the responses presented in Table 1 shows that the majority of the students would like to use technology to carry out different college activities. Depending on the type, the *Very important* and *Extremely important* answers range from 40.59% (Participate in interactive class activities) to 66.45% (Communicate about class-related matters). If the percentage of the *Moderately important* responses is added, then it can be assumed that to satisfy the needs of the WCScotland students, the college should introduce more technology-enhanced activities. The course attendants will probably benefit from incorporating the technologies they enjoy using outside the classroom into their coursework. As communication about class-related matters by means of commonly used online tools, particularly by means of social networking, was viewed as a big positive, which was also seen in responses to other questions, it may be concluded that the WCScotland students will appreciate more activities supported by collaborative tools. This hypothesis can be supported by the percentage of the respondents who regarded interactive class activities as important (70.22%).

Table 2.

What type of learning environment do you prefer?

Activity type	Responses	
Courses with no online components	**11.21%**	52
Courses with some online components	**62.72%**	291
Courses that are completely online	**5.60%**	26
No preference	**20.47%**	95
Total		464

Source: table courtesy of George Johnson, Director Technology and Innovation, West College Scotland

Table 2 shows that technology enhanced learning appears to be popular among the respondents – more than half (68.32%) stated that they would prefer to attend courses delivered online or with an online component. This proves that the inclusion of web technology can become a decisive factor to evaluate the quality of the education offered by colleges and universities.

3.2 Gdańsk university of technology

Over the last two academic years different online components have been developed by the E-learning Team at the Language Centre of Gdansk University of Technology. Web 2.0 has been used in order to enhance the learning opportunities for students of various faculties attending regular courses in English. The aims of the shift from a traditional classroom based on coursebook activities and supplementary written exercises to a web-enhanced environment were as follows:

- to introduce variety into teaching and learning English for specific purposes,
- to teach students professional English in authentic context,
- to prepare attendants for blended programmes,
- to facilitate self-directed learning,
- to test potential advantages of web-enhanced classes for university education,
- to assess to what extent students can benefit from e-learning incorporated into classwork.

The survey analysis presented in this subsection attempts to investigate how the respondents perceive classes enhanced by various Web 2.0 tools. Their evaluations show whether they like working in an e-learning environment, how engaging such learning is, and whether, in their opinion, the environment can help them make better progress in technical English. The research into the nature of web-enhanced language classes at GUT and their impact on an increase in student competences is its initial stage and may include subjective results.

Different technologies have been applied to develop new activities for students of science and engineering. A variety of courses have been designed in Moodle, which is the main learning platform at Gdansk University of Technology (Fig. 1). There is an ongoing discussion whether the LMS is a Web 2.0 technology or not. If it is used only as a document repository or an information board, it is definitely not. However, if its user-centered design, collaborative, text and image based tools are taken into consideration, and if they are applied accordingly, then by definition it is.

The analysis presented in this paper is based on the questionnaires completed by the great majority of the students who attended traditional classes during the following periods:

– the second semester of the academic year 2014-2015 (276 out of 288 enrolled on the courses: 55 out of 57 students of the Faculty of Architecture, 63 out of 65 students of the Faculty of Civil and Environmental Engineering, 42 out of 43 students of the Faculty of Electronics, Telecommunications and Informatics, 23 out of 24 students of the Faculty of Electrical and Control Engineering, 25 out of 27 students of the Faculty of Applied Physics and Mathematics, 47 out of 50 students of Mechanical Engineering, and 21 out of 22 students of the Faculty of Management and Economy),
– the first semester of the academic year 2015-2016 (69 out of 73 enrolled on the courses: 24 out of 24 students of the Faculty of Architecture, 23 out of 26 students of the Faculty of Electrical and Control Engineering, and 22 out of 23 students of Informatics),
– the second semester of the academic year 2015-2016 (178 out of 185 enrolled on the courses: 23 out 25 students of the Faculty of Architecture, 67 out of 68 students of the Faculty of Civil and Environmental Engineering, 14 out of 20 students of the Faculty of Electronics, Telecommunications and Informatics, 56 out of 62 students of Mechanical Engineering, and 18 out of 22 students of the Faculty of Management and Economy).

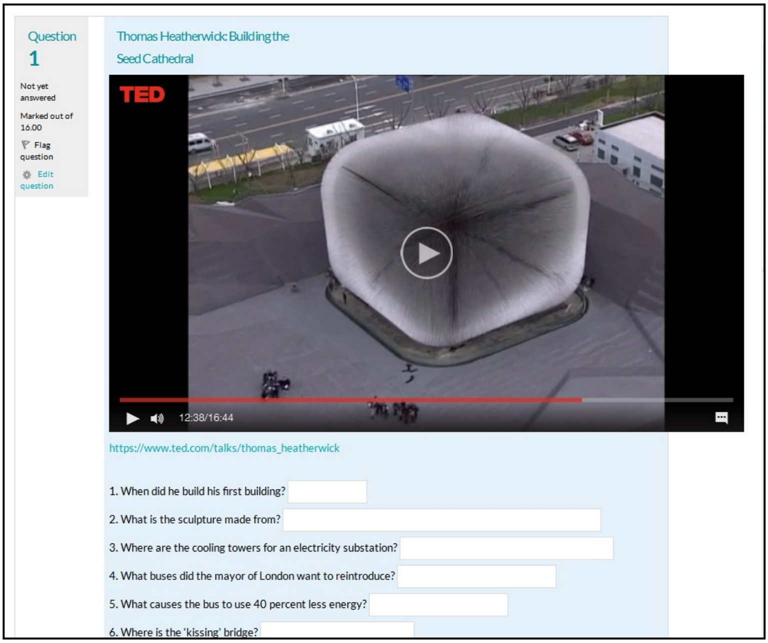

Figure 1. Part of a Moodle task based on https://www.ted.com/talks/thomas_heatherwick

The majority of the respondents, who completed questionnaires in the second semester of the academic years 2014/2015 (276) and 2015/2016 (178 respondents), stated that web-based materials with online activities based on documentaries, uploaded to Moodle, should be used in class. The answers are grouped in Table 3. The students themselves specified their preferences, no suggestions were given in the questionnaire. Almost 60% would like them to support face-to-face classes 3-4 times a semester, which means that approximately once a month an online component should be added to traditional tasks performed in class. Slightly less than a quarter would prefer to learn from them more regularly – almost twice a month. The data are similar across the semesters.

Table 3.

Frequency of web-based tasks

How often would you like to do online activities in class?	Number of students Summer 2015	Percent age	Number of students Winter 2015	Percent age	Number of students Summer 2016	Percentage
Every class (15 per semester)	13	4.71%	3	4.35%	10	5.62%
5–8 times per semester	58	21.01%	12	17.39%	41	23.03%
3–4 times per semester	160	57.97%	43	62.32%	106	59.55%
1–2 times per semester	38	13.77%	10	14.49%	17	9.55%
Never	7	2.54%	1	1.45%	4	2.25%

Source: Own work

Since the first semester of 2015/2016, the free learning platform Kahoot has been mainly used to increase concentration during online productions and in-class presentations (Figs. 2 and 3). Class activities in a web-enhanced classroom are structured around constructivist ideas, which means that some control over the learning process is shifted onto the learner. That is why, most of the kahoots were developed by the students. To introduce the task, the first kahoots for each group were prepared by the teacher, but they were based on students' productions. Besides their main goal, which was to increase students' concentration, all of them aimed to test peers' engagement and learning outcomes.

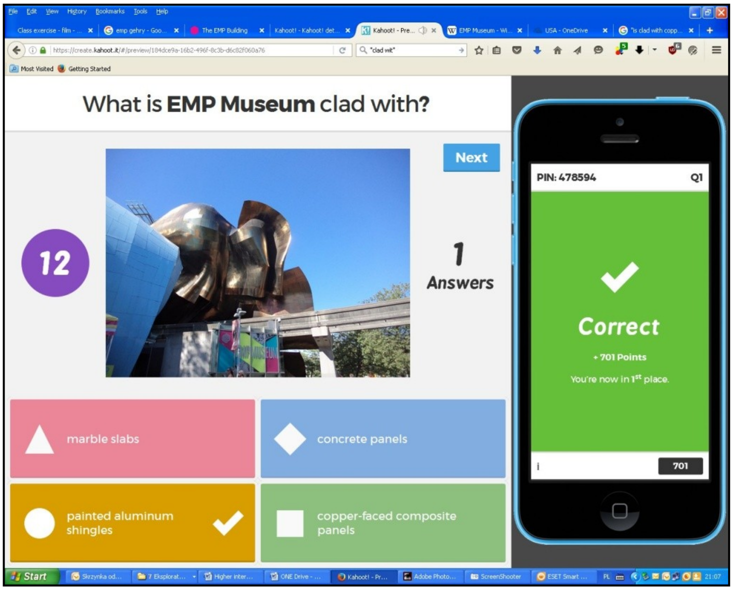

Figure 2. Kahoot: Ugly buildings – teacher-developed kahoot

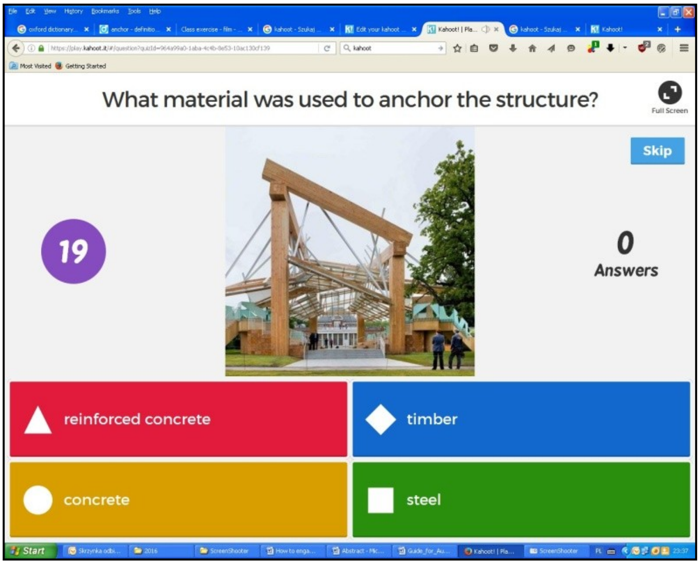

Figure 3. Kahoot: Ugly buildings – student-developed kahoot

Knowing that there was going to be a kahoot after a video task or a presentation, students admitted, both verbally during conversations in class and in the surveys, to better focus on their subject matter. I observed an increase in the students' concentration in class, which resulted in deeper engagement. My observation was later confirmed by the students' opinions expressed in the surveys. The vast majority, 70% - 80%, stated that kahoots made them concentrate and be more active in class[1]. Besides, when there was a kahoot in class, the atmosphere was more positive, friendlier and livelier.

Table 4.

Kahoots to enhance ESP face-to-face classes, academic year 2015/2016

Do you want to do kahoots in class?	Yes (%)	Rather yes (%)	Rather no (%)	No (%)	I don't know (%)	Total number of students
Architecture	53.19	42.55	–	4.26	–	47
Civil Engineering	52.24	41.79	2.99	-	2.99	67
Electrical and Control Engineering	56.52	30.43	8.7	–	4.35	23
Informatics	27.27	27.27	18.18	4.55	22.73	22
Mechanical Engineering	48.21	32.14	5.36	12.5	1.79	56

Source: Own work

The observed popularity of kahoots can also be seen in the answers to the question about their occurrence during other faculty courses (Table 4). There is a difference in the opinions the respondents provided – approximately 90% of both Architecture, Civil Engineering, Electrical and Control Engineering, and Mechanical Engineering students often would like to do such quizzes in class. In contrast, only 54.54% of the Informatics students expressed the same attitude, the reason probably being the nature of the classes that are predominant in their specialisation. Some of the respondents from this group stated that they did not like that exercise type, because they did not feel the need to do them – they explained that most of their faculty classes were not traditional lectures but hands-on laboratory exercises and projects. Learning by doing which seems to dominate their learning process in their opinion does not require supplementing with additional web tools.

Collaborative tools like *wiki* and *Thinglink* were used to encourage students to work in groups and explore the assigned topics in depth, so they helped to develop both language and non-language skills. Tasks supported by them involved creation and recreation of knowledge, critical thinking, reflective thinking and collaborating to achieve the best possible outcome. It is also understood that classes enhanced by website creation and data publishing technologies can prepare students for the

[1] A detailed analysis of the collected data will be provided in a paper on students' concentration and enaggement.

increasingly collaborative nature of tasks they will have to undertake in work context (Fig. 4).

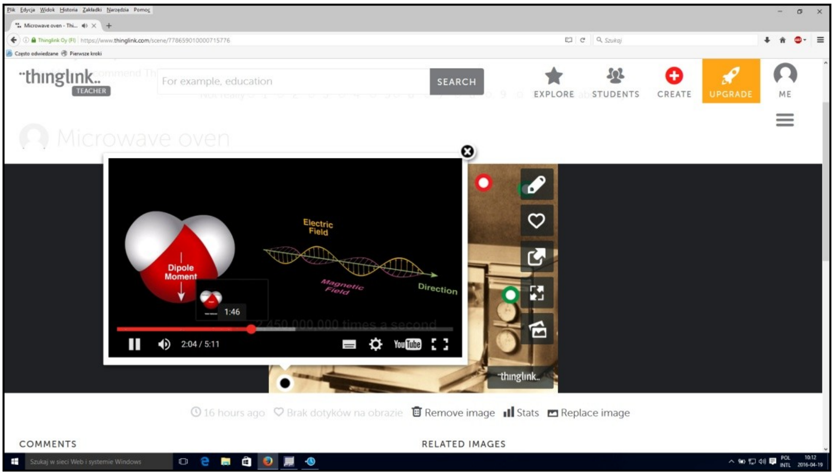

Figure 4. Interactive poster on inventions: microwave ovens – project by a group of Electronics students

The collaborative aspect of learning technical English is shown in table 5. It provides the comparison of the opinions on the use of *wiki* and *Thinglink* to support collaboration during projects. Not many students used *wiki* in my English classes in the previous academic year, and only 52 out of 86 (60%) completed the surveys. They came from the Faculty of Mechanical Engineering, the Faculty of Civil Engineering and the Faculty of Electronics, Telecommunications and Informatics. All of them, however, stated that this tool had been useful to collaborate on specifications. In the second semester of 2015/2016 two groups of students, 18 students of Electronics and 28 students of Mechanical Engineering, wrote specifications in the form of a wiki in Moodle. The questionnaires were completed by 14 students of Electronics (77%) and 27 (96.43%) students of Mechanical Engineering.

Unlike the students doing a wiki, the ones preparing interactive posters had no experience using Thinglink. Therefore, it is worth stressing that all the projects done with this tool were of excellent quality, and the follow-up presentations in class were a great success. Many students discussed the results, so engagement was higher than during traditional classes with PowerPoint presentations, where only a few students or none usually want to share their opinions.

The projects in the form of a wiki were simpler and required less time to complete. The final results were interesting, but not very complicated. All of them were prepared in a text-based format with an addition of a few drawings or pictures. The students were asked to write a specification of an existing device/appliance or of an invented one. They had to follow the example given in the coursebook as far the structure and type of information were concerned. In contrast, those preparing an interactive poster were advised to look for data on the Internet. The subjects ranged from accidental inventions and discoveries to Business Analytic issues. Most of the students used only one tool, either *Wiki* or *Thinglink*. Thus, it is difficult to hypothesise why there were substantially more *Yes* answers from the wiki users (Wiki: 72.04% and Thinglink: 40.74%). The total of the positive answers given by both groups is very high – 94.62% and 72.59%, and the discrepancy is smaller[2].

Table 5.

Suitability of Wiki and Thinglink for collaborative projects

Did the e-learning environment enable preparing collaborative projects?	Wiki October 2014 – June 2015, February – May 2016	Percentage	Thinglink February – April 2016	Percentage
Yes	67	72.04%	55	40.74%
Rather yes	21	22.58%	43	31.85%
Rather no	5	5.38%	16	11.85%
No	0	0%	13	9.63%
I don't know	0	0%	8	5.93%

Source: Own work

4. FINAL REMARKS

E-learning has changed over the years and focuses now more on the best possible ways of enhancing education rather than on technology itself, which keeps changing and developing (JISC 2004). There are a number of advantages of using web-enhanced materials in class and outside it. Tools for their creation allow for personalisation, collaboration and knowledge sharing, to name the most important activities. Moreover, because of their nature, they provide various ways of engaging students in learning tasks, thus increasing their interest, concentration and motivation (Mokwa-Tarnowska 2015a).

Classes during which students have the opportunity to share control over the teaching process seem to be more engaging not only for the most active creators of

[2] More detailed comparative research will be conducted next year and its results will be published in due time. The questionnaire included also other questions concerning the suitability of T*hinglink* to learn technical English. On the basis of the input it can be stated that there is a correlation between using Web 2.0 and creating a better environment for learning technical English.

educational material but also for the whole cohort. Both profession-related content and new types of classroom activities are major factors in achieving satisfactory progress in acquiring different skills and knowledge as many researchers have found out (Krajka 2015, Mokwa-Tarnowska 2015b, Półjanowicz et. al 2015, Kalamarz 2014, Crook 2008).

An online component has to be incorporated into the syllabus in a meaningful way so as to enhance and improve the learning experience. If the combination is successful, students will willingly attend face-to-face classes supplemented with online tasks uploaded to an LMS, e.g. Moodle, and developed with Web 2.0 tools. If course participants are attracted to the environment, and feel partly in control of what is being done in class and beyond it, they will concentrate more during difficult activities. This may result in them meeting their professional needs more efficiently, which in turn will increase their satisfaction with their achievements.

The data presented above show that the majority of the respondents treated the online activities they had participated in as a valuable addition to traditional classes. The Thinglink interactive posters exhibited during the regular face-to-face meetings included a variety of information on different professional subjects. Most of them were linked to online animations, short documentaries, funny films explaining serious technical problems, and lectures on innovations. The content of each poster increased students' interest and concentration. It was easy to notice it during the follow-up discussions, which engaged more students than ever. The Kahoot quizzes increased student workload – they had to be created in advance, and added an element of gamification, which built excitement among all the participants. As a result, their engagement in learning was deeper.

There was also a noticeable increase in the language skills of the GUT students. They had an excellent command of vocabulary related to the topics covered in the online environments, which they demonstrated in discussions and mid-semester tests. The Thinglink tasks helped them prepare deeper analyses presenting multi-layered problems from different angles. Thus, they engaged them in more active learning resulting in better language profession-related competence in English. In comparison with the students who had earlier discussed similar topics in a traditional environment, structured around textbook exercises and online texts, the ones who used Thinglink and Kahoot produced more advanced sentences both in oral and written productions, and they scored higher in paper-based tests. Extensive research on an increase in language competence will be presented when more quantitative and qualitative data is collected.

There is much discussion of what quality in higher education means. At least one of the ways to assess it is to measure the learning outcomes, that is to evaluate the students' skills and competences during the whole education process. Measurable improvement in student performance can be achieved by creating a proper educational environment, in which teaching and learning techniques are effectively blended with new tools for pedagogic gain. Research into students' progress, achievements with respect to their expectations and attitudes will certainly help educators to reach this goal.

REFERENCES

Bower, M., 2015: *A Typology of Web 2.0 Learning Technologies*. [online] at https://webcache.googleusercontent.com/search?q=cache:tMb4Q21kMZMJ:https://library.educause.edu/resources/2015/2/a-typology-of-web-20-learning-technologies+&cd=1&hl=en&ct=clnk&gl=us (accessed 21 July 2016)

Crook, Ch., 2008: *What are web 2.0 technologies, and why do they matter?* In: *Education 2.0? Designing the Web for Teaching and Learning*: *A Commentary by the Technology Enhanced Learning phase of the Teaching and Learning Research Programme, eds.* E. Carr et al. University of London, London, 2008, pages 6-9, [online] at http://eprints.ioe.ac.uk/6217/ (accessed 19 July 2016)

DiNucci, D.,1999: *Fragmented Future*, *Print* 53 (4): 32, 220-222, [online] at http://darcyd.com/fragmented_future.pdf (accessed 21 July 2016).

Freeman, S., et al., 2014: *Active Learning Increases Student Performance in Science, Engineering, and Mathematics*. Proceedings of the National Academy of Sciences of the United States of America, vol. 111 no. 23, 8410–8415, ISSN: 1091-6490

Howe, N., and Strauss, W., 1991: *Generations: The history of America's future*. Quill, New York, 1991, pages 544, ISBN: 978-0688119126

Howe, N., and Strauss, W., 2000: *Millennials Rising: The Next Great Generation*. Vintage Books, New York, 2000, pages 432, ISBN: 9780375707193

Howe, N., and Strauss, W., 2003: *Millennials Go To College: Strategies for a New Generation on Campus*. Lifecourse Associates, Grat Falls, VA, pages 228, ISBN: 9780971260610

Huang, R., Yang, J.. 2014: *The Framework and Method for Understanding the New Generation of Learners.* In *The New Development of Technology Enhanced Learning*, Part of the series *Lecture Notes in Educational Technology,* eds. Huang, R., Kinshuk, Ch., Nian-Shing, Springer-Verlag, Berlin 3-25, ISBN: 1007/978-3-642-38291-8

JISC. 2004: *Effective practice with e-learning*. JISC, Bristol, 2004, pages 56

Jones, Ch. and Shao, B., 2011: *The Net Generation and Digital Natives: Implications for Higher Education,* A literature review commissioned by the Higher Education Academy, [online] at http://oro.open.ac.uk/30014/1/Jones_and_Shao-Final.pdf (accessed 20 July 2016)

Kalamarz, R., 2014: *Blending foreign language learning with key competences. Does e-learning do the trick? International Journal Continuing Engineering Education and Life-Long Learning*, 24(1), pages 77–95, 2014, ISSN: 1741-5055

Krajka, J., 2015: *Analiza potrzeb w planowaniu kursów języków do celów zawodowych – o roli technologii społeczeństwa informacyjnego*. In: *Nauczanie języków obcych na potrzeby rynku pracy*, eds. M. Sowa, M. Mocarz-Kleindienst, U. Czyżewska, Wydawnictwo KUL, Lublin, 2015, pages 221-237, ISBN: 978-83-80610063-7

Mokwa-Tarnowska, I. , 2015b: *How to engage students in online learning – web-enhanced and blended ESP classes*. In *IT Tools – Good Practice of Effective Use in Education*, ed. E. Smyrnowa-Trybulska, Studio Noa, Katowice, Cieszyn, 2015, pages 81–88, ISBN: 978-83-60071-82-3

Mokwa-Tarnowska, I., 2015a: *E-learning i blended learning w nauczaniu akademickim: Zagadnienia metodyczne*. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2015, pages 178, ISBN: 978-83-7348-613-3

National Center for Biotechnology Information, 2014: U.S. National Library of Medicine. The Associated Press. January 1, 2014

O'Reilly, T., 2005: *What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software*, [online] at http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html (accessed 04 July 2016)

Półjanowicz, W., Roszak, M., Kołodziejczak, B. and Bręborowicz, A., 2014: *An analysis of the effectiveness and quality of e-learning in medical education* In: *E-learning and Intercultural Competences Development in Different Countries, Monograph,* Edited by Eugenia Smyrnova-Trybulska, University of Silesia, Studio-Noa, Katowice-Cieszyn, 2014, pages 177-196, ISBN: 978-83-60071-76-2

Prensky, M., 2001a: *Digital Natives, Digital Immigrants*. *On the Horizon*, 9 (5), 2001, 1-6, ISSN: 1074-8121Richardson, H., 2010: *Students only have '10-minute attention span'*. News.bbc.co.uk. January, 2010. [online] at http://news.bbc.co.uk/2/hi/uk_news/education/8449307.stm (accessed 19 July 2016)

Prensky, M., 2001b: *Digital Natives, Digital Immigrants, part 2: Do they really think differently? On the Horizon*, 9 (6), 2001, 6, ISSN: 1074-8121

Roszak, M. et al., 2015: *E-learning Portal Tools for Medical Education*. *Studies In Logic, Grammar And Rhetoric,* 43 (56), 177-193, ISSN: 2199-6059

Statistics Brain Research Institute, 2015: *Attention Span Statistics*. [online] at http://www.statisticbrain.com/attention-span-statistics/ (accessed 19 July 2016)

Tapscott, D., 1998: *Growing up digital: The rise of the Net generation*. McGraw-Hill, New York, 1998, pages 336, ISBN -10: 0071347984

Tapscott, D., 2009: *Grown up digital: How the Net generation is changing your world*. McGraw-Hill, New York, 2009, pages 384, ISBN-10: 0071508635

Tapscott, D.,1999: *Educating the Net generation*. *Educational Leadership*, 56, 5, 1999, 6–11, ISSN: 0013-1784

Wilczyńska W, Michońska-Stadnik A. 2010: *Metodologia badań w glotodydaktyce. Wprowadzenie*, Avalon, Kraków, 2010, pages 295, ISBN: 978-83-60448-06-9

Wilson, K. and Korn, J. H., 2007: *Attention during lectures: Beyond ten minutes*. *Teaching of Psychology* 34, no. 2, 2007, 85–89, ISSN: 1532-8023

INTEGRATION OF RESEARCH PROBLEMS SOLUTION THEORY WITH THE UTILIZATION OF COMPUTER ORIENTED STUDY ENVIRONMENT

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Abstract:*This study analyzes the main scientific methods of research problem solving, as the most important in the search of innovative research ideas with the utilization of separate components of computer oriented system in the process of teaching the natural and mathematical sciences. The structural components of solution theory of research problems are demonstrated, the examples of realization of educational material concentrated presentation are provided. All the stages of research problems solution algorithm are analyzed. The modeling of project - research work is demonstrated. The structure of project - research activity and search -algorithm of research ideas are described. The stages of research of situational problems during the process of solution of research problems are considered in the study.*

Keywords: solution theory of research problems; project-research activity; modeling; computer oriented learning system; systems of computer mathematics.

INTRODUCTION

Formulation of the problem.

Taking into account the professions that will be in demand in the future, it is appropriate to improve the training of the future professionals. In the process of education of pupils at school it is relevant to use new ways of learning, appropriate pedagogical technologies, the utilization of which will promote the pupils' personality development, their creative skills, and the ability to act independently in the modern information space. It is important to form the universal skills of modeling and solving applied problems in the pedagogically balanced way in order to avoid numerous problematic situations in the professional activity.

It is advisable to realize the creative work process, basing on the theory of salvation of research problems. The purpose of introducing the theory of salvation of research problems in the educational process is the formation of creative mathematical thinking and educational upbringing of the pupil's personality, his / her readiness to complete the complicated life challenges.

While teaching the subjects of nature - mathematical cycle with utilization of solution theory of research problems, the pupils' worldview expands and the ability to analyze the relevant patterns improves. Also, this way of teaching develops appropriate style of thinking that helps to learn the course material, not only during the lessons, where separate aspects of solution theory of research problems are used, but also during pupils' independent work.

Analysis of recent research and publications.

G. Altshuller, V. Arnold, D. Bogoyavlenska, O. Klepikov, M. Meerovych, Ya. Ponomaryov and others examined the problems of research on pupils' creative thinking development. S. Rubinshtein, O. Leontiev, A. Ershov, V. Monahov, M. Moiseev and others investigated thoroughly the psychological and pedagogical aspects of creative personality formation. E. Kabanova – Meller, N. Menchynska, V. Reshetnykova, N. Talyzina, A. Usova carried out research into the problems of mental techniques formation, including logical activities. The research of S. Arkhangelskiy, G. Ball, E. Zlotnykov, M. Klarin, V. Moliako, V. Uspenskiy and others is devoted to the study of the utilization of typology of tasks, as a method of goals achievement in educational process and in the formation of research skills.

The question of the methodological support concerning synergic interaction and establishment of cause and effect relationships between the separate components of computer oriented educational system and salvation theory of research problems in the educational and upbringing process is not reflected well enough.

The process of new systems and technologies creation is based on the search of innovative ideas. The creation of research ideas as a result of research and development of perspective directions becomes important nowadays. Obviously, the solution of these tasks becomes necessary in the project activity.

The process of finding ideas is the most difficult stage of the innovation process. In the educational and upbringing process, not enough attention is paid to the systematic and targeted research and development, as well as the creation of new research ideas with the utilization of research problem solution theory methods. The key problem for the organization of such education is the creation of methodological system of studying nature and mathematical disciplines with pedagogically balanced usage of separate components of computer - oriented system and the main aspects of the research problems solution.

The aim of the article. The aim of this research is the analysis and pedagogically balanced choice of educational methods of research problems solution which are considered to be the most important in the process of searching for innovational research ideas with the utilization of separate components of computer - oriented system in the process of teaching the nature and mathematical disciplines.

RESEARCH METHODS

During this research the following theoretical methods were used: analysis, comparison, generalization of materials of scientific, scientific - methodological and psychological -pedagogical literature; analysis of programming and methodological documents in the sphere of education, justification of theoretical foundations of project - research activity and main approaches of its formation in relation to utilization of separate components of computer oriented system of education.

RESEARCH RESULTS

Salvationofsituationaltasksintheprojectandresearchworkencouragestheformationofc reativethinkingandeducationofcreativepersonalityofthepupil, ready to solve complicated life challenges in different spheres. Among the main components of the research problems solution theory it is necessary to distinguish between the operators of removing the stereotypes, techniques for resolving conflicts, algorithms of research problems solution and others (Figure 1) (Altshuller 1973).

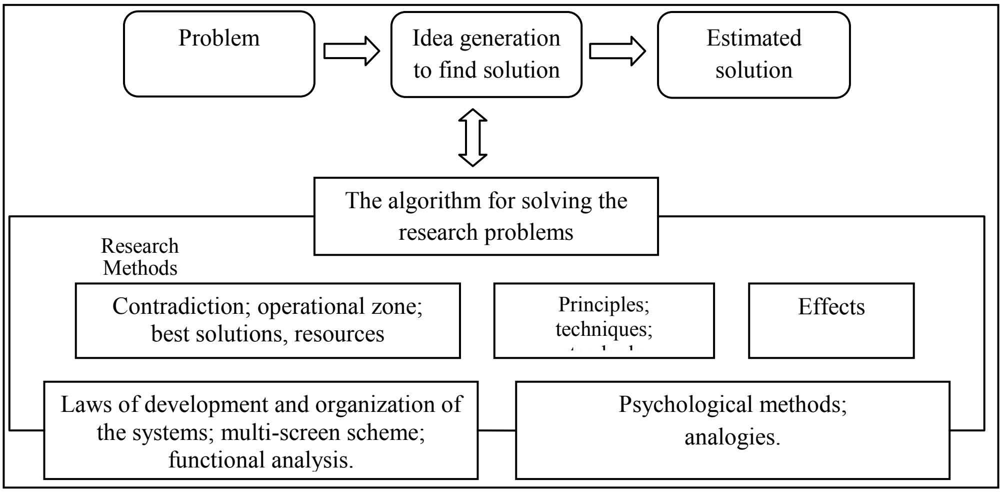

Figure. 1. Structural components of the research problem solving theory

In the process of solution of research problems, the main moments of solution of complicated non - standard problems with pedagogically balanced usage of separate components of computer oriented educational system are described (Hrybiuk 2015).One of the examples of the realization of the idea of the concentrated presentation of educational material is schematically described in Figure 2.

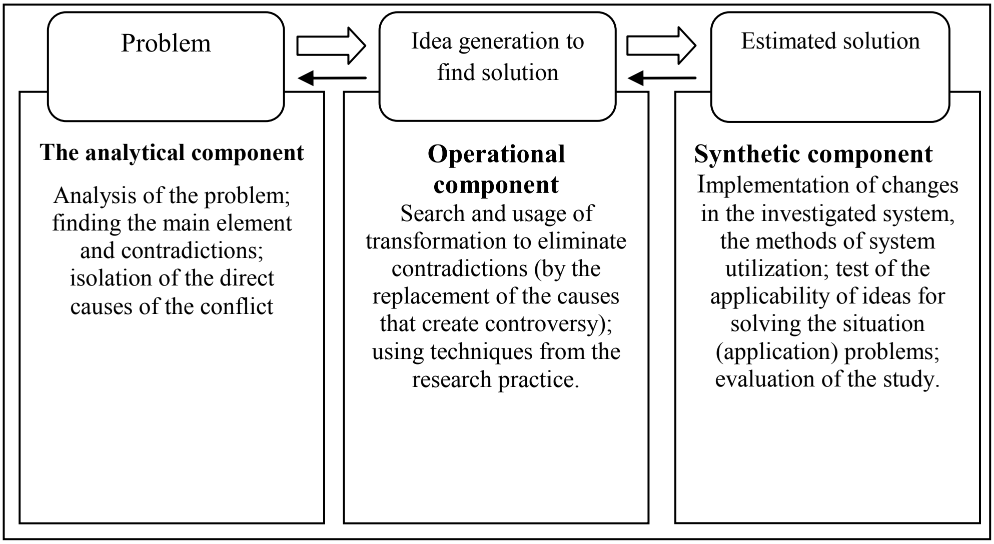

Figure2. Component approach in the context of solving the research problems

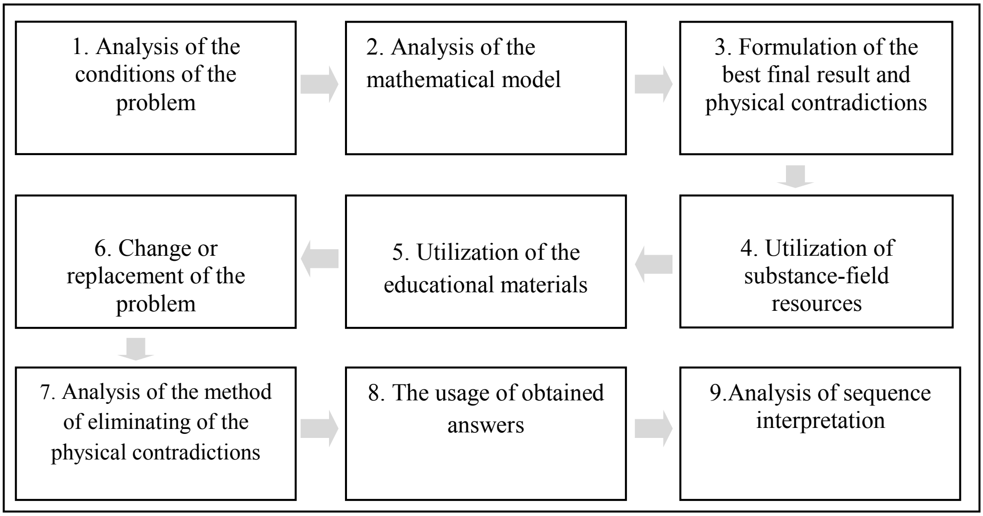

Figure 3. The algorithm for solving the research problems

Education of creative personality of the pupil can be possible only in the condition of the goal-oriented, motivated activity of the pupils in the process of salvation of research problems with the utilization of oriented rules and relevant algorithms (Gin 2015): analysis of the problem, model analysis of the problem, formulation of perfect end result and physical controversy, monitoring and utilization of material and field resources, utilization of educative and reference materials, modification or replacement of the problem conditions, analysis of removal methods of physical controversies, utilization of obtained results, sequence analysis of proposed problem (Figure 3).

The processes of extraction and reinvention play an important role in the research, as it is necessary to train the creativeness of the child through the project and research activity and proficiency of the pupil in order to repeat standard and non - standard processes (Orlov 2006). Accordingly, the utilization of reinventing modeling (reconstruction, renovation, reproduction) of the research process with the utilization of the main components of the research problem solution theory is presented in Figure 4.

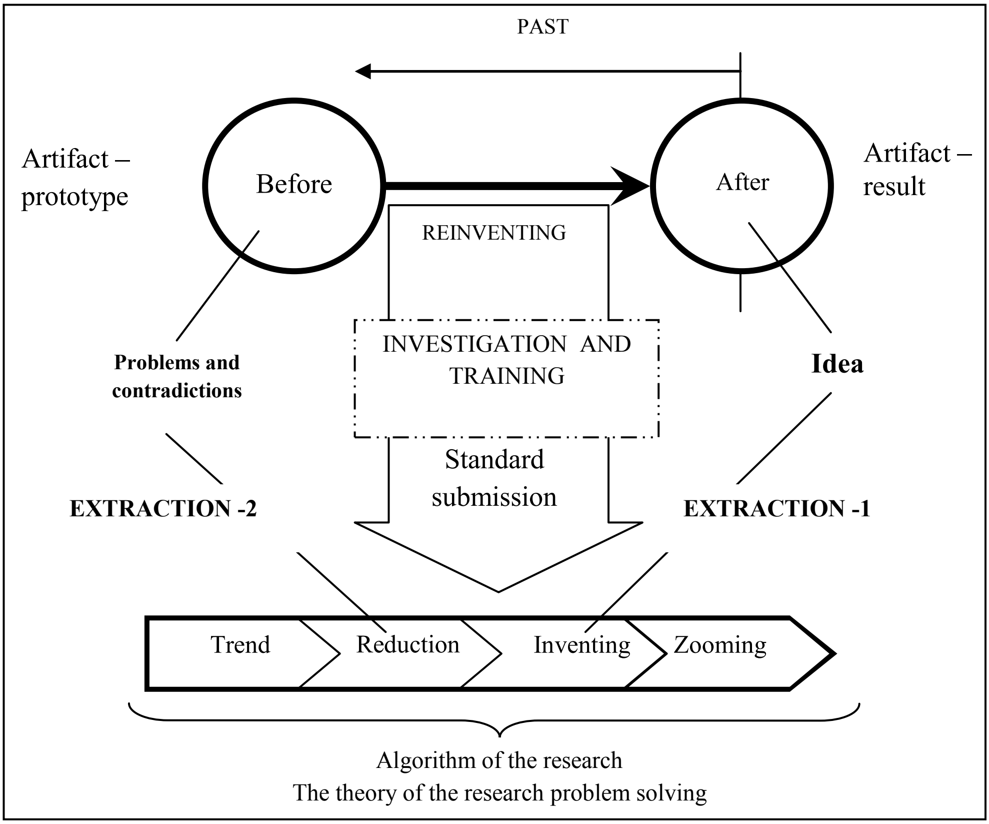

Figure 4. Simulation of the project-research work

Correlation between the process of inventing and reinventing in the process of utilization of research problem salvation theory is presented on the figure 5.

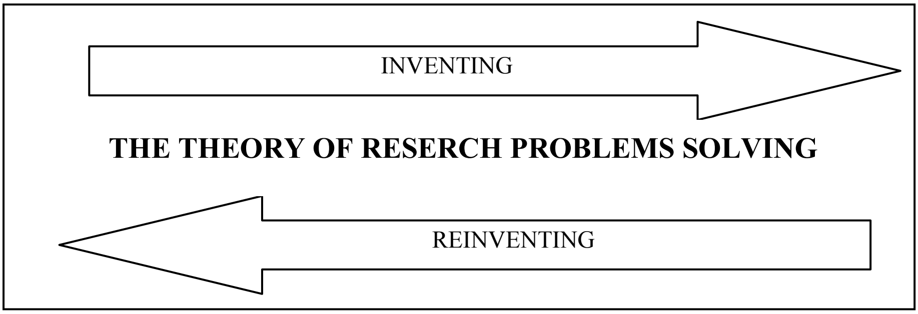

Figure 5. Inventing and reinventing in the process of research problems solving

Initially, the essence of scientific experiments is about the following factors (Hrybiuk 2013):

1) identification of the main problem that requires soluton in the proposed research;

2) identification of research method with the help of which it is planned to solve a research problem.

The main methodological means are the following (Hrybiuk 2015):

1) generalization and classification of models of the main problems and methods of problems salvation in the process of research;

2) establishment of laws in the context of problem appearance, monitoring, forecasting and systematicity concerning the problems solution.

Utilization of operational reinventing from the position of acceptance and consolidation of research skills and solution of the problems, as well as relevant demonstration of the research process of the well-known principles and methods of research problem solution by the pupil, encourages the formation of the important skills during the work of the pupils with prototypes, using the appropriate software for the effective solution of the existing problem situations.

Such a methodological approach stimulates associative thinking of the pupils and active perception of educational material. With the utilization of intuition, the pupils independently find interdisciplinary relationships, at the same time obtaining the experience in the project - research activity.

The process of solution of research problems consists of (Figure 6) (Grybyuk 2014):

a) functionally perfect model – the foreseen functioning of the system during the perfect solution of the research problem;

b) contradiction model – model of systematic conflict that reflects inconsistency of the requirements to the system;

c) transformational model – model of changes in the system that are necessary to eliminate contradictions and achievement of precise functionality of a perfect model.

d) resource model – a multidimensional model of system characteristics that demonstrates its aim, functions, composition and structural correlation between elements, relationships, educational and reference materials, form and spatial location, temporal parameters of functioning, efficiency and other efficiency performance indicators.

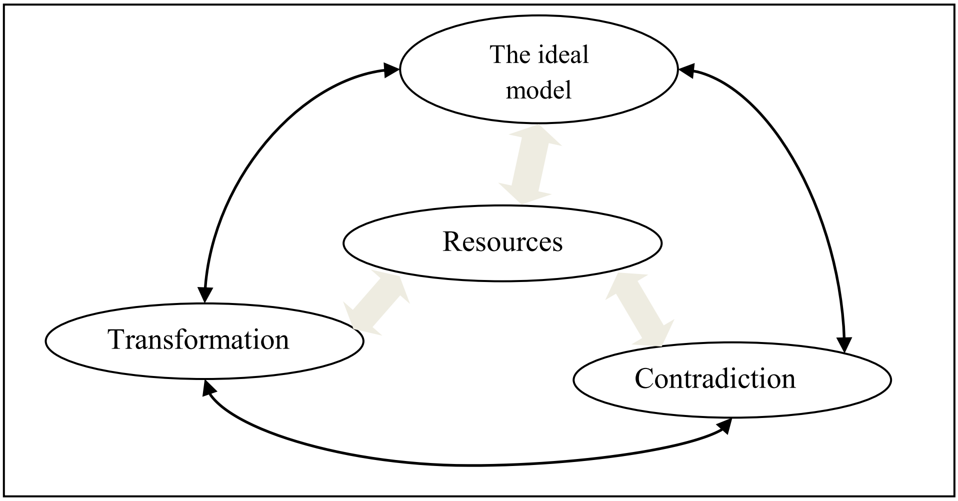

Figure 6. The main components of the research problems salvation theory

The aspects that are proposed above are fundamental, they accumulate the necessary scope of educational material that represents the most important part of creativity in solution theory of research problems, enforcing cognitive and instrumental components.

Undoubtedly, the researched systems (not only technical) are created for realization of a certain function and develop according to certain laws that can be used to control other systems.

During the life cycle of the system, its efficiency increases in the correlation between efficiency of the positive factors concerning the realization of the main functions of the system to the evaluation of the negative factors, that are related to expenses on the creation, exploitation and utilization of the relevant system.

Systems and their respective components are developing unevenly, it is the main reason of a slow increase of new systems efficiency, that causes appearance of technical problems (Hrybiuk 2014).

The contradiction between incompatible properties and requirements, necessary for the realization of functions of relevant components and the system as a whole is put in the basement of a certain life problem. The appearance of conflict contradiction with the utilization of technical means is accompanied by the creation of the research. The amount of types of conflict contradictions is limited and opens possibility of their clear recognition in real life situations, in order to use appropriate methods of technical problems solution. The relevant methods of contradictions solution are chosen during the project - research of the certain model. Among the research methods in our research, it is necessary to distinguish: the focal object method, brainstorming, synectics, and a method of morphological analysis (Orlov 2006).

Methods of problems solution are used together with other methods of complicated systems development control (economical, systematic and technical, cultural and educational, and even political), appropriate methods of development and stimulation of memory, attention, associative thinking, creativity, intellectual capacities and psychological development of the human as a whole.

The sense of focal object method is about positioning of attention on a certain perfect object; after that this object is compared with other randomly chosen objects. The combination of characteristics of two objects – focal and random, causes the appearance of creative ideas for the specification of the focal object. The main peculiarities of this approach are presented below (Figure 7).

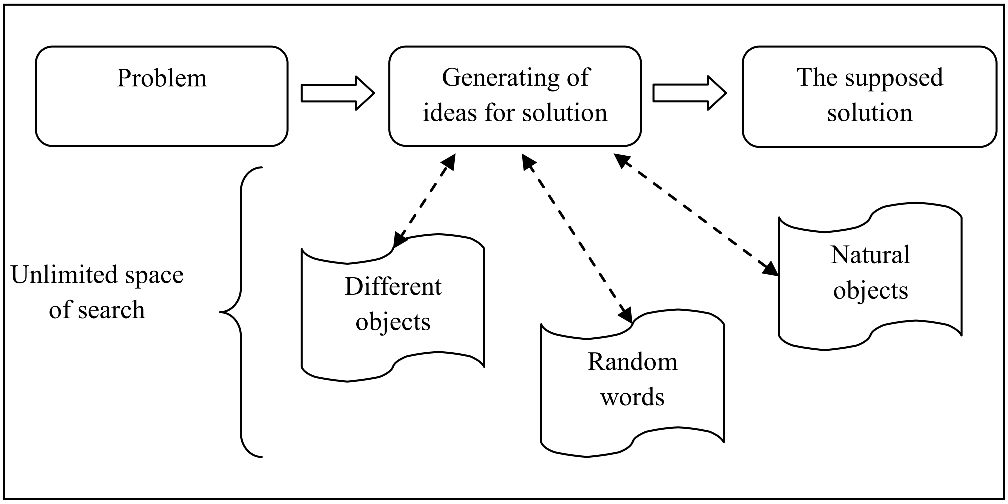

Figure 7. The method of focal objects

The proposed method is successfully used in the research (Hrybiuk 2015) for the development of associative thinking and skills of comparative analysis. As a result, a new point of view about the solution of the problem appears, it simulates the creative thinking. However, the negative aspect is the significant influence of random factors, absence of limits concerning the process of search, lack of resources for the realization of educational process.

The goal of brainstorming is about previous significant analysis of the situation through the list of control questions, and the presence of two phases during the research - idea generation, analysis and critics of the ideas by the pupils.

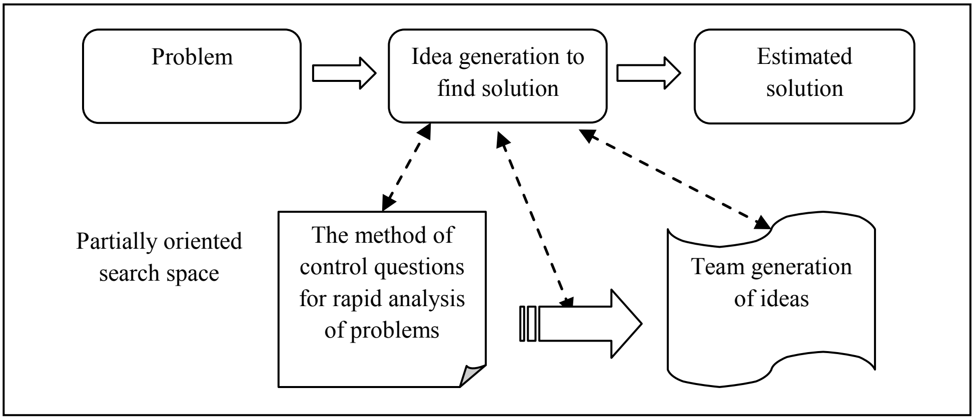

Figure 8. The method of brainstorming during the research

The proposed method is used for the quick (generational) thinking, it is aimed to overcome the negative stereotypes of pupil's thinking. Obviously, this universal method does not require large expenditures of time on generation of research ideas, however, it does not offer a clear direction concerning the search of project ideas, it is complicated in particular individual situations and it does not offer the way to transfer the practical experience to pupils.

Synectics is a method, oriented on the team realization of research ideas, it is also connected with the ideas of brainstorming (Figure 9).

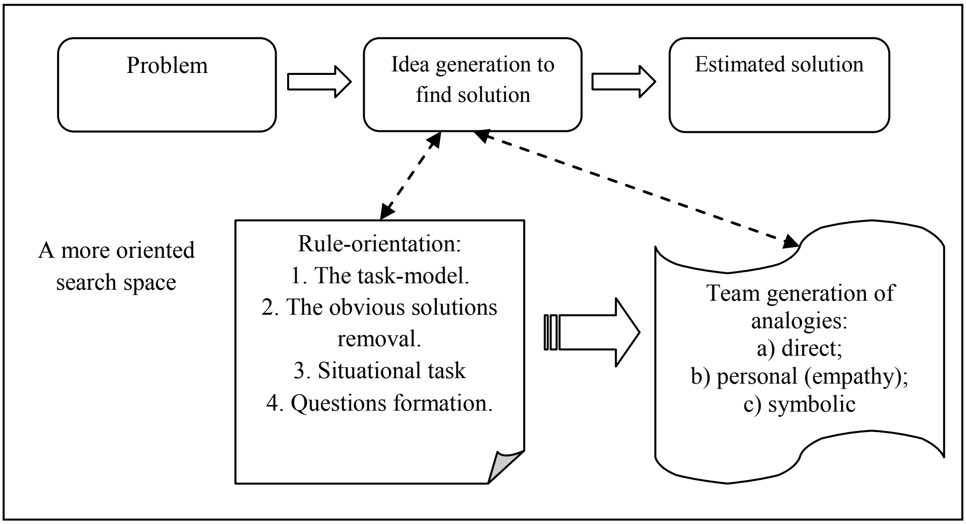

Figure9. Synectics in the project - design work

Synectic method is quite universal, as it offers comprehensive utilisation of pupil's personality resources and realisation of ideas in a team – the characteristics which are necessary for the development of pupil's creative skills. The method of morphological analysis is used in the process of search of limits of systems solutions and for the realization of systematical analysis of perspective directions of problem solutions.

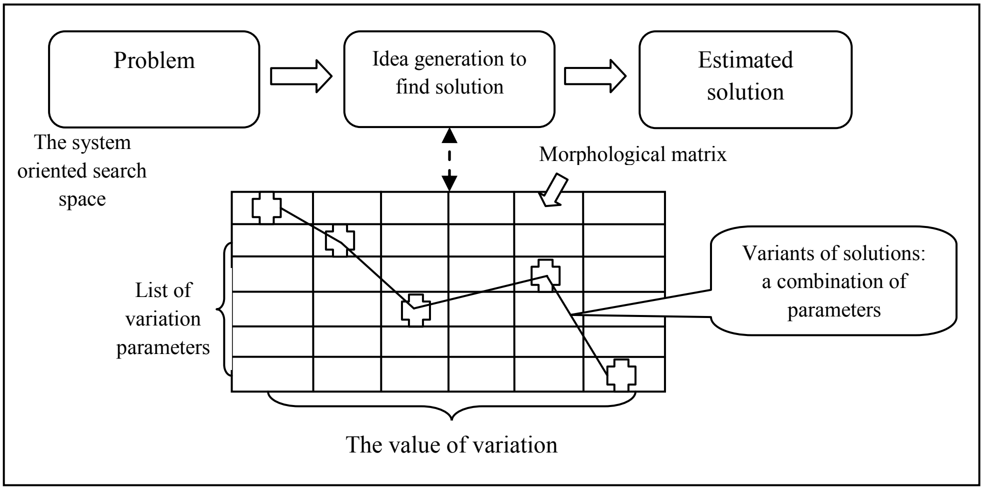

Figure10. The method of morphological analysis in the research - design work

The proposed method is used effectively during the computer analysis of data in the process of search of alternative solutions and realization of logical analysis of educational materials, etc. The utilization becomes complex only if the matrix will increase in the dimensions. The process of project-research activity can be described in 5 problem levels that consist of 6 stages: selection of problem, choice of search conception, data collection and analysis, search of solution ideas, transformation of ideas in the construction, and perspectives of ideas further implementation (Table 1) (Altshuller 1973).

Table 1

The structure of the research - design work

Levels	A	B	C	D	E	F
5-th	Finding the new problem	Finding the new method	Getting the new data of the problem	The formulation of the new principle	Creation of new design principles	Change of the whole system, where a new design is introduced

4-th	Finding the new task	Finding the new search concept	Getting the new data of the task	Finding the new solution	Creation of new construction	Applying the new construction
3-rd	Changin g the primary problem	Changing the search concept concernin g the condition of the task	Changing the collected data concernin g the condition of the task	Changing of the known solutions	Changing of the initial construction	Introduction of new construction
2-nd	The selection of one task from the several tasks	The selection of one search concept from the several search concepts	Collecting informati on from several sources	The selection of one solution from several solutions	The selection of one construction from the several constructions	Introduction of modification s of the finished construction
1-st	Utilizatio n of the current task	Utilizatio n of the search concept	Utilizatio n of the current data	Utilizatio n of the current solutions	Utilization of the current construction	Implementati on of the current construction
Stage s	**Selectio n of the task**	**Selection of the search concept**	**Collectio n and analysis of the data**	**Search for salvation ideas**	**Transformati on of idea into design**	**The prospect of the implementat ion**

In the process of project-research activity, it is necessary to use different creative ideas in order to find the perfect final solution. The process of research ideas search consists of several stages that cover different variants (Figure 11). The strategy of algorithmic search is built, basing on the creation of procedural characteristics of the research in the form of algorithm that has certain sequence of operations, actions, data processing. Such strategy is based on the specification and utilization of research stages for the successful salvation of relevant tasks of the project. Also, it foresees the strengthening of the components of system analysis with a clear formulation of the study goal (Chyapyale 1990).

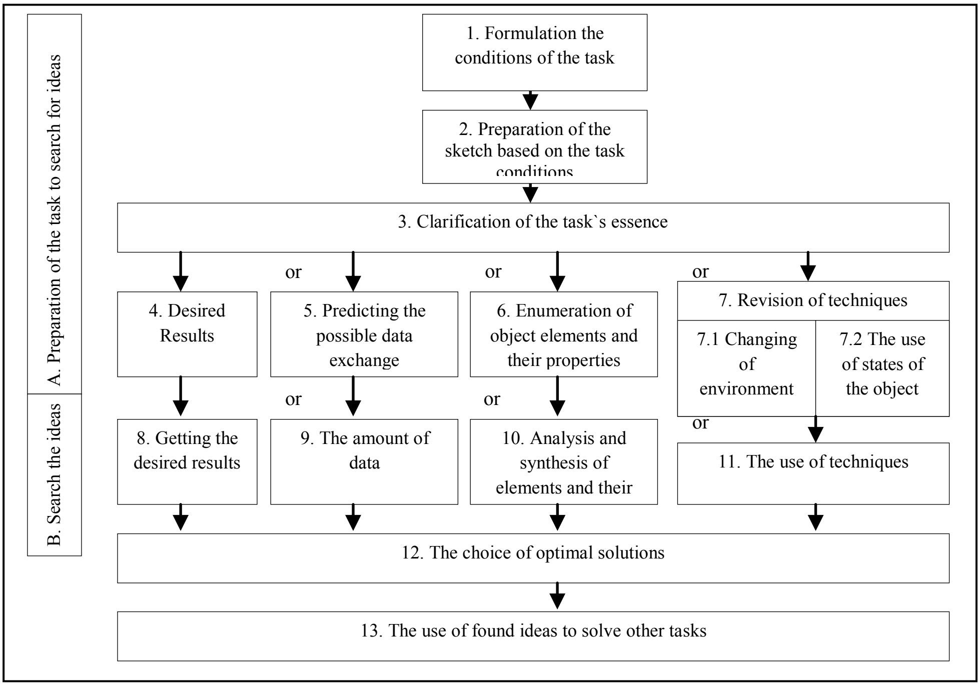

Figure11. Block - diagram: Search of the research ideas

The following research stages of situational tasks are considered in the research, during the solution of research problems (Table 2).

Table 2

Components	Levels of research				
	Rationalization	**Modernization**	**Principle**	**Synthesis**	**Research**
The initial condition	Condition with one parameter	Multi - parameters condition; direct structural analogues	Unstructured tasks; only functional analogues	Not many facts are known; No functionally structured analogues	Uncertainty is the main target factor; there are no analogues
Resources of the problem and researcher	Resource is obvious and easily accessible; Basic professional training	The resource is non-obvious, available in the system; Standard professional training	The resource often does not function with other systems and levels; Combination thinking is developed	The resource is from previously acquired knowledge; associative thinking, thorough erudition, ability to overcome stereotypes	Unknown resource and / or its usage; exclusive, selective motivation, lack of stereotypes

The complexity of the task	Tasks without controversy	Standard tasks	Non standard tasks	Experimental tasks	Research tasks
Rules of transformation	Engineering optimization solution	The engineering solution based on typical (standard) anagoges	Research solution by using combined methods	Research solution by using integration scientific and technical elements	Scientific and technical discovery
The level of innovation	A small parametric replacement of elements	The functional structural solution without changing the principles of functioning	Research with the system effect of replacing the functioning principle	Prominent researches with systemic effect of significant changes in the surrounding systems	The largest study with systemic effect of radical changes in the surrounding systems

All theoretical and practical instruments of research problems solution are structured (Figure 12) taking into account the administrative, technical and physical components. All the below presented components are the instruments of the operational level, as they are used even if research project is realized on tactical and strategic levels. The proposals, presented below are used for the better understanding of its peculiarities (Altshuller 1973).

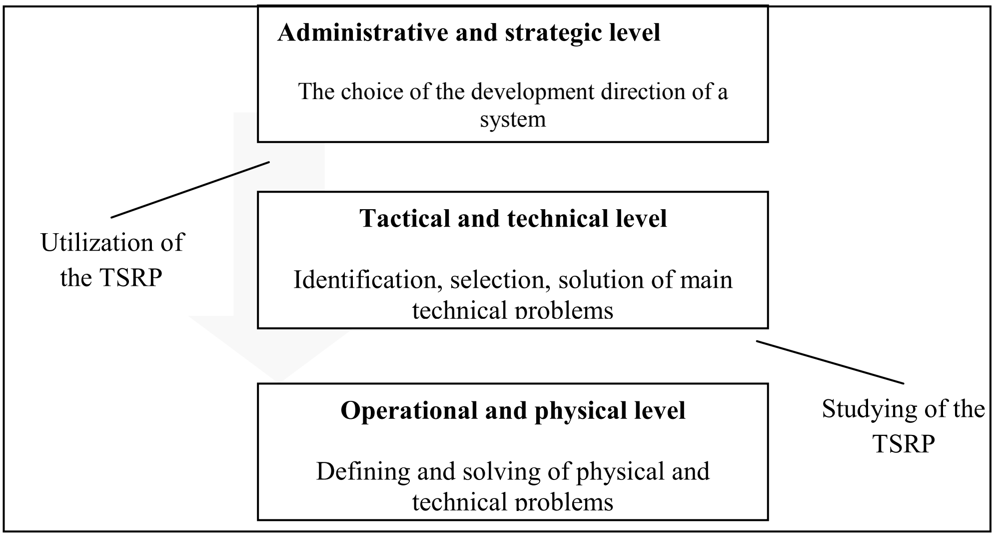

Figure12. The process of analyzing and solving of research problems

Procedure, recommended in the research (Figure12), for selection and analysis of instruments during the salvation of situational problems has the following advantages:

1. Methods of operational level are mostly based on practice that is why their priority exploration allows starting faster the utilization of instruments of the research problems solution theory for the salvation of situational tasks.
2. The operational level knowledge of project and research work is the basement for understanding the ideas and methods of higher levels, as education of pupils is usually organized from simple and practical to more complicated and abstract.
3. The following education of tactical and strategic levels on the examples of the projects allows development of operational instruments skills.
4. On the operational level, the project can be studied in more details. It accelerates the formation of certainty in the constructiveness and effectiveness of research problems solution theory as a whole.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

Multidimensionality and feasibility of research problems solution theory is based on the formulation of problem structure, its reduction about thoughtful and simplistic forms as a binary controversies that are determined by the diagnostics of the problems and identification of their real essence; formulation of ideal goals, modeling of necessary functions, which correspond to the desired solutions of research problems that enables removal from stereotypical influence of usual solutions in the objects of environment; utilization of experience of effective research creation for finding solutions of situational tasks; utilization of development laws of the proposed systems for the strategic search of direction search of relevant ideas of salvation, using independent components of computer oriented educational system and methodology of the step by step analysis of practical problem and synthesis of solution idea with the utilization of the proposed guidelines and algorithms of project and research tasks solution.

REFERENCES

Altshuller, G.S., 1973: *The Algorithm of the Invention*. / G.S. Altshuller - M .: Moskovskiy rabochiy. - 1969 (1-st ed.); 1973 (2-nd ed.). - 296 p.

Chyapyale, Y.M., 1990: *Search Methods of the Inventive Ideas* / Y.M. Chyapyale - M .: Mechanical engineering. - 1990. – 96 p.

Gin, A.A., 2015: TRIZ - *Pedagogy: a Book for the Smart Parents*. / A.A. Gin - Moscow. – 2015. – 71 p.

Grybyuk, O.O.,2014: *Mathematical Modelling as a Means and Method of Problem Solving in Teaching Subjects of Branches of Mathematics, Biology and Chemistry* // Proceedings of the First International conference on Eurasian scientific development. «East West» Association for Advanced Studies and Higher Education GmbH. Vienna. 2014. p. 46-53.

Hrybiuk, O.O., 2013: *Computer-Oriented Systems of Teaching Mathematics in Secondary Schools* / O. O. Hrybiuk // teoria i praktyka-znaczenie badań naukowych: Zbiór raportów naukowych. (29.07.2013 - 31.07.2013) - Lublin: Publisher: Sp.z oo "Diamond trading tour", 2013. - p. 89 - 101.

Hrybiuk, O.O., 2014: Impact of Information and Communication Technologies on Psychophysiological Development of the Young Generation. "*Science*", the European Association of pedagogues and psychologists. International scientific-practical conference of teachers and psychologists "*Science of future*": materials of proceedings of the International Scientific and Practical Congress. Prague (Czech Republic), the 5-th of March, 2014 / Publishing Center of the European Association of pedagogues and psychologists "Science", Prague, 2014, Vol.1. 276 p. - p. 190-207.

Hrybiuk, O.O., 2015: *Cognitive Theory of the Computer Based System for Learning Natural and Mathematical Sciences and Relationships of the Verbal and Visual Component* / O. O. Hrybiuk // Humanitarian Bulletin of the SHEE ‘Perejaslav-Khmelnytsky State Pedagogical University named after Hryjoriy Skovoroda’ – Appendix 1 to the issue 36, Volume IV (64): Special issue ‘Ukrainian high education in the context of integration into the European educational space.’ - Kyiv: Gnosis, 2015. - p. 158-175.

Hrybiuk, O.O., 2015: *Pedagogical Designing of Computer-Based Educational Environment in Disciplines of Natural - Mathematical Cycle*. / O. O. Hrybiuk // Scientific notes. - Issue 7 - Series: Problems of methods of physical - mathematical and technological education. Part 3 - Kirovograd.: RIO KSPU them. V. Vynnychenko, 2015. - p. 38-50.

Hrybiuk, O.O.,2015: *Heuristic Tasks with the Use of Dynamic Mathematic GeoGebra in the Context of STEM - education* // Problems and prospects of professional training of teachers of mathematics: Collection of Science Works based on the materials of the Science and Practical Conference, 26-27 of November 2015 / Ministry of Education and Science of Ukraine, The Vinnytsia State Pedagogical University named after Mykhailo Kotsiubynsky [and others]. – Vinnytsia: Planer, 2015. – p. 148 - 152.

Orlov, M.A., 2006: *Fundamentals of the Classical TRIZ. A Practical Guide for inventive thinking.*- 2-nd ed., rev. and ext. / M.A. Orlov – M .: SOLON-PRESS. 2006. – 432 p.

POSSIBILITIES AND RESOURCES OF THE EPODRECZNIKI.PL PLATFORM FOR GENERAL EDUCATION USING THE EXAMPLE E-BOOK “WORLD THROUGH THE MAGNIFYING GLASS. CHEMISTRY”

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Abstract:*The article presents the opportunities and resources of the epodreczniki.pl platform in 2012-2015, 18 free e-books and 2,500 open educational resources have been prepared and made available under the Digital school project, as part of the free Creative Commons license, accessible through the open public education portal for students and teachers.*

Keywords: e-learning, platform, eBooks, chemistry

INTRODUCTION

The number of students and teachers using e-textbooks is growing rapidly. Interest in the portal is more than 100 times higher than in the previous school year, when only sample content was presented (MEN).

On 18 January 2016 the epodreczniki.pl Internet platform already had 37 364 671 page views. This figure represents the number of visits on the e-textbooks site. The data collected by the regional education authority indicate that the e-text books have so far been used by 58 percent of students and 48 percent of teachers in Poland. Polish Community Abroad has also been using them. (Wałecka 2016).

The www.epodreczniki.pl technological platform is a complex information system consisting of a set of tools and services that provide functions supporting the collection, management, editing and distribution of open educational content compatible with the current core curriculum. The platform provides users in the operational mode, with constant access to the Internet connection, and enables them to download and access selected digital educational content without the need to maintain the Internet connection, using a mobile application. In addition, the platform provides an intuitive and easy-to-use portal interface, to automatically adjust the user interface and scale the digital content according to the type, screen resolution, multimedia formats and standards supported by various students and teachers tools.

The technology platform also meets the key requirements regarding the security level of software and calculation-network infrastructure. Using the latest cloud technology, the platform provides dynamically scalable number of end users and supports continuous integration with external IT systems implemented in schools, e.g. e-journals and e-learning systems (Kurowski 2015).

E-textbook can be activated and is fully supported by a web browser, on any operating system, e.g. Microsoft Windows, Linux, Mac OS and it does not require any additional software installation by the user. In order to start using the e-textbook simply type in the browser address: www.epodreczniki.pl.

1. HOME PAGE OF EPODRECZNIKI PLATFORM

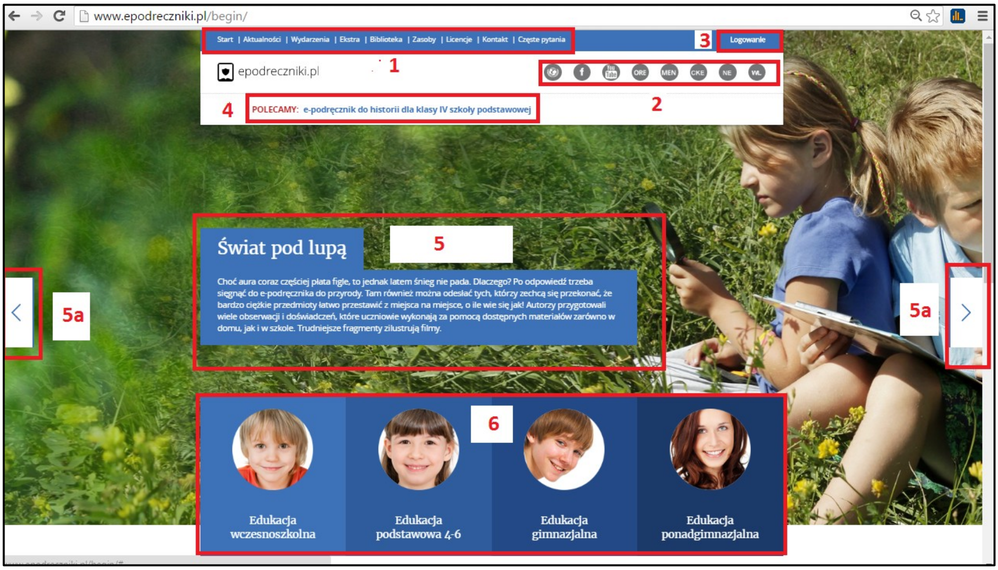

Figure 1. Home page of the epodreczniki.pl platform
(Source: Author's archive)

At the top there is a bar comprising:

- navigation bar allowing the user to navigate to different parts of the portal (1)
- links to websites, among others, ORE, MEN, CKE (2)
- login and registration of a new user (3)

- recommended resources and the content of e-textbook (4)
- excerpts of selected articles from the news section (5), which automatically change from time to time, or can be navigated using the arrow keys on the keyboard or on the sides of the screen (5a)
- tiles with the teaching levels leading to the e- textbook set appropriate for the selected (6).

2. E-BOOKS – CHEMISTRY. WORLD THROUGH THE MAGNIFYING GLASS (E-PODRECZNIKI – CHEMIA. ŚWIAT POD LUPĄ)

2.1. Content

Chemistry is surrounding us everywhere. We come across it not only in the chemical laboratory, but in the bathroom and even in the kitchen. Many phenomena which can be observed everyday cannot be understood without the basic chemistry knowledge. Therefore, it is important to get to know the surrounding phenomena and processes on their macro and micro scale, taking into account the relationship between the properties of substances and their practical significance. Chemistry e-textbook teaches us how to formulate research problems, how to state a hypothesis and verify it. Numerous experiments will help you gain correct research habits and develop problem-solving skills. The proposed research and observations are illustrated with a rich selection of photographs, diagrams, animations and videos to facilitate independent work. Interactive tasks will help you acquire knowledge and skills in an attractive, yet effective way. Some lessons have a "think and act" top bar link. It leads to additional interesting experiments, tasks and questions, which can be resolved using your knowledge, logical thinking, and intuition. "Think and act" tool facilitates the assimilation of these issues with a particular lesson. To revisit it, just select the “read” link on the top bar.

2.2. Home page – chemistry. World through the magnifying glass

After selecting one of the available e-textbooks you can work in two variants:

• a student (1)

• teacher (2).

Additional content (3) beyond the core curriculum for general education is marked in the platform resources with a star icon, and the methodical elements (4) dedicated to the teacher are marked with the biretta icon

Figure 2. Home page of the epodreczniki platform World through the magnifying glass Chemistry class 1. Middle school–left screen menu
(Source: Author's archive)

2.3.Chemistry world through the magnifying glass – user's options

E textbook allows you to choose several options of use:

- *Read* - Select this option to switch to the content of e-textbook (1)
- *Download and print* - this option allows you to generate a PDF file and print the content of the e textbook (2)
- *QR code* - this option is dedicated to mobile devices and allows you to open an e-manual with a QR code (3)

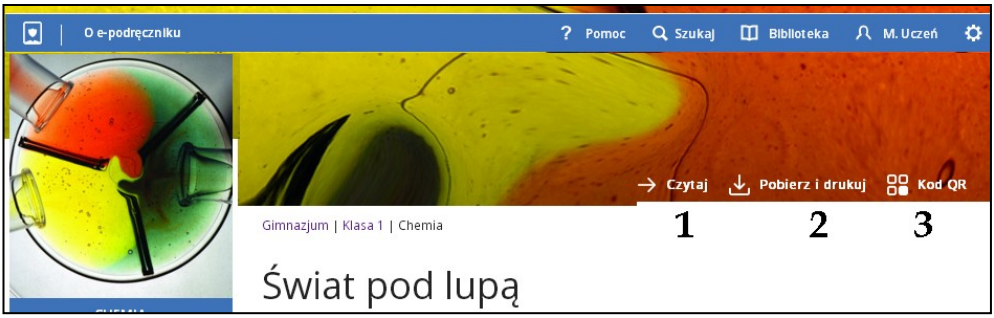

Figure 3. Home page of the epodreczniki platform World through the magnifying glass Chemistry class 1. Middle school–right screen menu
(Source: Author's archive)

Use of the printed version of the e-textbook should be supported by mobile devices in order to use all prepared resources, which is why the videos, animations, and interactive task and tests sides have QR codes to grant access to the relevant page of the e-textbook to view materials or do exercises and tasks from any mobile device, e.g. notebook or a phone.

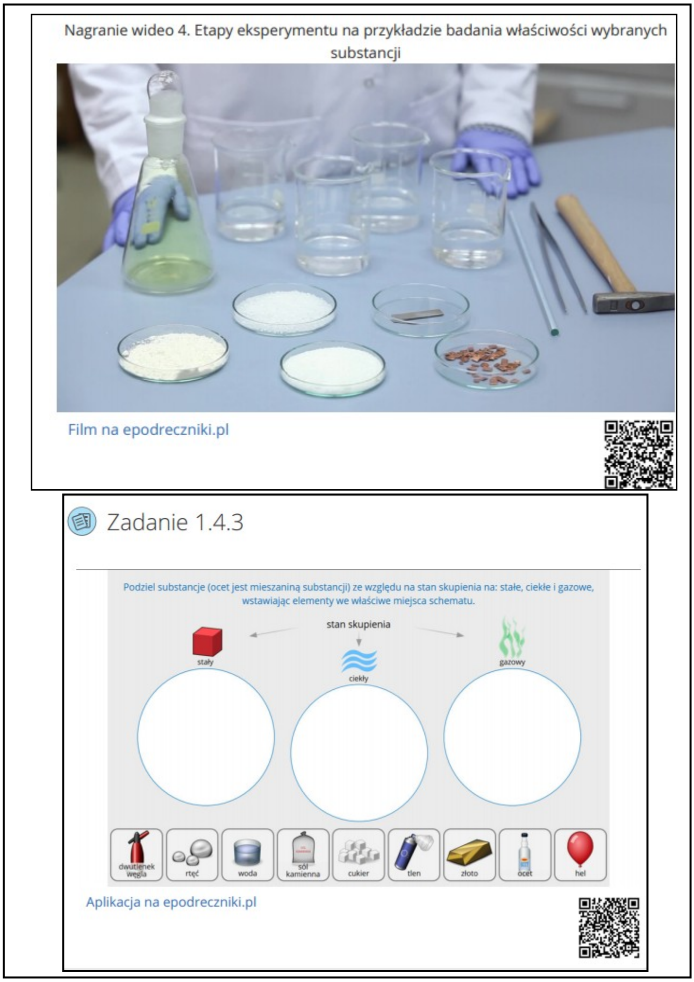

Figure 4. Chemistry textbook in PDF version – screenshot of a video recording with a QR code, interactive task – screenshot of a figure with a QR code

(Source: Author's archive)

2.4. Login – user profile

It is necessary to log in the www.epodreczniki.pl platform to access all available options. To do so, a registration form has to be filled in and sent to the server. The user is successfully registered once the activation link sent to the e-mail address given in the registration process is clicked. The epodreczniki portal may also be accessed via Librus, Office 365, Microsoft account or Google + account.

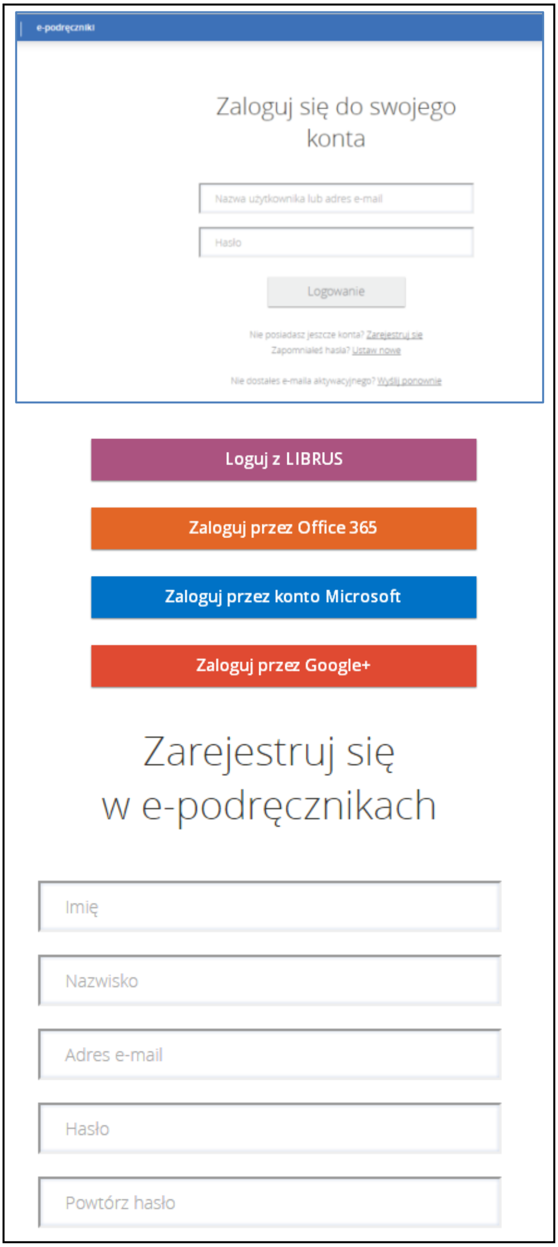

Figure 5. Login and registration to the epodreczniki platform
(Source: Author's archive)

Following a successful registration, every user may fill in account information: nick (username), residence, attended school, as well as select an avatar or add their own picture. Account information including first name, last name, gender and account type (student or teacher) are given below.

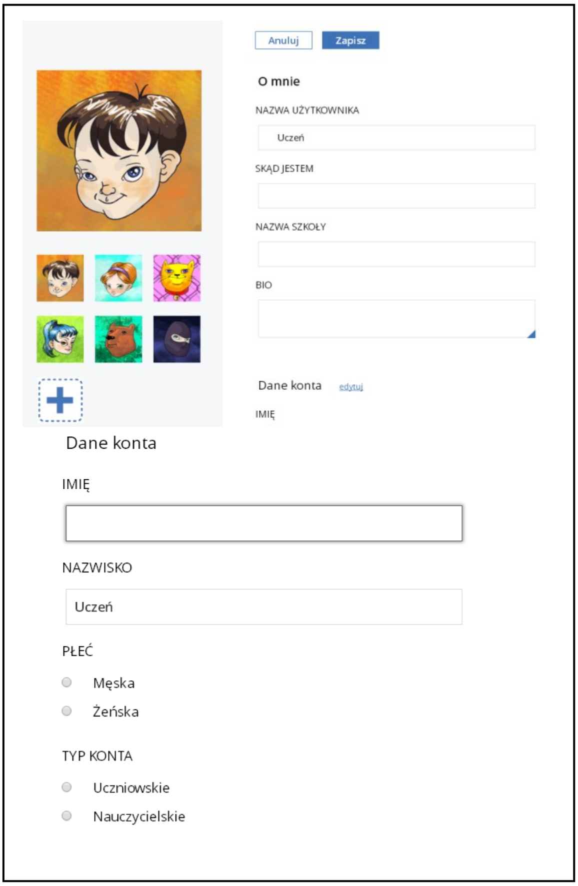

Figure 6. Epodreczniki – user profile
(Source: Author's archive)

2.5. Lesson modules

Once a specific module (lesson) is selected, the following bookmarks become available from the top bar:

- Core curriculum (1) – once this function is active, it enables the display of information pertaining the presented educational content with regard to the current core curriculum. The description includes the e-textbook title, education stage, and a detailed description of skills as defined by the core curriculum with regard to the currently viewed part of the e-textbook.
- licences (2) – once this function is active, it enables the display of detailed information with regard to license for the presented e-textbook content and its authors.
- licences for objects (3) – enabling/disabling display options for large-format multimedia and interactive objects licence (WOMI) details

- supplementary descriptions (4) – once this function is active, it enables the display of multimedia content descriptions, e.g.: detailed description of what is seen in a video material. This function might be especially useful for the visually impaired.
- contact (5) – contact form which enables all users to submit an error, express an opinion, or submit a new idea with regard to the functionality of the platform.

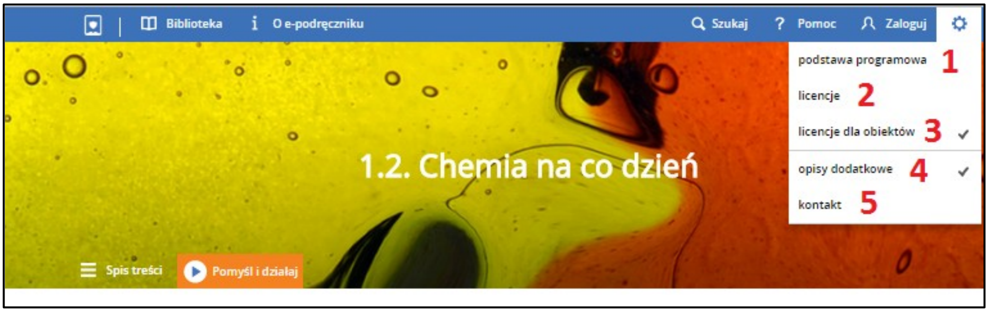

Figure 7. Home page for lesson 1.2. Everyday chemistry in the e-Book World through the magnifying glass Chemistry class 1
(Source: Author's archive)

Following login, the user may:

- highlight text with colour (1),
- make notes within the e-textbook (2).

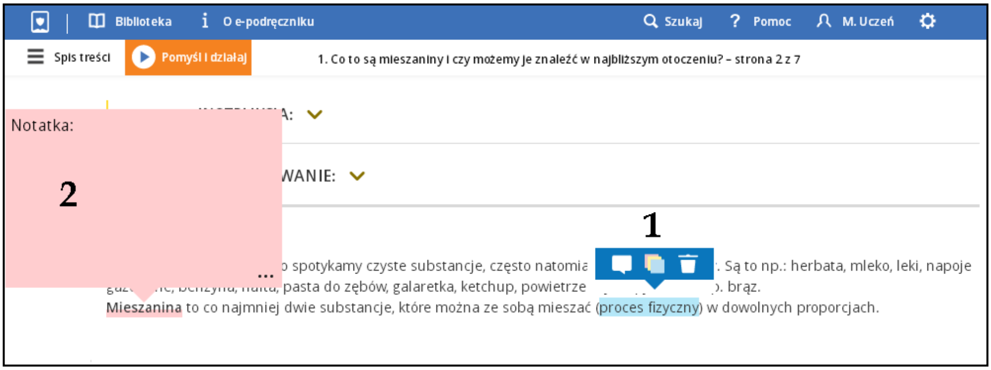

Figure 8. User options: highlighting, making notes
(Source: Author's archive)

2.6. Lesson module structure

2.6.1. What you know and Soon you'll learn

Lessons in natural sciences e-textbooks begin with recurrent elements *What you know* and *Soon you'll learn*.

1. *What you know* – once this bar is selected, it displays information on what the user should know prior to the lesson

2. *Soon you'll learn* – once this bar is selected, it displays information regarding the content of the next section of the e-textbook.

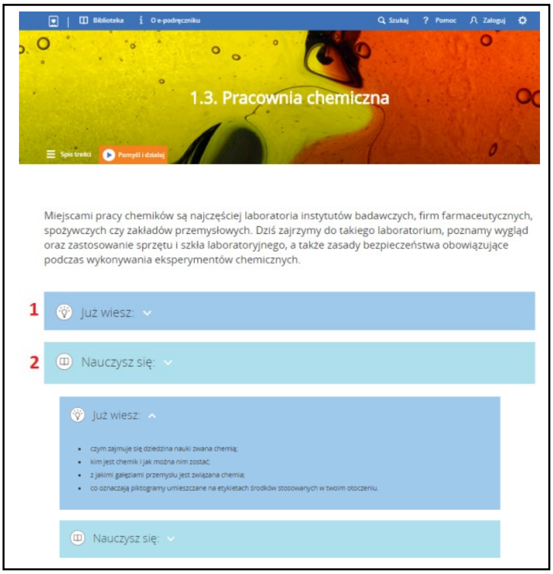

Figure 8. Home page elements for Lesson 1.3. Chemistry lab
(Source: Author's archive)

2.6.2. Text

Aside from the text of the e-textbook, certain significant elements have been highlighted. These are, among others:

- **commands** marked by a hand with index finger outstretched, on a blue circle

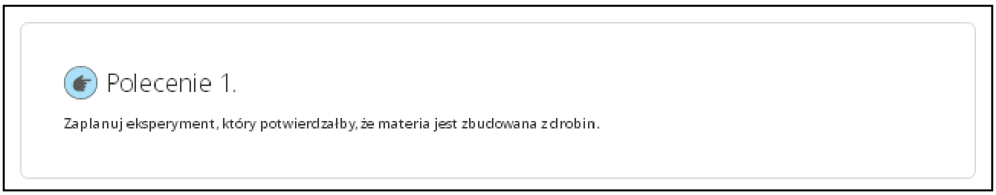

Figure 9. Commands
(Source: Author's archive)

- **trivia** marked by an exclamation mark on a pink circle supplementary information that might interest the user – usually only the first sentence is displayed, while the rest is revealed once selected.

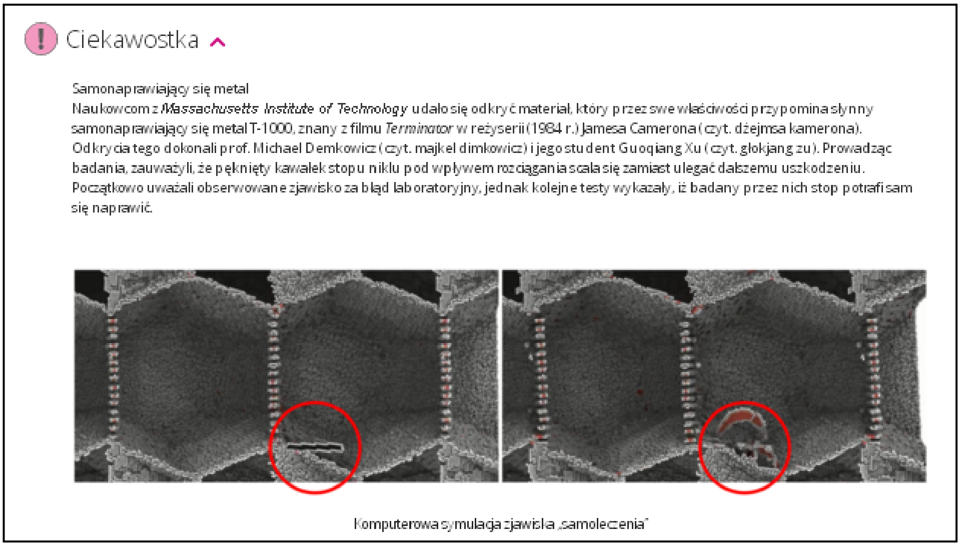

Figure 10. Trivia
(Source: Author's archive)

- **Learn more –** content exceeding the core curriculum

Figure 11. Learn more
(Source: Author's archive)

2.6.3. Experiments

Experiment descriptions are marked by a test tube on a yellow circle and yellow bars. The descriptions include:

- warnings regarding the necessity of using safety goggles, gloves, or adult supervision,
- hypotheses – once students suggest a hypothesis – once selected, one or several hypotheses suggested by the authors is displayed to choose from
- what is necessary – once selected, if students do not design the experiment, displays the equipment and the reagents necessary to conduct the experiment
- instructions – detailed information on how to conduct the *experiment*
- summary – observations description and experiment summary, optionally: pictures or video of the process.

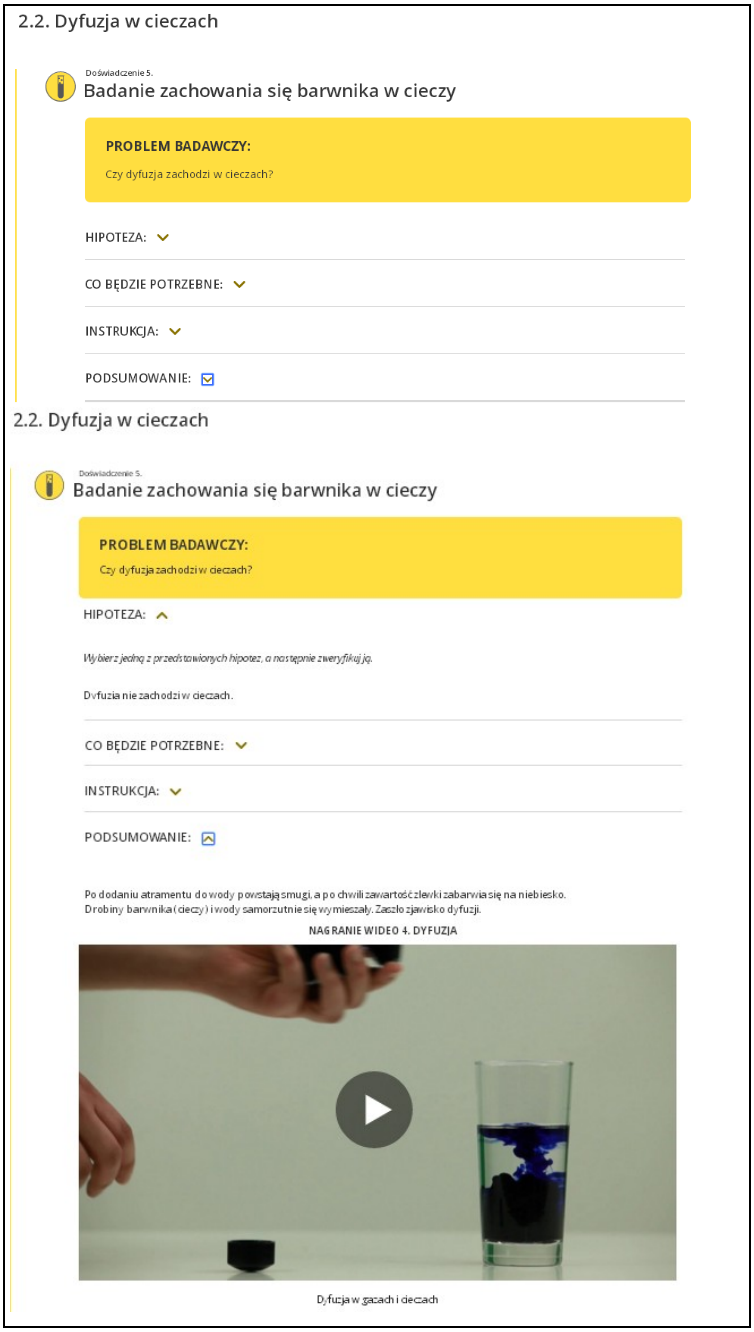

Figure 12. Experiment
(Source: Author's archive)

2.6.4. Summary and homework

Every lesson module ends with a short summary: a repetition of the most important information from the lesson and a suggestion for homework. Homework marked with a star exceeds the core curriculum.

Figure 13. Summary and homework
(Source: Author's archive)

2.6.5. Tasks

There are numerous types of tasks which facilitate consolidation of information and encourage students to work. These are, among others:

- single choice
- multiple choice
- fill in the blanks
- true/false
- arrange in pairs
- arrange in order
- crossword puzzle

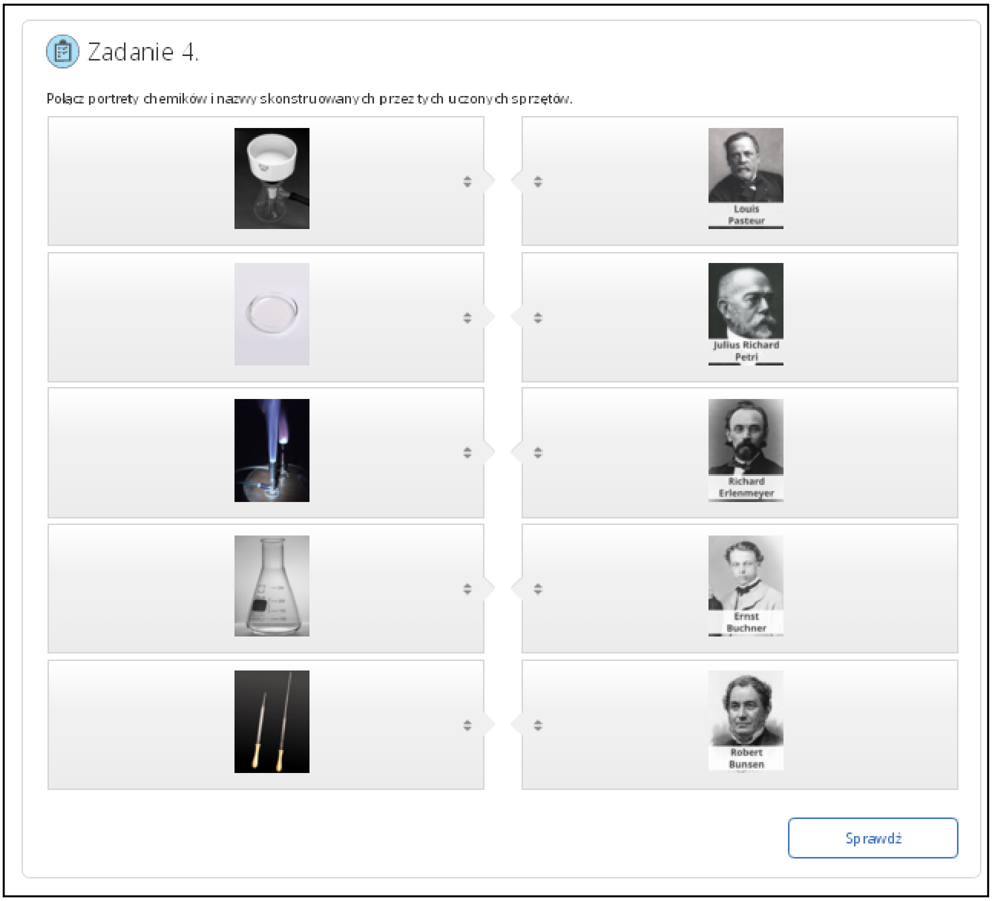

Figure 14. Arrange in pairs tasks
(Source: Author's archive)

2.4. Information saved in user profile

In the user profile in the upper menu information is divided into four categories:

- **My shelf** – contains recently selected e-textbooks used by the user

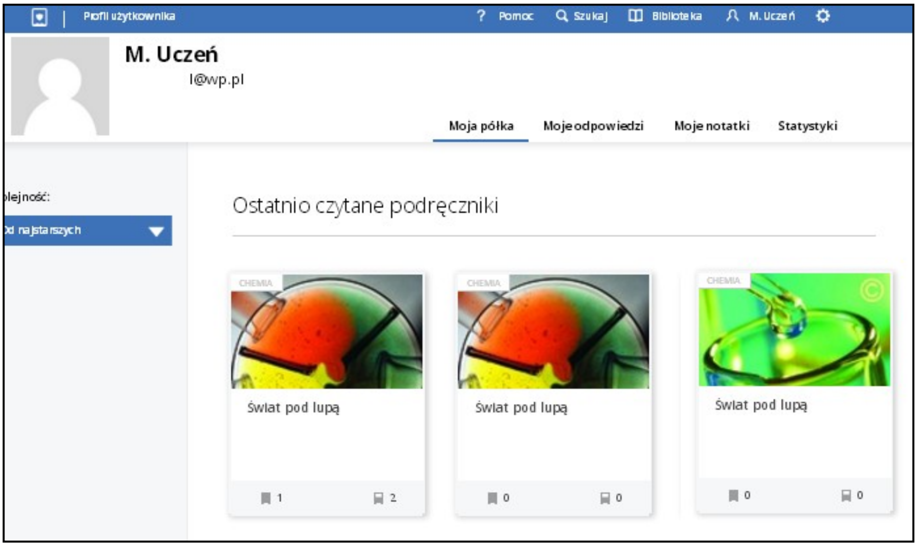

Figure 15. User profile – My shelf
(Source: Author's archive)

- **My answers** – contains the users' answers to open question
- **Notes** – contains both additional information saved as notes and the content highlighted with colours which may be accessed by clicking the *READ* button (the button opens the specific page of the e-textbook where the note was added)

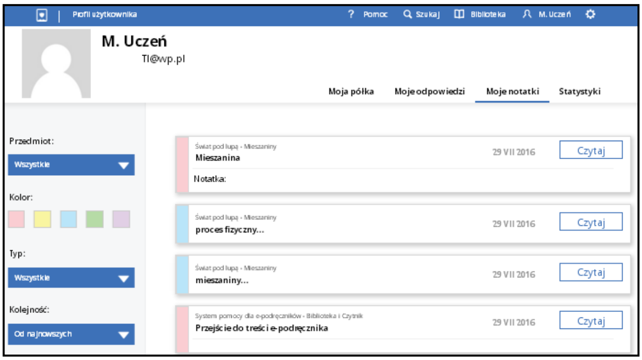

Figure 16. User profile - Notes
(Source: Author's archive)

- **Statistics** – contains the number of notes and the date they were made.

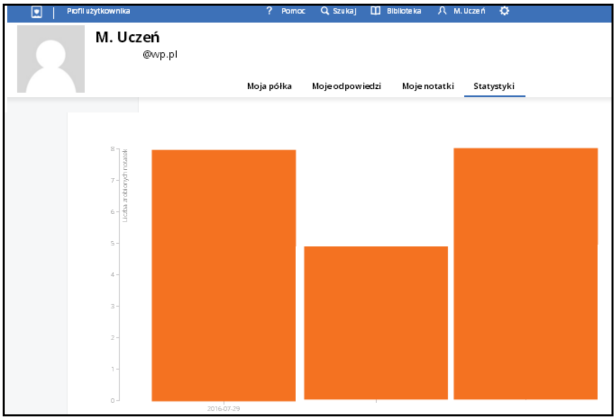

Figure 17. User profile - Notes
(Source: Author's archive)

CONCLUSION

The epodreczniki.pl platform is the largest collection of open educational resources in Poland. These resources may be accessed at any given time and place, both in Poland and abroad, via computers, laptops, mobile devices: tablets and phones, on all operating systems and Internet browsers.

The epodreczniki.pl platform assists an innovative teaching method, while the published multimedia such as: videos, animations and interactive tasks may be an attractive repository of content for both students and teachers.

REFERENCE

Bartoszewicz M., Karawajczyk B. 2015: World through the magnifying glass Chemistry class 2. /Chemia. Świat pod lupą, klasa 2 gimnazjum/. ISBN 978-83-64915-67-3

Bartoszewicz M., Karawajczyk B., Kamińska-Ostęp A. 2015: World through the magnifying glass Chemistry class 1 /Chemia. Świat pod lupą, klasa 1 gimnazjum/. ISBN 978-83-64915-66-6

Bartoszewicz M., Szczepaniec H., Wojewoda A. 2015: World through the magnifying glass Chemistry class 2. /Chemia. Świat pod lupą, klasa 3 gimnazjum/. ISBN 978-83-64915-68-0

Kurowski K. 2015: E-podręczniki założenia technologiczne. [On-line] at http://www.man.poznan.pl/files/e_podreczniki_zalozenia_technologiczne_1_1 .pdf (accessed 24 July 2016)

MEN E-podręczniki coraz popularniejsze 2015 [On-line] at https://men.gov.pl/ministerstwo/informacje/e-podreczniki-coraz-popularniejsze.html (accessed 24 July 2016)

Wałecka B. 2016: E-podręczniki do kształcenia ogólnego 2012 – 2015 PO KL, Priorytet III, Działanie 3.3, Poddziałanie 3.3,3. [On-line] at https://www.ore.edu.pl/attachments/article/6692/E - podreczniki_do_ksztalcenia_ogolnego_29.01.2016.pdf (accessed 24 July 2016)

CREATING AN E-LEARNING MODULE TO HELP LANGUAGE TEACHING: AN EXAMPLE OF DEVELOPMENT RESEARCH

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Abstract: *We propose here to analyze the process of development research which was undertaken aiming at setting up the e-learning module of the Institute for French Studies at the University of Warsaw. Doing so, we intend to propose a frame of reflection that can be employed by the institutions which would like to implement such a module in their courses.*

Keywords: Language teaching, E-learning, Development research, Transversal skills.

INTRODUCTION

The emergence of e-learning modules in the higher education context nowadays is a trend that cannot be ignored by institutions which have not taken the decision to follow this path yet. Every faculty has its own specific needs and requirements, specific views and goals. That is why if the main core of an LMS (Learning Management System) is good for most, a solution imported from another environment will, however, rarely fit. Therefore, a good planning and reflection has to be part of the implementation process.

In order to make the best choices and build the ideal tool, a development research seems to be the best process. A development research must be planned, objectives need to be set, steps must be followed, tools need to be implemented to control the development.

But such research is not only a period of the creation of the module itself, but also the basis on which a further scientific analysis can be developed through action research, transforming an educational tool into a scientific research environment. This second part will insure the possibility of checking the didactic efficiency on the long term.

In this paper we propose to discuss development research (which was then followed by action research) undertaken at the Institute for French Studies at Warsaw University from 2010 to 2013.

First we will remind the theoretical model of development research, with steps that should be followed. We will then see in the second part the choices we made to implement our module and analyze the results of a survey conducted among our students aiming at checking their feeling about the platform created.

1. DEVELOPMENT RESEARCH IN THEORY

1.1 Development research: a study from inside

As well as the action research that can follow, the development research is characterised by the very specific position of the scientist: he is not a spectator, but mainly an active actor in the process. His energy will be focused on the development of the tool, and he will have to interact a lot with his environment to shape it for the best results. As Pierre Nonnon (2002:1) underlines, development research is characterized by “an abductive approach, which instead of building a theory of knowledge as it is done during fundamental research, is rather trying to clarify and organize ideas from educational expertise and technological innovation as a template. It is therefore more about deriving ideas and plausible explanations to construct a model of action including constraints coming from both the technological environment and the rules of learning.”

In the context of the development research, various skills are required. These can be the skills of one person or of a team, accordingly to the competence level: researcher to bring the knowledge and set up the parameters for the research, teacher, didactician to plan the content, technology specialist (named “technolog” by Nonnon) to choose and shape the technical aspects of the LMS, educational psychologist to ensure the good cooperation and interaction with the students.

Indeed, Pegrum (2005) reminds us that e-learning is not a methodology but a technological medium for the methodology. Therefore, a sole technology specialist is far from enough to set up the tool.

All of this will have to be taken into account before even starting the project in order to set up a team if needed and have all the skills required for the implementation and analysis.

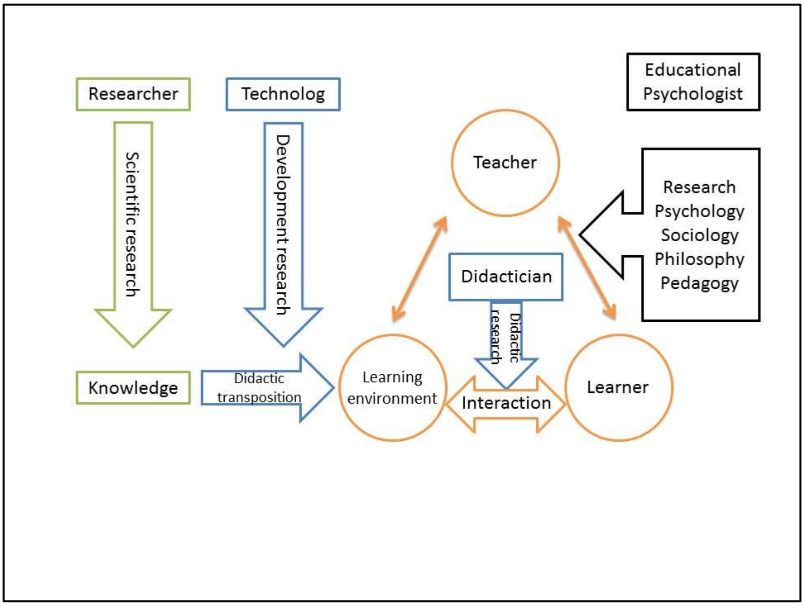

Figure 1. Development research
Source: Nonnon, 2002:1 (Our own translation)

1.2 A roadmap to development research

1.2.1 Step One: Why and what for?

Before even choosing an LMS, the very first step will be an analysis to identify the problem to which an e-learning module could bring a solution and see if the module would really bring something to the student. We can sum this up by a simple question: why do we need it? Such a change must have an advantage over the traditional way of teaching. Such a module must be the answer to a problem met or expected in teaching.

Once the problem has been analysed and being sure e-learning can bring a solution, goals must be set. The role of the teacher and the expert in didactics is crucial here, as they will have to identify their problem and say what teaching goals they have. The technology specialist must consult with them to see if e-learning can bring efficiency and what would be the best LMS according to the kind of use.

In our domain, language teaching, blended learning solutions will be often be preferred. Debra Marsh (2012: 1-2) reminded that interaction with an authentic audience as well as immersion in the target culture will be limited in a classroom, the length of the lessons will be sometimes too short or ill-fitted, the stress conditions due to the expression in front of the others will be too strong for some students and autonomy will remain pretty limited. As Davies (2003:212) wrote:

“Online training is playing an increasingly important role, but practical aspects of training can be delivered better in face-to-face workshops. A judicial mix of online and face-to-face training is therefore desirable. Online training works best when there is substantial peer group and tutor support. The technology for delivering online training must be robust, the user interface must be transparent, and hardware must be easily accessible to trainees. Content must be relevant and consist of a mix of theory and practical aspects. Trainees need adequate time to complete assignments set by tutors, and tutors need time to mark them."

There are many e-learning solutions on the market, and just as we do when we buy a car, we must analyse them to see which one best fits our needs and context. To choose, we must take into account:

- What are the laws on e-learning in the country? For instance, for universities in Poland, e-learning modules cannot exceed 60% of the total of the teaching hours included in the curriculum (Dąbrowski 2013: 209).

- What equipment do we possess and need? Are our students equipped enough and do we have an alternative for the ones who are not? As underlined by Dąbrowski (2013 :206-207), if we use a commercial LMS, the faculty has to pay a licence for every student.

- Who will take care of the module and who can solve technical problems in case they appear? Is the LMS fitted with the options we require for the content we want to implement?

- How complex is the use of the LMS? What is the level of computer literacy of our teachers and our students? Is a training course on LMS needed and who can provide it?

1.2.2 Step Two: How?

Once we answered all of these questions and chose the tool for the environment, a strategy must be set up and tools created to check if the module proves to be efficient or not.

For the strategy, didactic materials must be chosen. Which resources will be useful for teaching and in which format? E-learning brings here two aspects: interactivity with the content and multimodality. The repartition between the types of media used and the way we treat them will vary from what is done in a classroom, as the constraints like time and space will differ. However, while setting up the content, the same three parameters must be kept in mind: validity, reliability and feasibility: will the content really help to achieve our goals, will it work the same way for every student and can it be done within the frame given?

One first constraint will be the legal one, linked to copyright. During the conception of the content, especially multimedia, we will always have to check the rights of use. Another one will be the amount of time we expect the student to be able to give: as the time frame is not so clear, it would not be fair that the e-learning goes too far on his private time. That is why the student will have to know both the limit of time given but also the expected volume of time to achieve the work given through e-learning.

Once content has been determined according to the goals we want to achieve, tools must be put in place to control and evaluate the module. These tools will be essential as they have to tell us how to modify the content or/and the environment to achieve our goals and measure if the module solves the problem met or not. We must keep in mind that all the actors in the environment must have their word, that is why the tools must also include students. We must not only check the efficiency according to their results, but also have a feedback on how they feel about the work in the environment. Canals of intensive communication are needed to have the best feedback as possible. This communication is not only a way to give the students opportunity to express themselves, but also to provide them with technical and affective support. Such a support is required as a student can often feel alone, isolated or even neglected when in front of the screen.

2. AN EXAMPLE OF DEVELOPMENT RESEARCH

2.1 The context of development research and the strategy

In 2010, our Institute for French studies decided to open a curriculum for students who never learnt French before. A specific program had to be set up in order these students could reach after three years of studies an equivalent level to the "classical" students who passed the extended Matura in French, as the final exam for the diploma would be strictly the same. Of course, the number of hours in the curriculum was increased, but it was still not enough to teach the whole complexity of the language. We needed then a way to develop their ability to find by themselves the information they lacked, manage their time, have a critical approach. It is because of these constraints that an e-learning module was thought of. A LMS was proposed in 2009 by the Lyon 1 university and some experiments were conducted on it, but it was not used ever since as no real need was felt.

We had a need and we had an environment, therefore we started reflection on how to fit the environment to our new needs. We chose Spiral which seemed simply the best choice for our goal: it was free, less complex, we did not require any server as it is provided by Lyon, a free technical online support and free training is given and the environment was from the start designed to use multimedia. We chose to use Facebook to communicate with our students as the vast majority of them are present on this social network. For the others, Skype, email and of course meeting in person were other solutions for contact. This kind of communication seemed to us more efficient than to oblige them to connect regularly to a platform they would use only for the module. Another important element of the platform is that is has a restricted access to members, allowing us to take advantage of the Polish legislation about copyright. The law in Poland authorises to use any content for didactic purposes and to archive them without being subjected to the author's right. This was very important to conceive the content in the environment.

The prime goal of our module is to develop the transversal skills (Roosen in Crutzen, 2005 : 10) of the students, such as:

- use of new technologies,
- information seeking,
- critical judgment,
- text structuration,
- problem solving,
- time management.

A second goal was to facilitate the use of the general and linguistic competences defined in the CEFR (2001:101) in a contextualised environment and to push the students to go and discover francophone culture.

To do so, we used multimedia content inside tasks to be completed every two weeks. 14 groups of activities and 6 tasks were designed; the work being given during the two first years of studies.

To monitor possible problems and check the validity of the tool, we used direct feedback from the students during the whole time, we monitored the results and the connection frequencies and set up two anonymous online enquiries that students had to answer.

In these enquiries we asked the students questions on their expectations during the language teaching, the feeling they had as users on their personal development thanks to the module, the felt degree of difficulty of the module and its various elements, on the advantages and problems of the module and had an open question for proposals of further development.

2.2 The setup and results

2.2.1 Setting up the content

When designing the content, we evaluated the amount of presence of transversal and cultural competences in the work given, using a scale going from never to very often. During the first year, students were working on thematic groups, being a set of various activities having as a link a main subject but without a final goal. These questions were mainly Multiple choice questions, short open questions and texts with gaps, translation often being given. We used ~~lots~~ of pictures, recorded speeches, videos, internet links and original texts. Such group of activities could contain up to 18 videos or 13 pictures.

With tasks, the difficulty increases and multiple choice questions disappear. The text structuration becomes more important as students have to write longer texts. We also deliberately increased the number of cultural elements to push them to discover the francophone culture.

2.2.2 Modifications of the module and opinion of the students

Thanks to chat and discussion with the students and data collected, discussion with the creators of the platform and administration, changes were brought to the module.

The first array of changes was of a technological nature. For the first two years (2010 to 2012), the version of the LMS was Spiral (Spiral, which then evolved into Spiral Connect followed by Claroline Connect is a LMS created by Lyon 1 University and its team ICAP lead by Christophe Batier. It is used by over 40 institutions. In Lyon 1 only, over 150 000 users are connected daily, and the LMS includes the library and marks systems. The technical support is 24/7 given by the ICAP team, and all the data is stored for free on their servers. We did not choose the newest version of the LMS, Claroline Connect, as it is more fit for MOOCs.). The interface was not really user friendly, there was no integrated chat and the videos and audio files required an internet link. In 2012, Spiral was upgraded to Spiral Connect. This version is in “flat style”, can be personalized, has a chat, is very intuitive. The video and audio files are integrated to the thematic groups and stored on the server. In this way no internet link is required, meaning we always have access to the files. No specific codec is required and any internet browser can open them. There is even a mobile version allowing students to do the work on their smartphones or tablets.

The second array of changes done within these 3 years were of an organizational nature. At the beginning, students were getting a mark counting for the average, and the e-learning was put for 4 semesters. But it quickly occurred that during the second year e-learning was taking them too much time and was a nuisance during their exam sessions as the work often collided with it. We therefore decided that it would be put during 3 semesters, in order the students can focus on their exams. It is important to keep this first semester of the second year, as only then they have the linguistic ability to write longer texts in French and so to perform correctly during the tasks given. Unfortunately, the mark had to be abandoned for administrative issues. This was a good motivator for the students. Students are now a bit less motivated, unless when a competition emerges among them (this was noticed few times). To compensate somehow, it was decided that the validation of the module was a prerequisite to go to the final exams.

Two anonymous enquiries were set online to check the opinions of the students after the 1st year and after the 2nd year of studies. During the development research phase, its aim was to improve the tool and check its adequacy to the goals.

When asked about the weak points of the module in the enquiry after the 1st year after the development research was considered completed (results from 2013 to

2015), only 37 out of the 73 (50,6%) answered this open question. For 9 of them (therefore 12,3% of the total), there were none, 7 underlined technical problems (9,5%), 6 indicated lack of time (8,2%), 4 (5,5%) lack of group projects and lack of live contact, 2 (2,7%) said that the content was not synchronised with the other lessons and only 4 (5,5%) found it totally useless.

Concerning the advantages of the platform, 40 people out of the 73 taking part in the survey answered this question (54,8%). 20 (27,4% of the total) liked the flexibility in terms of time and having the possibility of doing the work at their own pace, 11 (15%) underlined the fact that it was interesting or helped them to develop new useful competences, 8 (11%) loved the work on information seeking and 7 (9,6%) appreciated the diversity of the documents used, especially in multimedia.

We asked the same questions to the 2nd year students but from 2014 to 2016, which means the very same students but after they completed the 2nd year work on the platform. A total of 58 persons answered. About the weak points, 7 (12%) criticized the lack of human contact, which according to them was demotivating. Only 4 (6,9%) talked about technical problems. 17 respondents (29,3%) said that the tasks were very time consuming, one of them admitting that it was the case not because of the given laps of time but the problem that they all do things at the last minute, and then are confronted to a huge mass of work. For 2 persons (3,4%), the lack of immediate correction was a problem. 6 students (10,3%) found the platform useless, not having the impression that they have learnt anything and treating it as a punishment.

2.2.3 Meeting the goals?

About the objectives we had, the results of the enquiry for the 1st year students once the module was considered as stable were the following:

Table 3.

Importance of the help in developing transversal and cultural competences thanks to the thematic groups for 1st year students (scale from 1- never, to 4 very often, n=73)

	1	2	3		average[1]
Text structuration	8	12	40	13	2,8
information seeking	3	6	18	46	3,5
critical judgment	8	19	30	16	2,7
Cultural elements	2	9	24	38	3,3

[1] We only give in our tables a ranking average only to see the underlying tendencies.

Source: Own work

The enquiry did not ask about time management as students did not know how to evaluate it. But as we read in the previous sub chapter: some are conscious of the fact that there is no management, just doing things at the last minute.

We can see that they felt progress in their skills in the scope of information seeking and cultural competence as expected because these were the most trained transversal skills worked on. However, even if the work on critical judgement was big according to us, the students did not feel much progress in this respect.

Table 4.

Importance of the help in developing transversal and cultural competences thanks to the thematic groups for 2nd year students (scale from 1- never, to 4 very often, n=58)

	1	2	3	4	average
Text structuration	5	17	21	15	2,8
information seeking	3	5	14	36	3,4
critical judgment	4	10	25	19	3
Cultural elements	0	2	10	46	3,8

Source: Own work

After the second year, at last they felt progress after the work on critical judgement, but still not much in relation to-text structuration even if most of the questions were open and required a structured text.

CONCLUSION

We tried to show here that creating an e-learning module is not just a technical matter. If development research is focused only on the constitution of a new tool, once completed it will allow for the undertaking of action research to study the processes within the environment created. As we saw here, development research is a good way to structure choices to be made and the team to compose when a faculty is thinking about an e-learning module. It requires time and a lot of consultation with all of the actors to perfect the tool as much as possible.

REFERENCES

Council of Europe, 2001. *The Common European Framework of Reference for Languages.* Cambridge University Press, Cambridge, 273 pages, ISBN 0521803136

Crutzen, & Dany. (2005). Les compétences transversales. Un concept-clé pour l'éducation à la diversité en Europe. Quelle réalité en communauté française ? Dans Aden, & Joelle, *De Babel à la mondialisation : apport des sciences sociales à la didactique des langues* , p. 10. CRDP de Bourgogne, Paris, 457 pages, ISBN : 2-86621-372-6

Dąbrowski, M. ,2013. E-learning w szkolnictwie wyższym. *Studia BAS*, pp. 203-212. ISBN: 978-83-927446-7-2

Davies, G. D., 2003. Perspectives on online training initiatives. In U. Felix, *Language Learning Online:Towards Best Practice*, pp. 193-212, Swets et Zeitlinger, Lisse, ISBN-13: 978-9026519482

Marsh, D. ,2012. *Blended learning, Creating Learning opportunities for Language Learners.* Cambridge University Press, Cambridge, 30 pages, ISBN : 978-1-107-91697-5

Nonnon, P. , 2002. *Considérations sur la R et D technologique en éducation et l'ExAO*. [Online] at http://mapageweb.umontreal.ca/nonnonp/rdeducart.html. (accessed 24 August 2016).

Pegrum, M. , 2005. Online learning: Fallacies, fibs and fables. Opening guest presentation at UWA Library Teaching and Learning Showcase on November 9th. University of Western Australia. Perth.

E-EDUCATION CONTENT MANAGEMENT

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Abstract: *E-learning is an innovative technology used to increase professionalization and student academic mobility. The ICT is considered to be a technological platform for higher education fundamentalization at the modern stage of development. Regarding the e-learning system, the implementation of the designed module of Web Dean's Office allows to regularly monitor how educational content is created and used, as well as to observe and analyze the activities of all educational process participants. It was an essential requirement to consider the forms of e-learning implementation and the requirements for education performance assessment and evaluation, which gives a possibility to both academic staff performance assessment in the educational content management system (performed tasks) and a control over student activity and academic group excellence in order to ensure quality education, while developing the module.*

Keywords: e-learning, Web Dean's Office, quality education, control of participants.

INTRODUCTION

The expanded application of e-learning and distance education technology for all forms of education in all fields of study; the created online courses and other kinds of e-learning content; standards for designing e-learning content and e-environments and the global shift from Learning Management System (LMS) to Training Management System (TMS) are among the main global trends in education informatization. Therefore, e-learning implementation based on using e-content that includes electronic training courses (ETC) and e-collaboration of all the participants of the educational processes is given a special attention to at Borys Grinchenko Kyiv University (BGKU) on the basis of electronic information and education environment of the University (Morze, Buinytska, Hrytseliak, 2015).

1. BGKU E-LEARNING SYSTEM

The peculiar features of e-learning are connected with the use of means, instruments and tools for education that could combine the efforts of the teacher and the student in order to facilitate the process of learning of the content of courses; to engage students into active learning with the help of educational materials and sources; to maintain systemic interaction between the teacher and the student, among the students, in collaborative small group forms of activity (forum discussions of different issues, chatting, video conferences), in customization and differentiation of educational processes harmonized with the student capacities and abilities; to promote personification in education and training in order to take student interests into account; to ensure academic staff and student time-efficiency due to automation of routine tasks performance.

There are various ways for e-learning system implementation at HEI. Purchasing a ready-to-install solution with the possibilities that are documented, that serves as a platform for the customer (institution) to spread an e-learning system is the most common way. The price for software application includes detailed documentation, as well as methodological and technical support. Yet, the customer (institution) implements the system in operation without any help.

The second option foresees entering an e-learning system in operation by the developer under the framework of its implementation, which is considerably more expensive and is, consequently, a less common practice for HEI. Nevertheless, the fact that the customer gets a unique system which is capable of problem-solving as an outcome of the project is an advantage.

The third option is the least risky considering finances. It is the ASP-service application. The point is that the customer gets an access to an existing functional e-learning system that is created on the platform of a software product.

The fourth variant was chosen by BGKU. It is deploying freely-distributed learning management system which is self-expanding using its own potential.

The BGKU e-learning system is organized on the platform of LMS MOODLE (Modular Object-Oriented Dynamic Learning Environment), and it is accessible at http://e-learning.kubg.edu.ua/ (Figure1). MOODLE is a free open source system for learning management that is targeted at cooperation, collaboration and interaction between the teacher and the student.

With the help of this system, students have a possibility to remotely learn educational material of different subjects, send the assignments done for the teacher to check them, take tests using the global network – the Internet. Teachers, in their turn, develop their own online courses and practice distance learning, send messages to their students, delegate, collect and check student homework, keep electronic registers for student academic record, set various course resources with the deadlines for working with them, etc. (Morze N., Buinytska O., Varchenko-Trotsenko L., 2015).

E-learning is an innovative technology used to increase professionalization and student academic mobility, whereas ICTs are considered to be a technological platform for higher education fundamentalization at the modern stage of development.

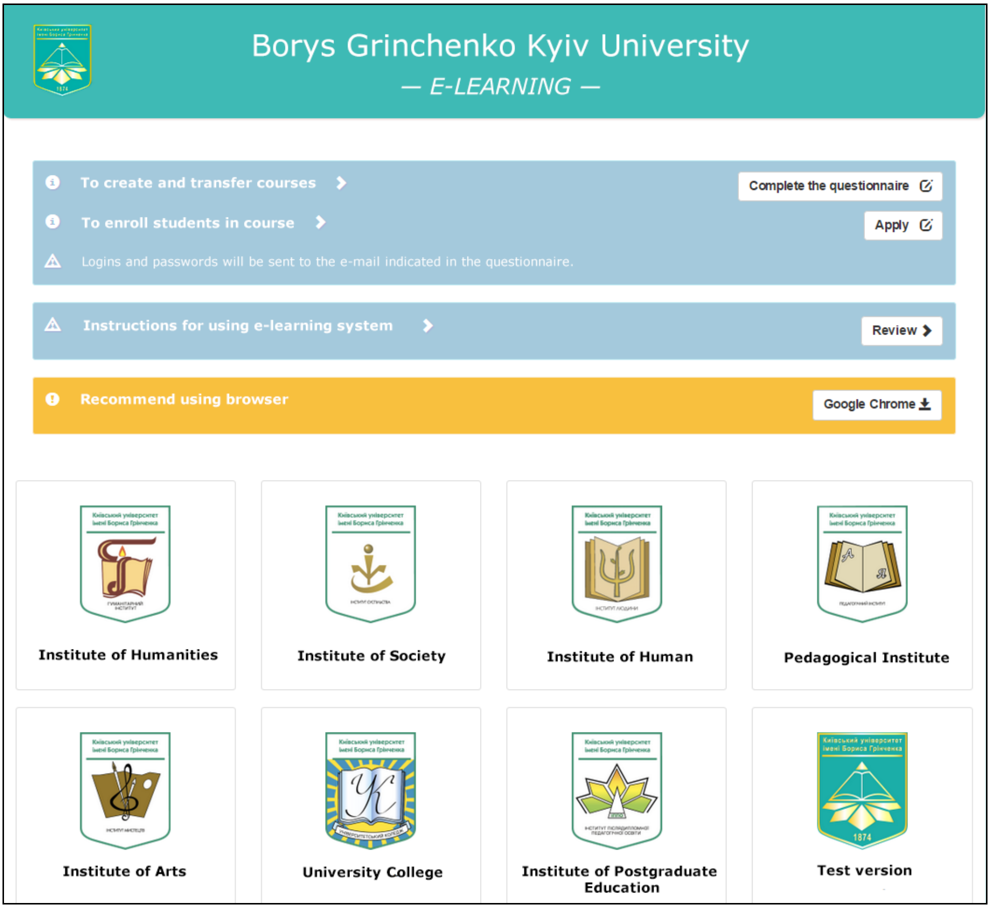


Figure 1. Home page of the University E-learning System

Source: Own work

2. WEB DEAN'S OFFICE MODULE IN MOODLE ENVIRONMENT E-LEARNING CONTENT MANAGEMENT SYSTEM

Through the developed "Web Dean's Office" (e-Dean's Office) module, the standard options of e-learning have been expanded at the University in order to organize and monitor the quality of the educational process. The development of e-Dean's Office was one of the objectives according to the local plan of BGKU as a participant of Tempus DESIRE (544091-TEMPUS-1-2013-1-BE-TEMPUS - JPCR), an international project, to ensure and control the quality of the developed online courses in embedded systems that are included into the curricula for training advanced students.

E-Dean's Office Module is implemented via MOODLE learning environment API (Application Programming Interface) following the recommendations of the official technical documentation (http://dev.moodle.org/) using such technologies as PHP, MySQL, JavaScript, HTML, JSON.

It was essential to consider the two component parts - forms of e-learning implementation and the requirements for education performance assessment and evaluation at HEI –while developing the module.

The main functionality of the e-Dean's Office developed is:

- making it possible to divide educational environment into subdivisions (institutes, chairs);
- creating training courses with possible additional settings (hours, forms of testing, authors, etc.);
- widening information about academic groups and students to include specialty, specialization, form of training, field of study, EQL (Education Qualification Level), etc.;
- working out curricula for directions of training with possible linking of training courses;
- student profile (page) for current courses, assignments that have not been accomplished and academic record to be displayed;
- group profile (page) for student academic record and courses during the current period to be displayed;
- teacher profile (page) for assignments that have not been checked and settings of training courses to be displayed;
- automated transfer of groups to directions of training for further education;
- synchronizing with an external data base to update information about academic staff, subdivisions, courses, etc.;
- automated collection of statistics regarding academic disciplines, training courses, chairs, etc.;
- search for teachers, groups and students by subdivisions to simplify the system navigation.

The Module provides a possibility to edit settings, create new records and delete old ones (subdivisions, training courses, directions of training, etc.) using special technical pages. Users are divided into groups with certain rights and levels of access. Therefore, the system is protected from unauthorized editing of personal data or system settings (Morze, Buinytska, Kocharyan, 2015).

e-Dean's Office Module consists of four sections: personal pages of students and teachers (virtual room); search system; management; statistics (Figure 2).

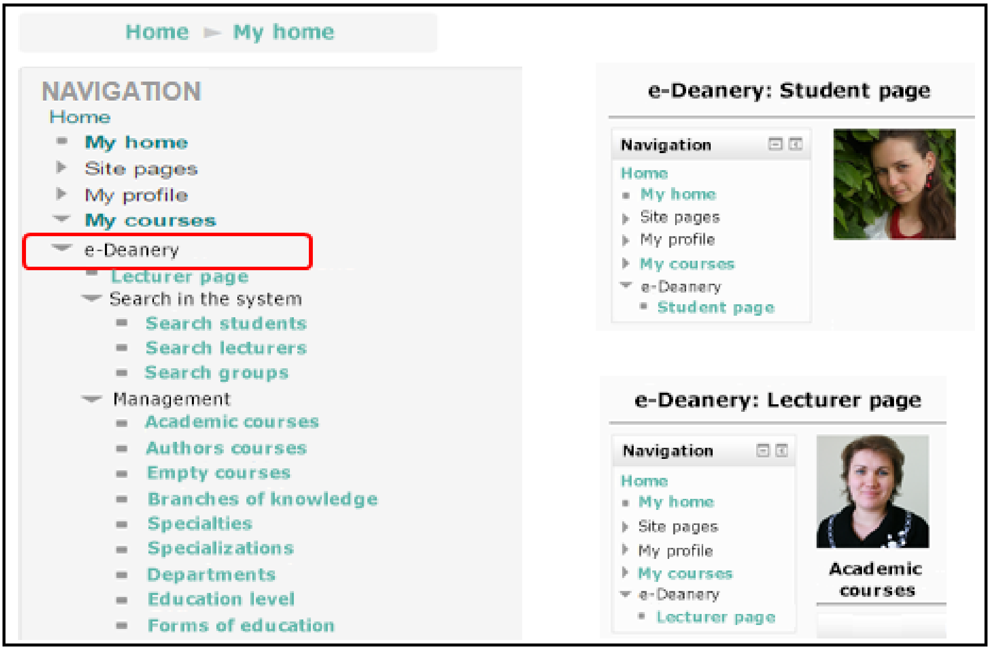


Figure 2. The Structure of e-Dean's Office
Source: Own work

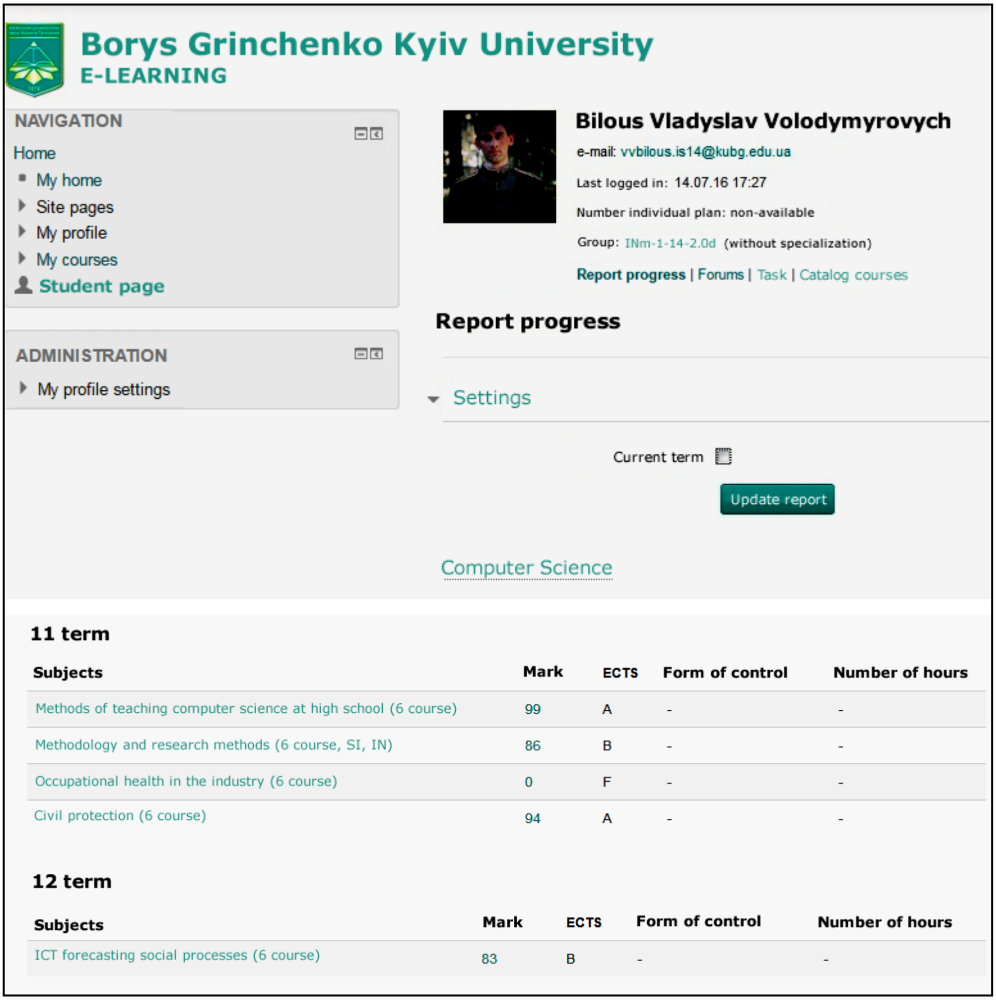
2.1. Student Virtual Room – Student Profile (Page)

STUDENT PROFILE (PAGE) that can be found on NAVIGATION bar of e-Dean's Office. Using this service enables students to see information in their accounts (name, surname, e-mail, when they were last seen in the system, individual plan number, group code), an academic record, a catalogue of elective courses (Figure 3).

ACADEMIC RECORD can be viewed both for the current semester and for the period of study of the chosen specialty. The academic record shows score in each academic discipline, ECTS grading scale, forms of examination and hours for the discipline, having been obtained by the current moment.

Information on forums, discussions in which the student takes part, is shown in FORUM menu that can be found in STUDENT PROFILE (PAGE) (Figure 4).

It is possible to see in what forums the students have participated and when they took part in discussions, as well as to refresh the content of disputes about problematic issues, in FORUM section.



Borys Grinchenko Kyiv University
E-LEARNING

NAVIGATION
Home
- My home
- Site pages
- My profile
- My courses
- Student page

ADMINISTRATION
- My profile settings

Bilous Vladyslav Volodymyrovych
e-mail: vvbilous.is14@kubg.edu.ua
Last logged in: 14.07.16 17:27
Number individual plan: non-available
Group: INm-1-14-2.0d (without specialization)
Report progress | Forums | Task | Catalog courses

Report progress

Settings

Current term

Update report

Computer Science

11 term

Subjects	Mark	ECTS	Form of control	Number of hours
Methods of teaching computer science at high school (6 course)	99	A	-	-
Methodology and research methods (6 course, SI, IN)	86	B	-	-
Occupational health in the industry (6 course)	0	F	-	-
Civil protection (6 course)	94	A	-	-

12 term

Subjects	Mark	ECTS	Form of control	Number of hours
ICT forecasting social processes (6 course)	83	B	-	-

Figure 3. STUDENT PROFILE (PAGE) In e-Dean's Office
Source: Own work

Report progress | Forums | Task | Catalog courses

Forums, which user take part in the discussion

Course	Forum	Topic	Last post	Author
Methods of teaching computer science at high school (6 course)	Analysis's discipline of baccalaureate	Analysis of baccalaureate	09.09.2015 16:24	Bilous Vladyslav Volodymyrovych
Methods of teaching computer science at high school (6 course)	Discipline's expectation	Discussion	07.10.2015 15:31	Bilous Vladyslav Volodymyrovych

Figure 4. FORUMS On Student Profile Page
Source: Own work

STUDENT PROFILE (PAGE) also shows the assignments that the student has to do in all the courses that have ETC developed. They can be found using TASKS menu (Figure 5).

The possibility to find all the tasks, that have been assigned during the whole period of study, as well as the ones that are assigned for the current semester, has found its implementation in TASKS menu. If the students select a task, they go to doing it at once, whereas if they select an academic discipline, they go to the complete ETC of the chosen subject.

Topic 4. Practical (seminars, laboratorial tasks) in professional disciplines	Methods of teaching social and pedagogical subjects (6 course)
Lecture 1. Inclusive Education as a model of social organization: genesis, conceptual and terminological definition and basic principles	Inclusive education (6 course)
Lecture 2. Philosophical methodological principles of educational integration	Inclusive education (6 course)
Seminar 1	Inclusive education (6 course)
Lecture 3. Regulatory support inclusive education	Inclusive education (6 course)
Lecture 4. Correctional (special) education in Ukraine and upgrading educational field	Inclusive education (6 course)
Modular control work 1	Inclusive education (6 course)

Figure 5. TASKS Assigned For the Current Semester
Source: Own work

The student are given a possibility to get variants of assignments; to send the assignments done; to do tests; to review the results of assessment of their works and tests; if it is necessary, to communicate with the teachers or representatives of educational department (supervisors); to receive information on educational process.

Element of evaluation	Amount	Mark	Interval	Percent	Response	Prosent in the course
Methods of teaching social and pedagogical subjects (6 course)						
Current control						
M1						
Seminar №1. The new paradigm of education. Tehnotrendy and features of generation Y	16,67 %	10,00	0–11	90,91 %		15,15 %
Practical work №1. Standards and guidelines for quality assurance in the European Higher Education	16,67 %	10,00	0–11	90,91 %		15,15 %
Seminar №2. Using the UNESCO recommendations for the components of the educational process	16,67 %	11,00	0–11	100,00 %	Well done!	16,67 %
Self-study training materials	12,12 %	8,00	0–8	100,00 %		12,12 %
Modular control work №1	37,88 %	23,00	0–25	92,00 %		34,85 %
∑ Total in category "M1"	-	**62 (A)**	**0–66**	**94 %**		-
M2						
Practical work №2. Teaching, learning and assessment programs built on competence approach	16,42 %	11,00	0–11	100,00 %		16,42 %
Seminar №3. The combination of ICT and educational technology. Methods of combination teaching material and ICT.	16,42 %	11,00	0–11	100,00 %		16,42 %

Figure 6. Display of the ETC Assessment
Source: Own work

An individual student performance record, that includes the deadlines for current control (control papers, tests, etc.), is carried out via e-Dean's Office. It also concerns records by separate subjects (according to modules within one course) and qualification papers. If we select the specific score in course GRADE menu, we will receive information on the academic record of all the activities that are mentioned in the academic discipline ETC (Figure 6). USER'S GRADES show the title of the assignment done, its percentage in the ETC, the score (points and percentage) for the assignment done, the assessment scale, reviews (comments) left by the teacher while checking and the correspondent value of the assignment in the frame of the course.

Review

General report User's mark

Course name	Mark
8.04030201 INF	59,14
Sociology of Education (5 course)	149 (A)
ICT forecasting social processes (6 course)	83,00
Methods of teaching social and pedagogical subjects (6 course)	99 (A)
Fundamentals of information education (5 course)	-
Methodology and research methods (6 course, SI, IN)	-
Monitoring of training activities (5 course)	-
Educational measurement (5 course)	42
Occupational health in the industry (6 course)	0 (-)
Civil protection (6 course)	94 (A)
SICTC	46,00

Figure 7. Assessment General Report Review

Source: Own work

12 term

Total in category "12 term" Average rating.	- **(Empty)**	-	**0–100**	-	-
System programming	0,00 % (Empty)	-	0–100	-	0,00 %
Technology development of distributed databases	0,00 % (Empty)	-	0–100	-	0,00 %
Sociology of education	11,11 %	149,08	0–170	87,70 %	9,74 %
Civil protection	11,11 %	94,39	0–150	62,93 %	6,99 %
Occupational health in the industry	11,11 %	0,00	0–125	0,00 %	0,00 %
Civil protection	11,11 %	94,39	0–150	62,93 %	6,99 %
ICT forecasting social processes	11,11 %	83,00	0–100	83,00 %	9,22 %
Educational measurement	11,11 %	42,42	0–100	42,42 %	4,71 %
Monitoring of training activities	11,11 %	13,81	0–100	13,81 %	1,53 %
Methods of teaching computer science at high school	11,11 %	99,09	0–106	93,48 %	10,39 %
Methodology and research methods	11,11 %	85,99	0–100	85,99 %	9,55 %
Fundamentals of information education	0,00 % (Empty)	-	0–0	-	0,00 %
Total mark of course Average rating.	-	**59,14**	**0–100**	**59,14 %**	-

Figure 8. Academic Record for the Period of Study

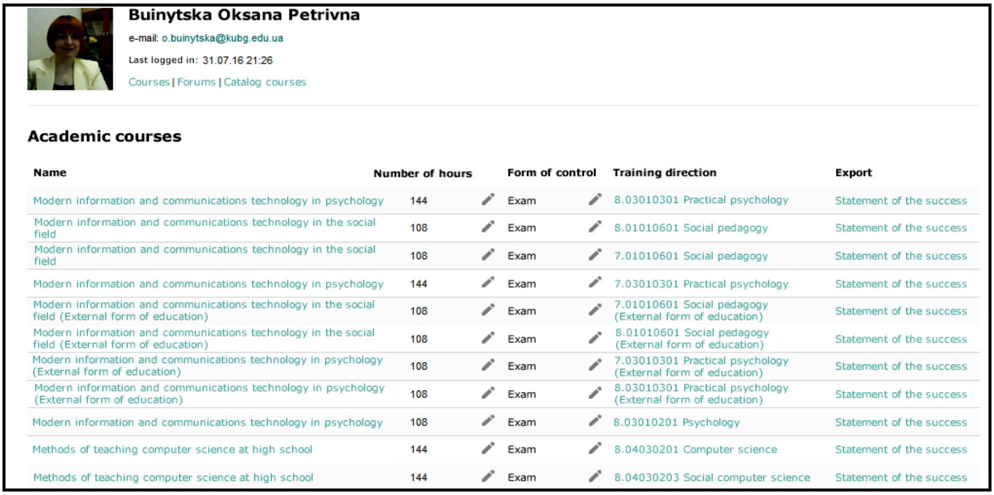
Source: Own work

If GENERAL REPORT link is selected, the score obtained in the academic disciplines and the average grade for the period of study of the specialty is displayed (Figure 7).

If we use SPECIALITY CODE link in GENERAL REPORT, we will get the results of the academic performance with the specified percentage of the training program me that has been already completed in all the academic disciplines in the context of semesters (Figure 8).

2.2. Virtual Teacher Room– Teacher Profile

In a virtual teacher room – TEACHER PROFILE, personal data, last seen (in the e-learning system) information, academic disciplines and courses lectured by the teachers, forums they participate to discuss problematic issues and the catalogues of courses designed to be elected by students are shown (Figure 9).



Buinytska Oksana Petrivna

e-mail: o.buinytska@kubg.edu.ua

Last logged in: 31.07.16 21:26

Courses | Forums | Catalog courses

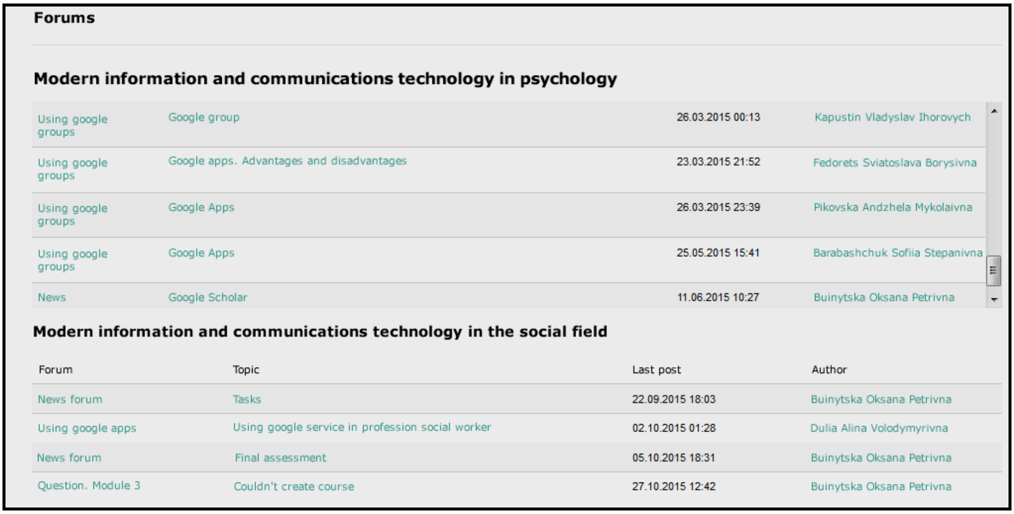
Academic courses

Name	Number of hours	Form of control	Training direction	Export
Modern information and communications technology in psychology	144	Exam	8.03010301 Practical psychology	Statement of the success
Modern information and communications technology in the social field	108	Exam	8.01010601 Social pedagogy	Statement of the success
Modern information and communications technology in the social field	108	Exam	7.01010601 Social pedagogy	Statement of the success
Modern information and communications technology in psychology	144	Exam	7.03010301 Practical psychology	Statement of the success
Modern information and communications technology in the social field (External form of education)	108	Exam	7.01010601 Social pedagogy (External form of education)	Statement of the success
Modern information and communications technology in the social field (External form of education)	108	Exam	8.01010601 Social pedagogy (External form of education)	Statement of the success
Modern information and communications technology in psychology (External form of education)	108	Exam	7.03010301 Practical psychology (External form of education)	Statement of the success
Modern information and communications technology in psychology (External form of education)	108	Exam	8.03010301 Practical psychology (External form of education)	Statement of the success
Modern information and communications technology in psychology	108	Exam	8.03010201 Psychology	Statement of the success
Methods of teaching computer science at high school	144	Exam	8.04030201 Computer science	Statement of the success
Methods of teaching computer science at high school	144	Exam	8.04030203 Social computer science	Statement of the success

Figure 9. TEACHER PROFILE In e-Dean's Office

Choosing the links FORUMS on TEACHER PROFILE (PAGE), it is possible to take a look at the forums by the academic disciplines and the forums in which the teacher has taken part (Figure 10).

Clicking on CATALOGUE OF COURSES which is displayed on TEACHER PROFILE (PAGE0, we can find all elective courses available to students (Figure 11). The teachers can choose the ones they lecture and to move them to MY COURSES to further analyze the performance of the students who will decide to take them.



Forums

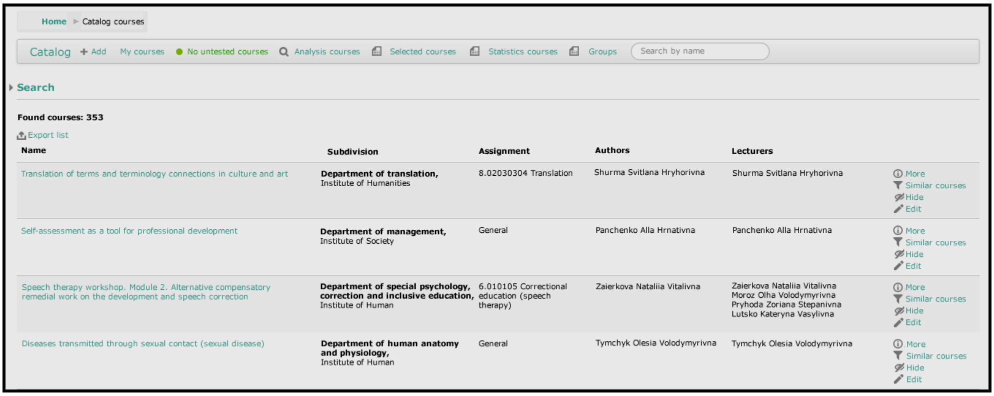
Modern information and communications technology in psychology

Using google groups	Google group	26.03.2015 00:13	Kapustin Vladyslav Ihorovych
Using google groups	Google apps. Advantages and disadvantages	23.03.2015 21:52	Fedorets Sviatoslava Borysivna
Using google groups	Google Apps	26.03.2015 23:39	Pikovska Andzhela Mykolaivna
Using google groups	Google Apps	25.05.2015 15:41	Barabashchuk Sofiia Stepanivna
News	Google Scholar	11.06.2015 10:27	Buinytska Oksana Petrivna

Modern information and communications technology in the social field

Forum	Topic	Last post	Author
News forum	Tasks	22.09.2015 18:03	Buinytska Oksana Petrivna
Using google apps	Using google service in profession social worker	02.10.2015 01:28	Dulia Alina Volodymyrivna
News forum	Final assessment	05.10.2015 18:31	Buinytska Oksana Petrivna
Question. Module 3	Couldn't create course	27.10.2015 12:42	Buinytska Oksana Petrivna

Figure 10. Forums by Academic Disciplines
Source: Own work



Home ▸ Catalog courses

Catalog + Add My courses No untested courses Analysis courses Selected courses Statistics courses Groups Search by name

Search

Found courses: 353

Export list

Name	Subdivision	Assignment	Authors	Lecturers	
Translation of terms and terminology connections in culture and art	**Department of translation,** Institute of Humanities	8.02030304 Translation	Shurma Svitlana Hryhorivna	Shurma Svitlana Hryhorivna	More Similar courses Hide Edit
Self-assessment as a tool for professional development	**Department of management,** Institute of Society	General	Panchenko Alla Hrnativna	Panchenko Alla Hrnativna	More Similar courses Hide Edit
Speech therapy workshop. Module 2. Alternative compensatory remedial work on the development and speech correction	**Department of special psychology, correction and inclusive education,** Institute of Human	6.010105 Correctional education (speech therapy)	Zaierkova Nataliia Vitalivna	Zaierkova Nataliia Vitalivna Moroz Olha Volodymyrivna Pryhoda Zoriana Stepanivna Lutsko Kateryna Vasylivna	More Similar courses Hide Edit
Diseases transmitted through sexual contact (sexual disease)	**Department of human anatomy and physiology,** Institute of Human	General	Tymchyk Olesia Volodymyrivna	Tymchyk Olesia Volodymyrivna	More Similar courses Hide Edit

Figure 11. Catalogue of Elective Courses
Source: Own work

Using e-Dean's Office allows the teacher to shape information (reports, academic activity outcomes) on the student performance during the course. The peculiarity of the teacher page is generation of student academic records by each of the academic disciplines. To get that done, you should go to TEACHER PROFILE (PAGE), select ACADEMIC RECORD STATEMENT in the line of the names of the academic discipline (Figure 12), enter the academic group code, fill in some standard spaces that are displayed in the record statement (Figure 13), use EXPORT function, print it out and sign the generated document (Figure 13).

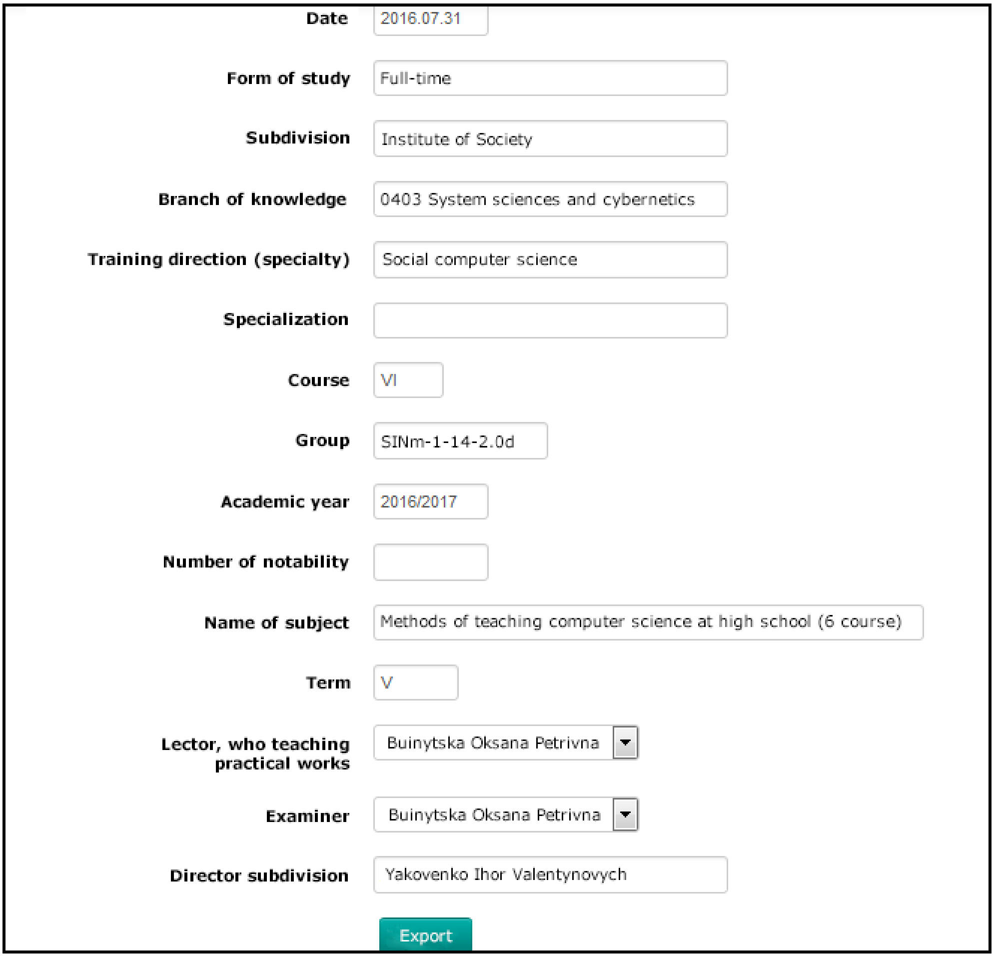


Figure 12. Filling in the Key Fields to Generate the Academic Record Statement

Source: Own work

Data is exported from e-Dean's Office module of the e-learning system as a typical text document which can be edited. It gives the educational department office workers a possibility to register the academic record statement in and to note its number.

Borys Grinchenko Kyiv University

Form of study: Full-time
Subdivision: Institute of Society
Branch of knowledge: 0403 System sciences and cybernetics
Specialty: Social computer science
Specialization: ___________________________
Course VI Group SINm-1-14-2.0d
2016/2017 academic year

SEMESTER CONTROL STATEMENT № ___________

Methods of teaching computer science at high school (6 course)
(Name of subject)

V term.

Date 2016.07.31

Examiner: Buinytska Oksana Petrivna
(degree, surname, initials)

Lector, who teaching practical works: Buinytska Oksana Petrivna
(degree, surname, initials)

№	Full Name student	№ INPS (gradebook)	The number of points (current control)	Signature, who teaching practical works:	The number of points (Final control - Exam)	Total points	The final score for national system	Score scale ECTS	Signature examiner
1	Honchar Viktoriia Dmytrivna		57		40	97	Excellent	A	
2	Kordetska Maryna Hennadiivna						Fail	F	
3	Lihus Serhii Andriiovych						Fail	F	
4	Lebabina Maryna Hennadiivna		52		37	89	Good	B	

Students in the group: 11

Director

____
(Signature)

Yakovenko Ihor Valentynovych
(surname, initials)

Absent ___________________
Present ___________________
"Excellent" A: 4
"Good": 2 - B: 2; C: 0
"Pass": 1 - D: 0; E: 1
"Fail": 4
FX with repeating an exam 0
F with obligatory re-learning course 0

Lector

____
(Signature)

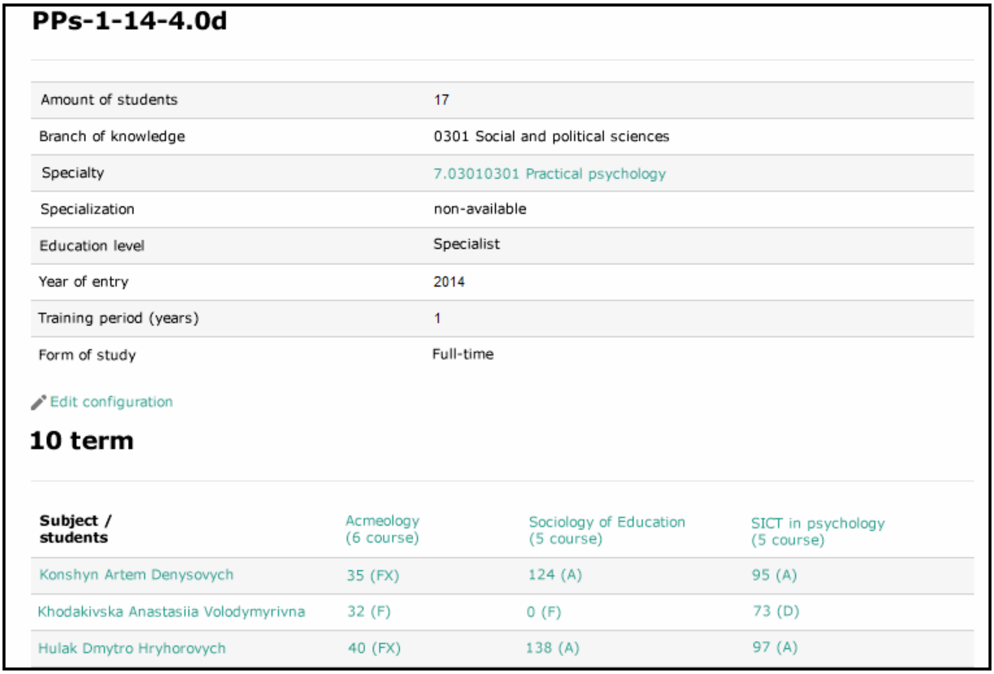
Figure 13. The Generated Group Performance Academic Record Statement
Source: Own work

3. USING E-DEAN'S OFFICE BY ADMINISTRATION

With the help of e-Dean's Office module, educational department administrators and supervisors, university and structural subdivision administration have a possibility to both account academic staff performance in the e-learning content management system and to analyze how efficiently the academic staff perform their educational tasks, as well as to control student activities and academic group excellence. These functions are implemented in Section Two of the Module – SERACHING of SYSTEM where you have certain separated options to find students (by surname), teachers (by surname) and academic groups (by specialty code) by institutions (Buinytska 2015).

Having found a particular student or teacher in the e-learning system, administrators (supervisors) get access to the virtual rooms of the selected people and they have a possibility to view all kinds of activity of educational process participants.

It is rather convenient for educational department supervisors and administrators to be able to monitor academic group excellence in all the academic disciplines during the current semester (Figure 14), which also enables them to generate academic record statements for scholarship and to control their performance.



PPs-1-14-4.0d

Amount of students	17
Branch of knowledge	0301 Social and political sciences
Specialty	7.03010301 Practical psychology
Specialization	non-available
Education level	Specialist
Year of entry	2014
Training period (years)	1
Form of study	Full-time

Edit configuration

10 term

Subject / students	Acmeology (6 course)	Sociology of Education (5 course)	SICT in psychology (5 course)
Konshyn Artem Denysovych	35 (FX)	124 (A)	95 (A)
Khodakivska Anastasiia Volodymyrivna	32 (F)	0 (F)	73 (D)
Hulak Dmytro Hryhorovych	40 (FX)	138 (A)	97 (A)

Figure 14. Accounting of Academic Group Excellence

Source: Own work

By selecting the link TRAINING COURSES located in ADMINISTRATION menu of e-Dean's Office module, we will get access to information about all the ETCs that are present in the system, which chair is responsible for their implementation, whether or not the ETC is a certified one (Figure 15). By selecting FILTERS, we may get statistic reports on the ETC developed by chair or specialty.

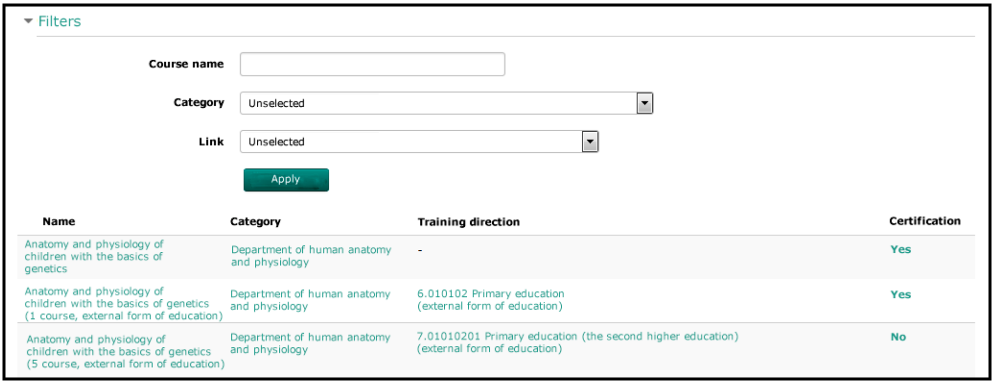


Figure 15. List of Training Courses
Source: Own work

Going to link DIRECTION OF TRAINING (SPECIALITY), the HEI administration can find student academic performance record statements in all the academic disciplines of the chosen specialty (Figure 16).

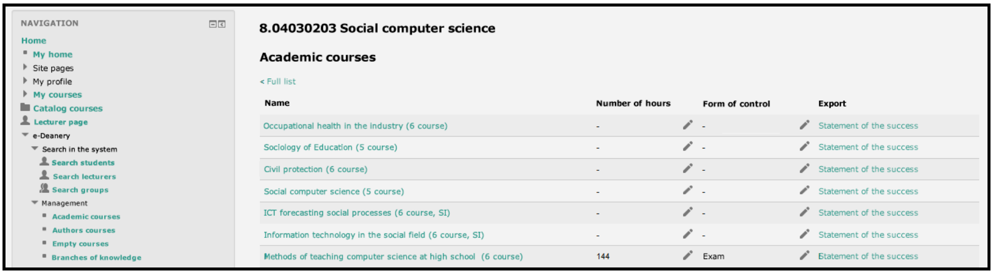
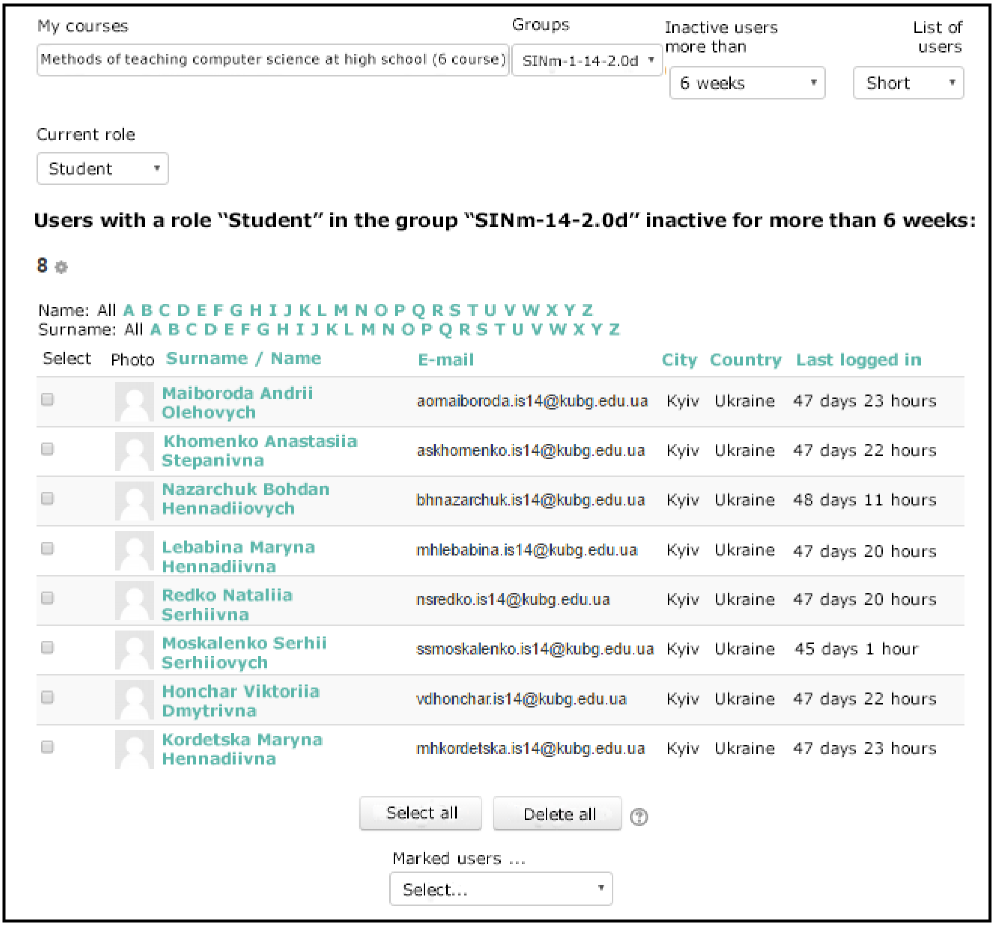


Figure 16. Accounting of Excellence by Specialty Disciplines
Source: Own work

Except accounting of excellence by disciplines, administrators can also analyze how students attend the ETC. To have it done, you should go to the link with the title of the ETC you need to check, and you should choose PARTICIPANTS on NAVIGATION bar (Figure 17). Applying the filters you need, in particular, available groups, not active participants for more than (one day, one week, one month, one year, etc.) and the role of student – there is a possibility to see the lists of students who ignore the work with the ETC.



My courses: Methods of teaching computer science at high school (6 course)
Groups: SINm-1-14-2.0d
Inactive users more than: 6 weeks
List of users: Short

Current role: Student

Users with a role "Student" in the group "SINm-14-2.0d" inactive for more than 6 weeks:

8

Name: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Surname: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Select	Photo	Surname / Name	E-mail	City	Country	Last logged in
		Maiboroda Andrii Olehovych	aomaiboroda.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 23 hours
		Khomenko Anastasiia Stepanivna	askhomenko.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 22 hours
		Nazarchuk Bohdan Hennadiiovych	bhnazarchuk.is14@kubg.edu.ua	Kyiv	Ukraine	48 days 11 hours
		Lebabina Maryna Hennadiivna	mhlebabina.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 20 hours
		Redko Nataliia Serhiivna	nsredko.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 20 hours
		Moskalenko Serhii Serhiiovych	ssmoskalenko.is14@kubg.edu.ua	Kyiv	Ukraine	45 days 1 hour
		Honchar Viktoriia Dmytrivna	vdhonchar.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 22 hours
		Kordetska Maryna Hennadiivna	mhkordetska.is14@kubg.edu.ua	Kyiv	Ukraine	47 days 23 hours

Select all Delete all

Marked users ...
Select...

Figure 17. Accounting of Student Attendance
Source: Own work

MANAGEMENT Section of Wed Dean's Office Module enables to view and edit (by the users with the appropriate rights for system management) the following categories:

- training courses (there are the developed ETC for each specialty labeled with internal certification);
- authors of courses (it is possible to get to know the name of the developer by the title of the ETC);
- empty courses (that do not contain any educational resources);
- field of study, specialization, subdivision EQL, forms of training (a simple list as a guide);
- specialties (reviewing disciplines over the whole period of student mastering of the chosen specialty in the context of distribution by semesters);

- expulsion of students (after the training is completed);
- LDAP synchronization (synchronizing users‘ accounts via the single login system to the BGKU e-resources).

CONCLUSION

Using Web Dean’s Office module in the University’s e-learning system allows the creation and use of e-learning content, as well as certain e-resources, to be constantly monitored with the activities of all the participants in the educational process being observed and analyzed. The transparency and open access to all statistical reports are considered to be an incentive for the teachers to be motivated to develop quality advanced electronic resources that can appeal to students and facilitate the desire to master academic disciplines.

Overall, the developed and certified e-learning courses in the academic disciplines, placed in the e-learning system, are one of the key instruments of assessment of the ICT implementation for educational activity and quality education at the University.

REFERENCES

Buinytska O. 2015: *Module "e- Dean’s " in the management of educational content LMS Moodle environment*. Computer science and information technology in schools, №4, 2015, p.62-71.

Morze N., Buinytska O., Hrytseliak B., 2015: *Implementation of corporate standards of ICT competence – guarantee qualitative open electronic environment of the university*. IT tools - Good Practice of Effective Use in Education: Monograph. Katowice, Cieszyn, 2015, pp. 41-61. ISBN: 978-83-60071-82-3 2015

Morze N.V., Buinytska O.P., Kocharyan A.B. 2015: *IC-competence of teachers and students as a way to formation of information educational environment of the university* (pp. 151-196). Section II. Competency-oriented education: quality assurance. In Ogneviuk V.O., Khoruzhaya L.L. and others (Eds.). Collective monograph. Kyiv: Borys Grinchenko Kyiv University, №24, 2015, 124 p. ISSN 2311-2409

Morze N.V., Buinytska O.P., Varchenko-Trotsenko L.O., 2015: *Creation of a smart university is our strategic objectives*: Section V. In Ogneviuk V.A. (Eds.). 5th edition with changes. Kyiv : Borys Grinchenko Kyiv University, 2015, 206p. ISBN 978-966-7548-84-1.

DISTANCE LEARNING IN EDUCATION – HOW TO DESIGN A FRONTER CHEMISTRY COURSE

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goskab@amu.edu.pl, krzysko@amu.du.pl

Abstract: *Many educational institutions introduce platforms as a tool for learning and perfecting the educational processes. On the Polish market, Fronter platform has become popular owing to 'Dolnośląska e-szkoła' ['Lower-Silesia e-school']. Pearson undertook development of Fronter platform and constructed exemplary learning rooms in accordance with the Polish core curriculum. The paper presents the developed teaching materials for the course on the Fronter platform.*

Keywords: platform, Fronter, chemistry, education, LMS

INTRODUCTION

Fronter was created in 1998 in Norway by Roger Larsen and Bjarne Hadlandplatform as an educational LMS (Learning Management System). From 2008 to 2015 the company belonged to Pearson Group and in 2015 it was acquired by a Norwegian competitor, It's learning. Fronter is a virtual learning environment that can be used depending on your needs. Fronter supports the preparation, conduct and analysis of lessons. It also provides tools that allow for documenting the results of teaching and communication between school, teachers, students and parents.

Fronter is designed to support good teaching by creating educational platform that is user-friendly for teachers. It is a website facilitating teachers to get children involved in learning, by supporting their self-active stance in this regard (Figure 1).

Working environment at Fronter takes the structure of a virtual building, consisting of corridors (is the unit used to group the rooms in which we define the right to create and supervise the halls on the platform) and rooms (is the basic unit in Fronter, in which the teacher delivers or carries out the subject/ course/ project or exercise, etc.) equipped with educational tools. Using the right corridors, lecturers and students can access rooms designed for them (usually corresponding to specific subjects). A powerful tool for viewing statistics allows the creator of the course to check the activity of its users (persons with authorised to log into Fronter and to access the groups (and rooms)), (number of visits in the hall, the execution time of each course modules).

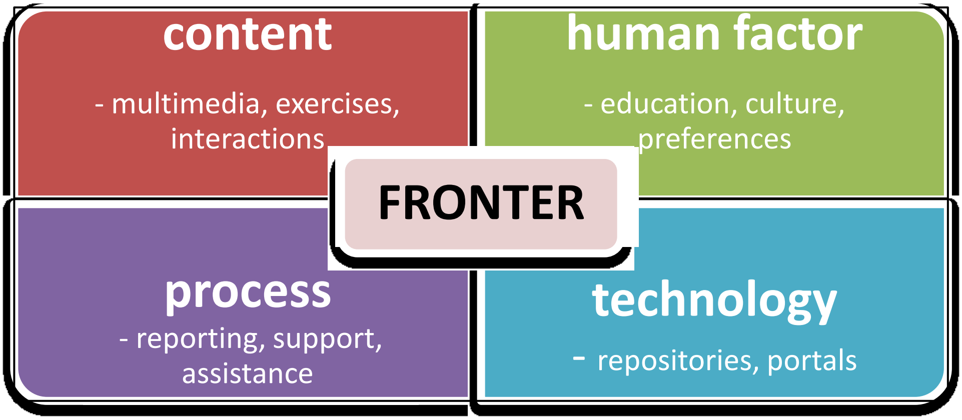

Figure 1. Fronter – learning environment.

Source: Own work based on Fronter, 2016

When designing a course eLearning platform should begin planning (Figure 2).

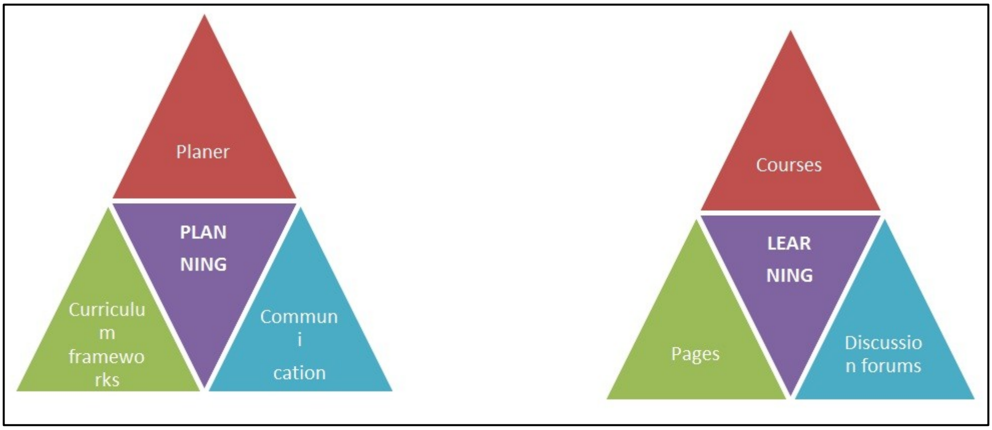

Figure 2. Fronter – planning and learning.

Source: Own work based on Fronter, 2016

Pages are a practical tool in Fronter, which allows to create entire lessons, develop individual concepts or organize items in the network.

Finally, let us mention the unconventional tool in the context of learning: discussion forums. On our platform you will find five types of forums, ranging from a simple conversation or multithreaded discussion through the debate with the positions and moderated discussion, and ending with "brainstorming". In practice, it is a tool to encourage students to work together, to exchange views, to be supported by a teacher or even to creatively master or develop lesson topic (Figure 2-3).

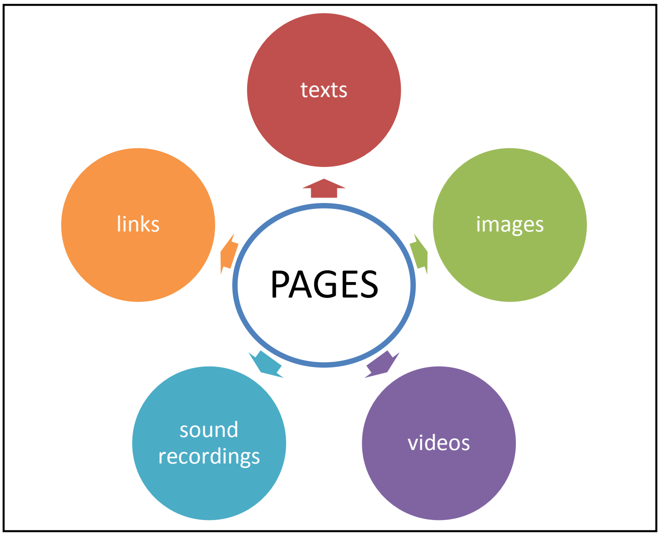

Figure 3. Fronter – pages.
Source: Own work based on Fronter, 2016

Evaluation of the student's work is not only important for the teacher and for the official "statistics", but also for themselves and for their parents - because next to the possibility of giving grades, we develop functions to facilitate the exchange of views on the work of the child or his/ her own self-assessment (Figure 4).

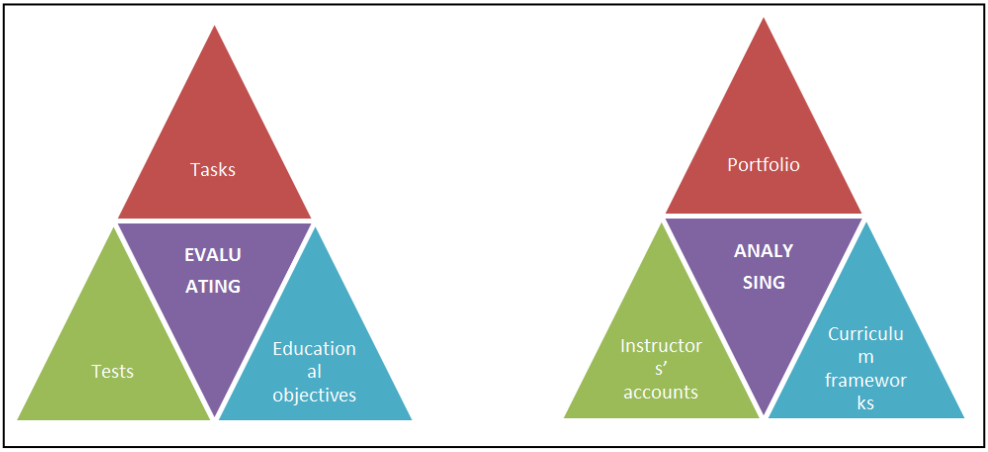

Figure 4. Fronter – evaluating and analysing.
Source: Own work based on Fronter, 2016

The final interesting example of "evaluation on Fronter" can be the *objectives of education*. They can be imported in the form of a core curriculum for Fronter, but they also can be defined at the level of the subject and the class, or individually for each student. Then we can assign them to individual resources, tasks or tests on Fronter and evaluate the progress against such objectives for each student.

1. FRONTER PLATFORM – SUBJECT ROOMS

Free patterns of subject rooms, which can be used by teachers in any way in the work with students. This project was initiated, conducted and supervised by Pearson, and the content development process was managed by a team of dedicated and creative teachers. This way, 17 template rooms on several different educational levels were created, each of them with the ability to be downloaded to Fronter (Table 1-3).

Table 1.

Fronter - template rooms for Primary school (classes 4-6)

Room	**Course**
1	English (part 1)
2	English (part 2)
3	English (part 3)

Table 2.

Fronter - template rooms for Secondary school (classes 1-3)

Room	**Course**
4	Chemistry
5	Physics
6	Biology
7	Computer science
8	Mathematics
9	Polish language
10	History

Figure 5. Home page of Chemistry Room dedicated to secondary school students.

Source: Own work based on Fronter, 2016

Chemistry subjects on Fronter for secondary schools:

- In the chemical laboratory
- Mixtures and their separation
- Metals and their alloys
- Periodic table of elements
- Oxygen
- Water
- Hydroxides
- Acids
- Salts
- Hydrocarbons (Figure 5)

Table 3.

Fronter - template rooms for Post-secondary schools (classes 1-3)

Room	**Course**
11	Chemistry
12	Physics
13	Biology

14	Computer science
15	Mathematics
16	Polish language
17	History

Figure 6. Home page of Chemistry Room dedicated to post-secondary school students.

Source: Own work based on Fronter, 2016

Chemistry subjects on Fronter for Post-secondary schools:

- Glass
- Soil
- Petrochemistry
- Fermentation
- Food
- Beverages
- Medicines
- Addictive substances
- Cleaning supplies
- Chemical packaging (Figure 6)

2. RECOMMENDED FRONTER PLATFORM CHEMISTRY MATERIALS FOR STUDENTS OF SECONDARY AND POST-SECONDARY SCHOOLS

The presented recommendations for chemistry lessons on Fronter platform were prepared based on e-textbook (www.epodreczniki.pl).

Topics were selected from the available contents (in accordance with the chemistry core curriculum for post-secondary schools – educational stages III and IV).

The following was recommended for each of the ten selected units:

- experiment that students can independently perform at home – *Home chemical laboratory* - and then present the results on the platform in the form of photographs or a video of the course of such experiment. This work can be done as an introduction to a lesson - in the case of pre-teaching ("reverse class" work method) or traditionally after the lesson;
- multimedia content, the purpose of which is only to supplement the traditional method of teaching and the experiments carried out during lessons. At any time, the teacher can enrich lessons with multimedia content: educational videos, photo and image galleries, illustrations, simulations, diagrams, tables and presentations. They not only provide educational material, but above all become an inspiration for students and teachers to create new resources.
- tasks for independent work of students.

An important argument in favour of recommending work with Fronter platform is the fact that it activates all students whose actions can be designed and monitored by a teacher who is able to diagnose and report student progress on an ongoing basis.

Figure 7. Home page of page dedicated to secondary school students.
Source: Own work based on Fronter, 2016

Figure 8. Home page of page dedicated to post-secondary school students.
Source: Own work based on Fronter, 2016

Each unit includes:

- experiment to be carried out independently – home chemical laboratory (fig. 9)

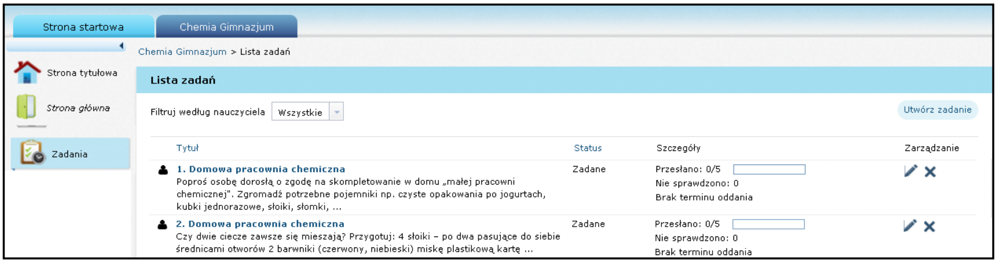

Figure 9. Home chemical laboratory – experiment to be carried out independently at home.
Source: Own work based on Fronter, 2016

Student homework can be evaluated using *task* tool by way of keying in notes and grades for each student's work. These works may be in the form of e.g. *Word* file - which is convenient because of the possibility of checking and adding online notes by the teacher. But it can be also a document on the platform or sound recording. A student can also add the self-assessment of the completed task.

- Educational materials, including:
    - references to lessons in e-textbook,
    - films,
    - animations,
    - presentations

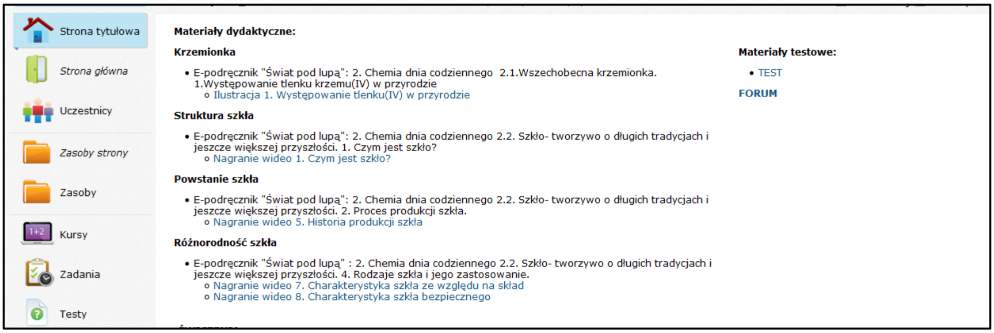

Figure 10. Contents of e-textbook and other Scholaris type portals for post-secondary school students.
Source: Own work based on Fronter, 2016

- Practice materials, including:
  - interactive tests,
  - tasks,
  - exercises,
  - exemplary forum discussion topics;

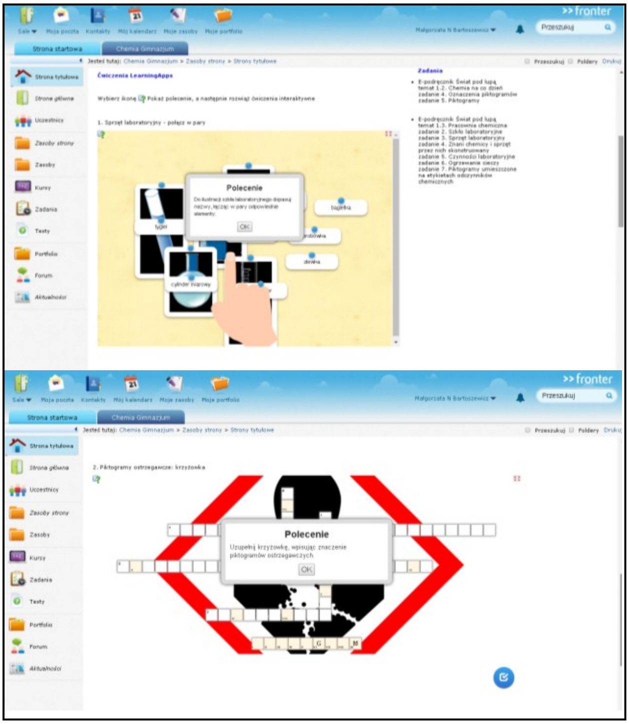

Figure 11. Learning Apps exercises for secondary school students.
Source: Own work based on Fronter, 2016

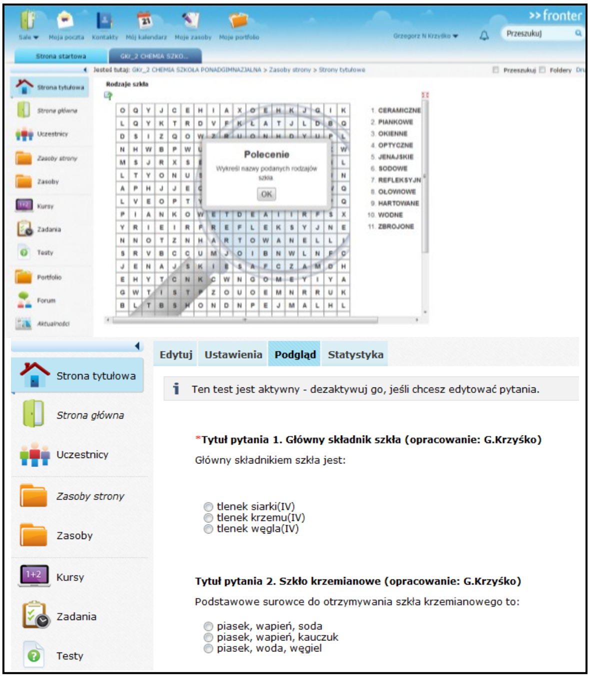

Figure 12. Learning Apps exercises and exemplary test for post-secondary school students.

Source: Own work based on Fronter, 2016

Tests include several different types of questions, both closed and open. In both cases - although it will be most convenient with the closed questions – we can define the correct answer and ask the system for automatic calculation of the result, as well as see detailed statistics of the test.

Tests include questions of the following type:

- single selection
- scroll-down list
- yes/ no
- multiple choice
- brief answer
- elaborated answer
- match the answer

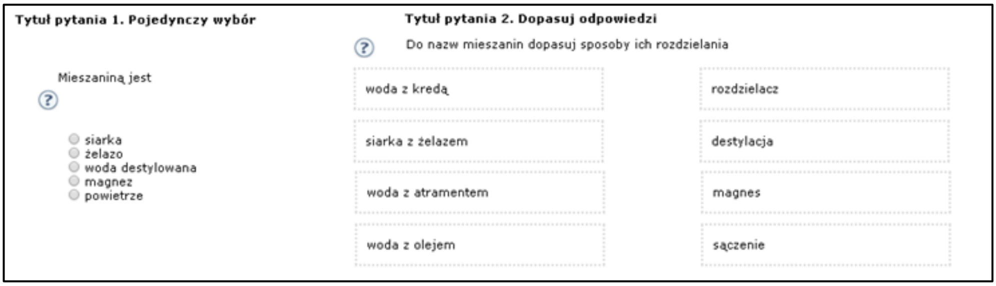

Figure 13. Exemplary test for post-secondary school students.
Source: Own work based on Fronter, 2016

3. FRONTER PLATFORM FOR HIGHER EDUCATION – CASE STUDIES

Most of the Norwegian academic institutions have been involved in the development and deployment of Learning Management Systems (LMS) such as Fronter, Blackboard Moodle, and WebCT. The dominant LMS-system is Fronter, an online learning platform. In this chapter we present the benefits and learning capabilities from the studies of Fronter usage at two universities in Norway: Buskerud College University (HiBu) and university of Agder (UiA) (Figure 14,15).

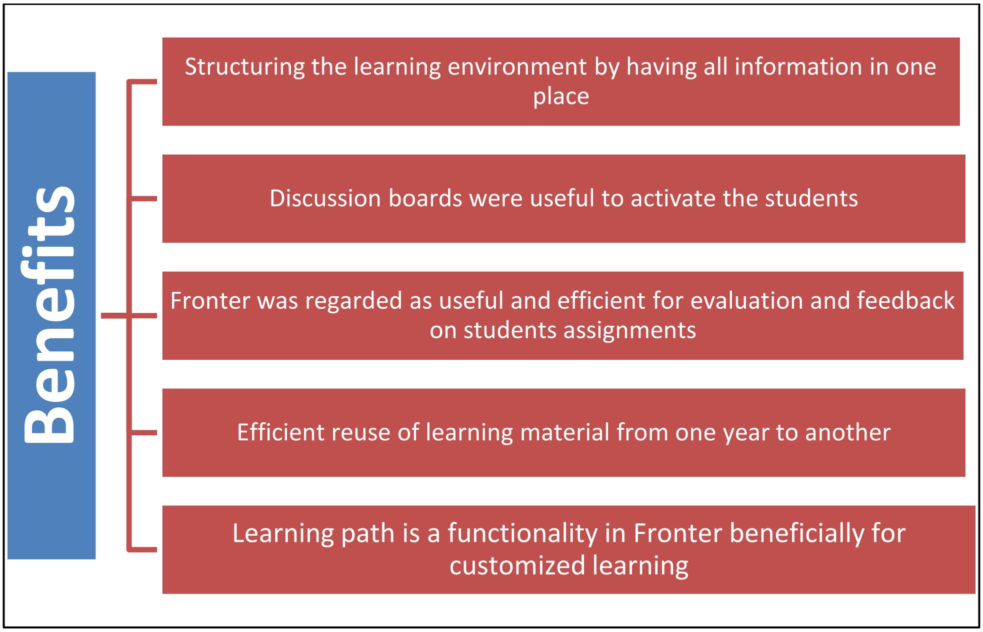

Figure 14. Fronter – benefits.
Source: Own work based on Bechina, Hustad, 2010

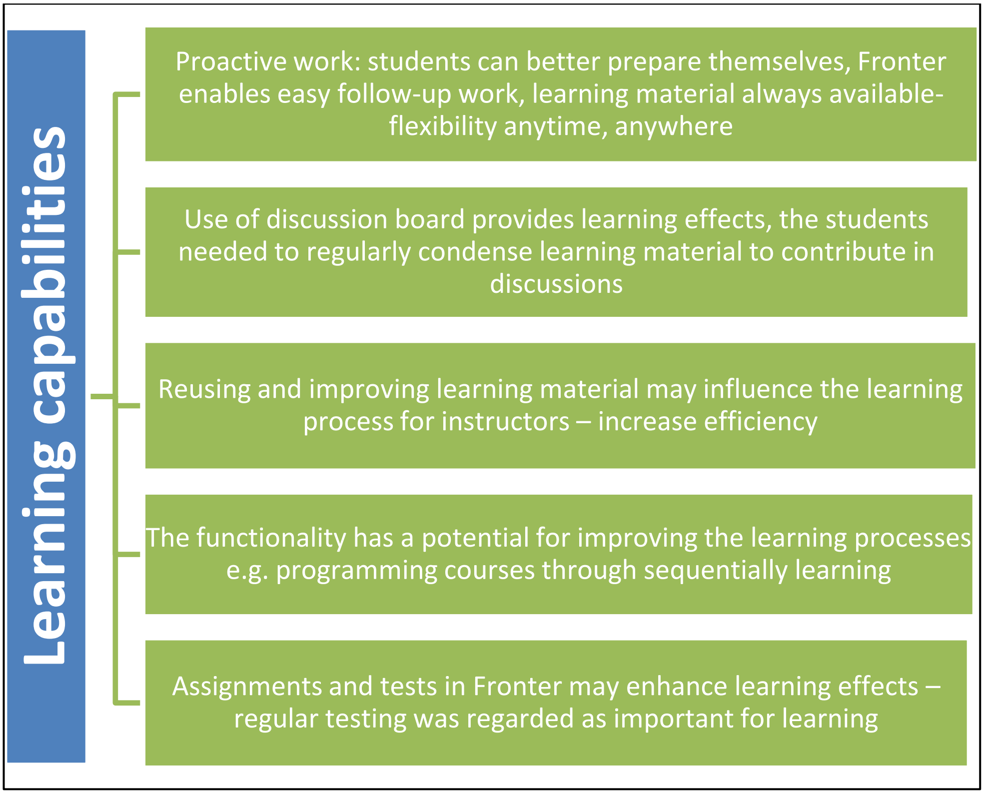

Figure 15. Fronter – learning capabilities.
Source: Own work based on Bechina, Hustad, 2010

CONCLUSION

Fronter platform have been adopted by several educational institutions in order to cope with stringent requirements for faster and more flexible education and higher pedagogical quality. In Poland, Fronter platform creates tremendous opportunities for supporting, preparing, conducting and analyzing lessons. It also provides tools that allow documenting the results of teaching and communication between the school, teachers, students and parents at each stage of education. This paper has discussed the factors hampering or fostering the learning capability by investigating the deployment and the use of a learning management system Fronter that is used by two Norwegian educational institutions participating to the evaluation. In Poland, the Fronter platform can support teachers in creating new, original courses and chemistry lessons that develop skill sets using the technology for distance learning.

REFERENCES

Bartoszewicz M., 2015: Chemia – gimnazjum, [on-line] at https://fronter.com/pce (accessed 24 July 2016)

Bechina A.A., Hustad E., 2010: *A Framework to Understand Enablers and Inhibitors in a Learning Management System: Experiences from Fronter,* Special Issue of the International Journal of the Computer, the Internet and Management, Vol.18 No. SP1, http://www.ijcim.th.org/SpecialEditions/v18nSP1/v18nSP1.htm (accessed 24 July 2016)

Fronter 2016 [on-line] at https://fronter.com/pce (accessed 24 July 2016)

Fronter[on-line] at https://pol.fronter.com/ (accessed 24 July 2016)

Fronter [on-line] at www.fronter.com (accessed 24 July 2016)

Kopciał P., Plebańska M., 2013: *Platforma Fronter jako system zarządzania wiedzą* e-mentor, 3 (50), ISSN 1731-6758

Krzyśko G., 2015: Chemia – szkoła ponadgimnazjalna, [on-line] at https://fronter.com/pce (accessed 24 July 2016)