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## Editorial

The use of new technologies in education implies new teacher roles, new pedagogies, and new approaches to teacher education (Makrakis, 2005). The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in new ways, to merge new technology with new pedagogy, and to develop socially active classrooms, encouraging co-operative interaction, collaborative learning, and group work. This requires a different set of classroom management skills. The teaching skills of the future will include the ability to develop innovative ways of using technology to enhance the learning environment and to encourage technology literacy, knowledge deepening, and knowledge creation. Teacher professional learning will be a crucial component of this educational improvement. However, professional learning has an impact only if it is focused on specific changes in teaching (UNESCO, 2011).

The authors of the papers presented in five chapters of Volume 1 Issue 2 have tried to find the answers to several current questions and showed some more important trends in the research on e-learning, that is – developing more adequate ICT tools and their effective use in education, educational intelligent systems, information and communication competencies in higher education, networking and developing of the educational IT space, formal and informal education based on ICT and e-learning.

Chapter 1 is devoted to the research on selected ICT tools for effective use in education and contains a manuscript “Discussion Paper on the Topic of More Adequate and Effective ICT Tools. Category: Tools for Making Didactic Videos.” The paper was prepared by an international team of researchers from five universities and four countries: Australia, Poland, Slovakia, and Ukraine. The team of authors is composed of experts from different scientific areas connected with ICT, e-learning, pedagogy, and other related disciplines: Eugenia Smyrnova-Trybulska, Ewa Ogrodzka-Mazur, Anna Szafrńska-Gajdzica, Nataliia Morze, Rusudan Makhachashvili, Martin Drlík, Martin Cápaj, Júlia Tomanová, Peter Švec, Tomayess Issa, Theodora Issa, Maryna Romanyukha, Mykoła Nakazny, and Lyudmyla Sorokina. The study aims at describing the role of multimedia in teaching. The authors claim it is considerable since multimedia offer various information presentation formats simultaneously. The combination of text, audio,

images, animation, video as well as hyperlinks has an advantage of using both of the two main channels – visual and verbal – for presentation in an efficient way. The authors have presented a ranking list based on quality and quantity assessment of choosing ICT tools and proposed some recommendations of features of a good presentation; furthermore, they analyzed some of the most frequent mistakes users make during elaborating a didactic video. The article describes some preliminary results of the implementation of Work Package 4 (WP4) “Selection and testing new IT tools” in the framework of the international research network IRNet.

Chapter 2 entitled “Information and Communication Competencies in Higher Education” contains the manuscript “Conditions of Effective Development of Information and Communication Competencies of Teaching Staff of the University,” prepared by a Ukrainian researcher Artur Kocharyan. The author summarizes the results of the pilot study on the implementation of the model of information and communication competencies of the university teaching staff conducted at the Borys Grinchenko Kyiv University, Ukraine and describes the basic stages of the research and the conditions of an effective implementation of the model. The article examines ways of improving the quality of higher education in Ukraine in the context of European quality standards for the university educational space. European standards and guidelines are considered in relation to internal quality assurance. The model of ICT competencies of teaching and research staff is studied and the structural components of this model – motivational target component, organizational and procedural component, contents and operational and technological component, diagnostic and effective components – are described.

Chapter 3 is devoted to the “Study on Networking and Educational IT Space” and includes the manuscript “On Networking. The Analysis of Selected Aspects,” elaborated by Eugenia Smyrnova-Trybulska and Przemysław Żebro. The authors present a study focusing on the theoretical and practical determinants of network functioning. In this study, some e-challenges are analyzed in the context of new prospects of the informational-educational space based on the Internet global network. It also includes a presentation of some key definitions as well as some exemplary types of networks. Collaboration, self-training, and exchange of experiences, research results, didactic materials, and teaching methods are focused on. Two cases are provided as examples – the Internet platform and network “Doskonalenie w sieci /Improvement in the Net/,” and the international research network IRNet, in the activity of which the authors of the presented article take an active part.

The second paper from Chapter 3 is entitled “The Experience of the Creation of Educational IT Space of the Region,” elaborated by Valentyna Khivrih. The researcher deals with the modern approaches to using information and communication technologies in the educational process, extracurricular activities, and management at the regional level in order to enhance the creative potential of students, teachers, and administrators. The article describes the conceptual bases of creating an information-educational environment of the region as a platform for information

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and achievement exchange between educators and the region's administration. It specifies the technology of implementing the content and technology component of the information-educational environment of the region as well as its main functional components. The author proposes the implementation model of the effective management of educational institutions in a form of a unified system for collecting, processing, and storing valid statistical and operational information on the activities of pre-school, comprehensive educational institutions, and territorial units of education management (in districts and cities). The article describes the integrated tools and technologies that are designed to ensure the educational needs of both students and teachers. The author also proposes the model of a single control centre for the information-educational environment of the region that organizes support for its exploitation and development.

Chapter 4 focuses on "Research on the Formal and Informal Use of ICT and E-learning in Secondary School." The first article, entitled "Creatively and Informally: Scratch and the Remix Culture," has been prepared by Wojciech Jan Zuziak from Poland, who demonstrates in his own study the attachment of education for creativity conducted with the use of coding (code to learn) to modern pedagogical theories. The social interactions between young creators are an important matter. The paper describes a prelude to the research on the phenomenon of remix of simple computer games created by a community of users in the Scratch environment. It presents selected problems of young creators connected with sharing their own creative work with other community members, such as authorship acknowledgement, formal acknowledgement for the first author placed on derived products (games), reactions of the first author to the creative development of his or her ideas by another creator or influence of a school grade on the will to share the project. The research on a group of students aged 15 to 16 described in the article will be repeated as a wrap-up of a series of lessons concerning creating computer games in the Scratch environment.

The paper entitled "The Development of Student Key Competencies while Studying Computer Science in Secondary School," elaborated by Taisiia Mukii, discusses the key competencies of the 21<sup>st</sup> century in the context of both the transition to a new humanistic paradigm of education and the results of PISA 2012 study "Creative Problem Solving." The author stresses the contradictions between traditional skills and 21<sup>st</sup> century competencies of the school graduate. The article also discusses the contradictions on the one hand between the public need of a personality with a highly developed intellectual, spiritual, and moral potential, and the insufficiency of theoretical and methodological bases of the development of the student's key competencies, and on the other hand between the traditional methods of computer science teaching and the necessity to solve problems of the educational process in conditions of ICT use. The results of the application of the IT teaching methods based on the principles of humane pedagogy are presented, and their effectiveness is confirmed.

Chapter 5, “Reports,” features an article by Eugenia Smyrnova-Trybulska, Ewa Ogrodzka-Mazur, Anna Szafrńska-Gajdzica, Ewelina Doluk, Tatiana Noskova, Tatiana Pavlova, Olga Yakovleva, Natalia Morze, Piet Kommers, Paulo Pinto, Laura Alonso García, Rocío Yuste Tosina, Prudencia Gutiérrez Esteban, Martin Capay, Martin Drlik, Josef Malach, Tomayess Issa, Theodora Issa, and Maryna Romanyukha entitled “Report on the Implementation of WP3 ‘Analyses and Evaluation of the ICT Level, E-learning and Intercultural Development in Every Participating Country’ in the Framework of the IRNet Project.” This article, prepared by an international team of authors – researchers from different scientific areas, connected with ICT, e-learning, pedagogy, and other related disciplines – focuses on the objectives and selected results of the IRNet (International Research Network). In particular, this article describes the research tools, methods, objectives, tasks, deliverables, and implementation of research trips. Besides, the article presents some of the more important events, such as (video)conferences, seminars, workshops, an e-round table debate, publications which were realized as part of the IRNet project. The researchers from Poland, Russia, Ukraine, the Netherlands, Spain, Slovakia, Portugal, Czech Republic, and Australia analyze the results of WP3 in the context of the next stages and Work packages of IRNet project.

In conclusion, it ought to be stressed that the articles from this issue, prepared by authors from nine countries, have presented a comprehensive overview of different aspects of the development of ICT and e-learning in European countries such as Poland, Ukraine, Czech Republic, Slovakia, Russian Federation, Portugal, Spain, and the Netherlands, as well as Australia. The researchers have presented interesting results received during the conducted study which could be considered as a next stage in the process of studying the conditions for continuing improvement and increasing the level of formal and informal education. In the implementation of the conclusions and outcomes of the research, what should be taken into account are the expectations of students and teachers concerning learning and teaching, development of skills in the area of ICT and e-learning competencies, elaborating of the effectiveness of the university open e-environment.

*Eugenia Smyrnova-Trybulska*

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Research on Selected ICT Tools  
for Effective Use in Education





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## **Discussion Papers on the Topic of More Adequate and Effective ICT Tools Category: Tools for Making Didactic Videos**

### **Abstract**

The article describes some preliminary results of the implementation of Work Package 4 (WP4) “Selection and testing new ICT tools” within a framework of the international research network IRNet and researchers from partner institutions from Poland, Slovakia, Ukraine, and Australia. These results concern analyzing and studying some categories of ICT tools for making didactic videos. The whole package period was divided into several main stages 1–5. The role of multimedia in teaching is considerable since they offer various information presentation formats simultaneously. The advantage of combining text, audio, images, animation, video, and hyperlinks lies in the use of both main channels – visual and verbal – for making didactic videos in an efficient way. Features of an effective presentation and examples of computer programs which may be used for this purpose have also been shown in the paper. The authors have presented a ranking list based on the quality

and quantity assessment of choosing ICT tools, proposed some recommendations of features of good didactic videos, and analyzed some mistakes users make most frequently while elaborating didactic videos.

**Key words:** information and communication technology (ICT), ICT tools, didactic videos, Custom Satisfaction Evaluation Model, international research network

## Introduction

This paper aims to discuss the implementation of Work Package 4 (WP4) with a special emphasis on the tools for making didactic videos. The authors elaborate on how to select and test new ICT tools, but also identify general methodological aspects of their effective use in education. Here we present a summary of the main aims of Work Package 4:

- testing ICT tools and the effectiveness of their use in education,
- developing the didactic video models,
- studying and elaborating types and categories of didactic videos,
- designing a list of items to define the quality of suggested tools for making didactic videos and their relative importance 1–5,
- developing a ranking list of ICT tools for making didactic videos,
- conducting a research on pedagogical and methodological aspects of the use of didactic videos, and
- characterizing methodological and technological aspects of multimodal didactic communication.

## Methodology and Stages of Research

According to the road map of all periods of implementation, this WP has been divided into several main stages 1–5.

**Stage 1** includes:

- identifying necessary skills to teach in the school of the future according to previous studies made and documents available,
- absolutely necessary skills:
  - knowing how to present content in multimedia format (presentations and didactic videos),

- recommended skills:
  - communication,
  - collaboration,
  - creativity,
  - critical thinking and problem solving,
  - productivity,
  - reflection and feedback,
  - social networking, and
  - searching.

Due to the analysis of different IT-tools and their application in education, conducted by the team of international researchers, there has been specified a different category of application, in particular Module 01, which contains:

- tools for making presentations, and
- tools for making didactic videos.

**Stage 2:** Tools identified by the team are expected to be reported in a Google Drive document available for remote collaborative work.

July: Teams responsible for identifying tools should present items to be used as criteria for evaluating and comparing tools by each task to implement a CSEM (Custom Satisfaction Evaluation Model).

**Stage 3** (September–October): Comparison and summary of the relative importance of tools, using a CSEM.

After a comprehensive analysis of a range of tools for making didactic videos several main, more effective tools were identified. Among such tools there are:

Main tools:

- Adobe Connect,
- Camtasia,
- Adobe Captivate,
- HyperCam, and
- BB Flashback Express.

Additional tools:

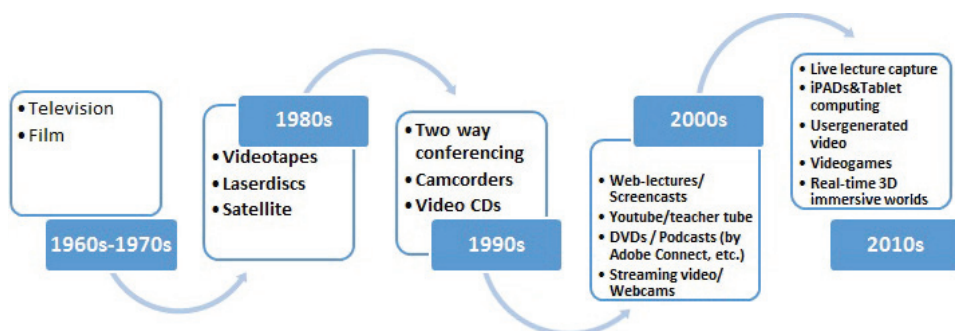
- Screenr,
- Snagit,
- Lightworks,
- Windows Movie Maker,
- Blender, and
- other.

## General Background of Research

### Didactic Video Evolution

The concept of didactic video has undergone dramatic changes over the years. At the times of video cassette recorders, viewing videos was possible only from the same physical cassette (Pitman, 1989). The presentation of a video to students demanded taking it from the library collection, planning the class, taking care of the equipment, and overcoming challenges such as low quality sound and blurred images (Woolfitt, 2015, p. 6).

The view on evolution of video tools as they are used in teaching was suggested by SURFnet/Kennisnet (2011, p. 5). Below we present an adapted view on the evolution of video as suggested by Greenberg & Zanetis (2012). As we can see from their graph, recent decades have made tremendous difference in the way of teaching, the 2000s and the 2010s added lectures, screen casts, and live lecture capture. We are yet to see what possibilities new video tools will bring us.



*Figure 1.* Timeline of educational video technology (partly based on Greenberg & Zanetis, 2012).

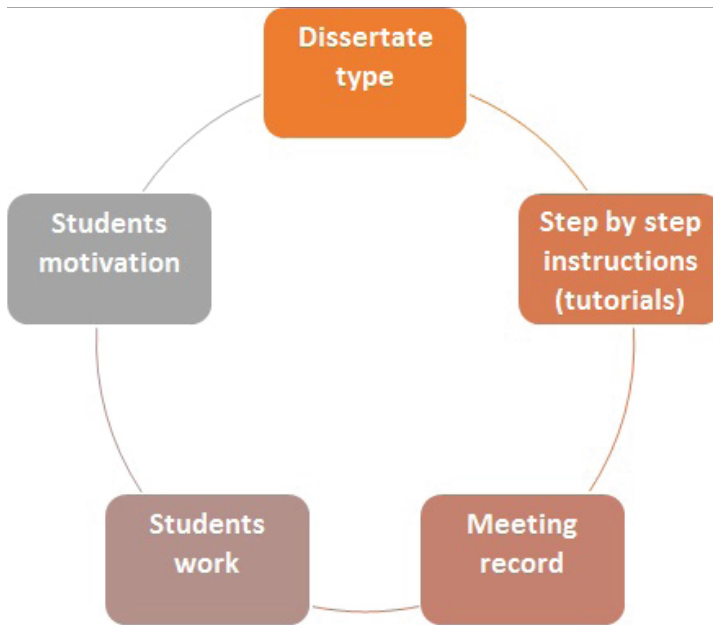
S o u r c e: <https://www.inholland.nl/media/10230/the-effective-use-of-video-in-higher-education-woolfitt-october-2015.pdf>.

Hansch et al. (2015) analyzed the video components in a variety of MOOC courses and interviewed the instructional designers. Their analysis led to video types based on what they refer to as the “different affordances of Video” and list nine features that include:

- building rapport,
- virtual field trips,
- manipulating time and space,
- telling stories,
- motivating learners,
- historical footage,

- demonstrations,
- visual juxtaposition, and
- multimedia presentation (Woolfitt, 2015).

Figure 2 shows another classification of the type and category of didactic videos.



*Figure 2.* Type and category of didactic videos.

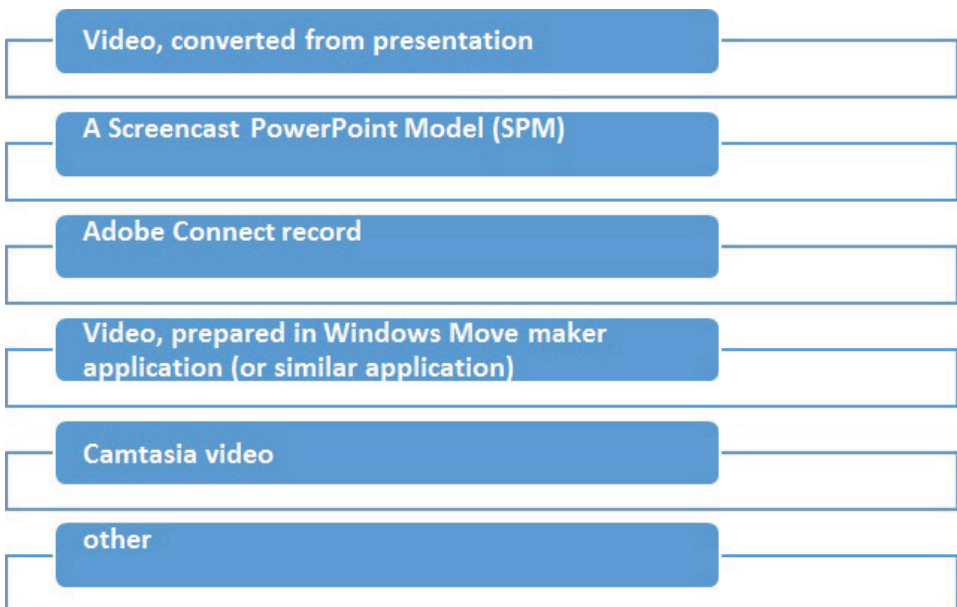
Source: Reis, 2015.

The list below presents the proposals of overview of different representations of video:

- clip/fragment (YouTube),
- Khan Academy (covering a specific subject),
- Feature Film/documentary,
- Live Lecture Capture (technician or student recording),
- Live Lecture Capture (automatic recording, or iPad Swivl),
- web lecture (pre-recorded studio lecture, covering several subjects) (10–45 min.),
- Knowledge Clip (pre-recorded studio lecture, covering one subject) (5–10 min.),
- Micro Clip (pre-recorded studio lecture, covering one subject) (1–5 min.),
- self-made web lecture (pre-recorded lecture by teacher, e.g. using MyMediasite, from teacher's own computer),

- Screen Cast (with audio and visual) (does teacher need to be in view?) (showing mouse clicks, on screen action),
- Webinar (live streamed discussion, recorded),
- Google HangOuts (live streamed discussion, instantly available on external server, e.g. YouTube),
- Skype/FaceTime (can be recorded),
- Virtual Classroom,
- student generated video content, and
- video recording of students (by students/lecturer) (Woolfitt, 2015, p. 18).

Other proposals are presented in Figure 3.



*Figure 3.* Didactic video models.

Source: Own elaboration.

### **Instruments and Procedure**

Experts of the IRNet consortium from the University of Silesia (Poland), Coordinator, Constantine the Philosopher University (Slovakia), Borys Grinchenko Kyiv University (Ukraine), Dneprodzerzhinsk State Technical University (Ukraine), and Curtin University (Australia) conducted the analysis and discussion concerning more important activities of tools for making didactic videos (Tables 1–5).



Table 1.  
*Camtasia Description, Activities, and Marking Guide*

Title of Application	Description	Activities	Marking Guide
1) Camtasia ( <a href="https://www.techsmith.com/camtasia.html">https://www.techsmith.com/camtasia.html</a> )	<p>Screen Recording &amp; Video Editing. A powerful, yet easy-to-use screen recorder, Camtasia helps you create professional videos without having to be a video pro.</p> <p>Easily record your screen movements and actions, or import HD video from a camera or other source.</p> <p>Customize and edit content on both Mac and Windows platforms, and share your videos with viewers on nearly any device.</p> <p>30 days are free (necessary registration on the website).</p>	<p>Record Anything Record high-quality videos in no time with Camtasia's advanced screen recorder.</p> <p>Edit Video Faster Create more professional videos without having to be a video pro. Multi-track Timeline Green Screen Effect Visual Effects Animate Content.</p> <p>Share Anywhere Easily share your videos and interact with your audience. Camtasia's expansive sharing capabilities allow your viewers to watch your videos anywhere, on nearly any device.</p>	<p>Product Training and Tutorials Users supported by <i>free videos, tutorials, guides</i>, and more. (<a href="https://www.techsmith.com/tutorial.html">https://www.techsmith.com/tutorial.html</a>)</p>

Table 2.  
*Adobe Captivate Description, Activities, and Marking Guide*

Title of Application	Description	Activities	Marking Guide
2) Adobe Captivate ( <a href="http://www.adobe.com/products/captivate/features.html">http://www.adobe.com/products/captivate/features.html</a> )	<p>Adobe captivate is a professional software to create e-learning content.</p> <p>From storyboarding to responsive eLearning, create virtually any kind of professional looking and instructionally sound content using a single tool.</p>	<ul style="list-style-type: none"> <li>• Best-in-class screen capture</li> <li>• High-definition screencast</li> <li>• Audio-video support and synchronization</li> <li>• Scenario branching</li> <li>• Text to speech</li> <li>• Support for right-clicking in simulations</li> <li>• Auto-text captions</li> <li>• Table of contents and Aggregator</li> <li>• Text enhancements</li> <li>• Pan and zoom support</li> <li>• Customizable skins</li> </ul> <p>Test and track</p> <ul style="list-style-type: none"> <li>• Comprehensive quizzing</li> <li>• Knowledge Check questions</li> <li>• Responsive drag-and-drop interactions</li> <li>• Pretest and branch-aware quizzing</li> </ul>	<p><i>Learn</i></p> <ul style="list-style-type: none"> <li>• Get Started</li> <li>• Tutorials</li> <li>• User manual</li> <li>• Previous versions</li> <li>• Developer</li> <li>• Connection</li> </ul>

Table 3.  
*HyperCam Description, Activities, and Marking Guide*

Title of Application	Description	Activities	Marking Guide
3) HyperCam (http://www.hyperionics.com/)	<ul style="list-style-type: none"> <li>Record video of users entire screen and save it to a file.</li> <li>HyperCam is an app that allows you to video capture the action from an area of users PC desktop.</li> <li>Hyper Come v2 is free, v3 is commercial (trial version is free).</li> </ul>	<ul style="list-style-type: none"> <li>HyperCam™ is powerful video capture software that records AVI movies (screencam) directly from your monitor, for <i>software presentations, software training, demos, tutorials, and fun!</i></li> <li>HyperCam supports text annotations, sound, and screen notes (great for creating automated software demos!).</li> <li>User can also select Frame rate and compression quality prior to video capture. Compatible with 32 bit and 64 bit releases of Windows. 8, Windows 7, Vista, XP, 2000.</li> </ul>	HyperCam 3 Tutorial elaborated by Solveing Multimedia (http://www.solveigmm.com/en/howto/hypercam-3-tutorial/).

Table 4.  
*Adobe Connect Description, Activities, and Marking Guide*

Title of Application	Description	Activities	Marking Guide
4) Adobe Connect (http://www.adobe.com/pl/products/adobeconnect.html)	<ul style="list-style-type: none"> <li>Adobe Connect web conferencing software offers immersive online meeting experiences from small group collaboration to large scale webinars.</li> <li>All the benefits of Adobe Connect Meetings are included with Adobe Connect Webinars and Adobe Connect Learning.</li> <li>Possibility record a video (podcast) multi-windows screen with presentation, editing and sharing.</li> <li>Commercial product.</li> </ul>	<p><i>Adobe Connect Meetings</i></p> <ul style="list-style-type: none"> <li>Discover the true power of digital meetings</li> <li>Access across device</li> <li>Personal digital office</li> <li>Rich recording and editing tools</li> <li>Highly secure communication and compliance</li> </ul> <p><i>Adobe Connect Webinars</i></p> <ul style="list-style-type: none"> <li>The all-in-one webinar solution for marketers</li> <li>Immersive experiences</li> <li>Robust registration</li> <li>Fully customizable events</li> <li>Built-in analytics</li> <li>Adobe Connect Learning</li> </ul> <p><i>The complete digital learning solution for trainers</i></p> <ul style="list-style-type: none"> <li>Engaging content delivery</li> <li>Mobile learning across devices</li> <li>Immersive classes live and on-demand</li> <li>Efficient training management and tracking</li> </ul>	<p><i>Learn</i></p> <ul style="list-style-type: none"> <li>Get Started</li> <li>Tutorials</li> <li>User manual</li> <li>Previous versions</li> <li>Developer</li> <li>Connection</li> </ul>

Table 5.  
*BB FlashBack Express Description, Activities, and Marking Guide*

Title of Application	Description	Activities	Marking Guide
5) BB FlashBack Express ( <a href="http://www.bbsoftware.co.uk/BBFlashBack_FreePlayer.aspx">http://www.bbsoftware.co.uk/BBFlashBack_FreePlayer.aspx</a> )	<ul style="list-style-type: none"> <li>Record your screen, sound and webcam.</li> <li>Share movies with one-click upload to Youtube and other video sharing sites.</li> <li>Save movies as Flash or AVI files.</li> <li>According to experts' opinions it is one of the best Free Screen Recorders.</li> </ul>	<ul style="list-style-type: none"> <li>Record Everything</li> <li>ScreenCast Sharing</li> <li>Flexible Publishing</li> <li>Webcam Recording</li> <li>Full-Featured Recording</li> </ul>	<ul style="list-style-type: none"> <li>Getting started:</li> <li>How to record</li> <li>Editing and Annotatin</li> <li>More tutorial videos</li> <li>Help manual</li> </ul>

### Data Analysis

During the discussion and analysis of the previous experience, a list of items has been elaborated to define the quality of suggested tools for making didactic videos and their relative importance 1–5 (Table 6); also, a ranking list of ICT tools for making didactic videos has been prepared (Table 7).

Table 6.  
*A list of items to define the quality of suggested tools for making didactic videos and their relative importance 1–5*

Items	US	UKF	BGKU	DSTU	CU	Total
1 Useful	5	5	5	5	5	25
2 Educational potential	5	5	5	5	5	25
3 Multifunctionality	5	3	5	4	5	22
4 Survey options	4	5	3	5	3	20
5 Friendly interface	5	3	5	5	5	23
6 Free	4	5	5	5	4	23
7 Group collaboration work support	5	3	3	5	5	21
8 Webinars support	5	4	5	4	5	23
9 Podcast support	5	4	5	4	5	23
10 Include the Tools for scheme and graph creation	5	5	5	5	5	25
11 Multi-windows interface	5	4	4	4	5	22
12 Customize and edit content on both Mac and Windows platforms	4	4	4	2	2	16

Table 7.  
*Ranking list of IT-tools for making didactic videos*

Tools	Points
Tool 1: Adobe Connect	252
Tool 2: Camtasia	239
Tool 3: Adobe Captivate	235
Tool 4: HyperCam	204
Tool 5: BB Flashback Express	196

## Pedagogical and Methodological Aspects of Didactic Videos

Below we list more important pedagogical aspects of didactic videos.

- Ongoing technological revolution has given birth to the new concept of “flipped classroom,” centered around the idea of screen casting, which has become a widely used methodology.
- The general algorithm of teaching in the classroom is changed in flipped classroom, where teachers prepare video lectures outside of the classroom for their students to study before class, while traditional home tasks and practical tasks are done together in the classroom.
- Screen casts can be used alternatively in this new classroom model, that is – as a source of instructions for the students (Ruffini).

**Methodological aspects of the use of didactic videos are presented below.**

- “There are many outstanding Web 2.0 tools for the classroom to promote teaching and learning. Web 2.0 tools such as a blog, wiki or YouTube are innovative ways of creating, collaborating, editing and sharing user-generated content online.
- One of the most popular Web 2.0 tools is the screencast.
- Screencasting has emerged as the teaching tool for online instruction” (Ruffini).

**How does the Flipped Classroom work?**

- “The flipped classroom is organized around the material students learn out of class by viewing a video of the teacher’s lecture posted online. By viewing the teacher’s lecture online, class time is used for answering questions about the material covered on the video and for class activities.
- Teachers may have students solve problems or answer questions and have them write down any questions related to the material on video that they did not understand (Liles, 2012).
- Once the students are in the classroom, the teacher will work with the students needing help either one-on-one or in a group setting” (Ruffini).

**PowerPoint Screencast is presented below.**

- “Camtasia Studio 8 has a PowerPoint plug-in which can record a PowerPoint presentation and narration.
- Almost all teachers use PowerPoint presentations for teaching.
- Using a PowerPoint presentation as a framework for a screencast makes sense because the content is already created.
- In Camtasia including a narration and infusing multimedia elements such as music, audio, video and quiz makes for a powerful learning resource tool” (Ruffini).

**A Screencast PowerPoint Model (SPM) steps include:**

- introduction,
- content PowerPoint,

- content video,
- credits,
- end, and
- assessment (Ruffini).

### Some Recommendations Concerning the Use of Didactic Videos in Distance Learning Courses

If the teacher's lecture is planned to be conducted during their own course in a blended or online format, it is recommended not simply to record hour-long lectures as stressed authors do (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/tips-for-designing-video>). Research shows that students do not engage in online lecture content in the same way as they do in face-to-face lectures. Shorter, sharper, single concept videos of 6 minutes or less are much more effective learning tools than long lectures. It is necessary to break down the content in e-learning course, and to re-examine the learning objectives and what the teacher wants his/her students to achieve ([http://thelearningcoach.com/elearning\\_design/chunking-information/](http://thelearningcoach.com/elearning_design/chunking-information/)).

Basic skills necessary for making a good didactic video are shown in Figure 4.



*Figure 4.* Basic skills necessary for making a good didactic video.

Source: Reis, 2012.

An author / a teacher should consider whether a video is in fact the best way for the students to learn the content. Students learn more effectively when they are actively involved in constructing their own meaning around information. Is there a more active way for your students to engage with this content? Sometimes video is the best option, especially for concepts difficult to grasp, but before starting a complex production, first it needs to be checked if there is an existing

open educational resource (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/open-content>) that a tutor could use instead. Additionally, one should be aware of the resources being produced by other teachers from educational institutions; collaboration with these teachers would be a rational and wise approach, because it would allow teachers to bring down the workload and share resources.

Explanations of concepts are also recommended. Students learn better from a coherent summary (Coherence Principle).

Using pictures and visual representations such as charts and diagrams together with audio narration to illustrate some points is essential and necessary in teaching, especially in the form of the a seminar, tutorial or lecture (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/best-practice-in-making-an-instructional-video>).

By using various multiple inputs, students will learn and benefit to create different mental models to capture, understand, and build connections for the unit and materials (Multimedia principle) (Table 8).

Table 8.

*The main findings and video production recommendations*

Finding	Recommendation
<b>Shorter videos</b> are much more engaging.	Invest heavily in <b>pre-production lesson planning</b> to segment videos into chunks shorter than 6 minutes.
Videos that intersperse an <b>instructor's talking head with slides</b> are more engaging than slides alone.	Invest in <b>post-production editing</b> to display the instructor's head at opportune times in the video.
Videos produced with a <b>more personal feel</b> could be more engaging than high-fidelity studio recordings.	Try <b>filming in an informal setting</b> ; it might not be necessary to invest in big-budget studio productions.
Khan-style <b>tablet drawing tutorials</b> are more engaging than PowerPoint slides or code screencasts.	Introduce motion and continuous visual flow into tutorials, along with extemporaneous speaking.
Even high quality pre-recorded classroom lectures are not as engaging when chopped up for a MOOC.	If instructors insist on recording classroom lectures, they should still plan with the MOOC format in mind.
Videos where instructors <b>speak fairly fast</b> and with high enthusiasm are more engaging.	Coach instructors to bring out their enthusiasm and reassure that they do not need to purposely slow down.
Students engage differently with lecture and tutorial videos for tutorials.	For lectures, focus more on the first-watch experience, add support for rewatching and skimming.

Source: <http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/best-practice-in-making-an-instructional-video>.

When possible, try interspersing visual content such as slides, graphics, and screencasts with a video of the teacher talking. The teacher's presence is engaging for students.

However, for a content-focused video it is better to include text and diagrammatic supports as well as a video of the teacher talking, to help explain and illustrate concepts for students. For more complex projects, consider developing a storyboard to help you plan out the sequence and elements of your presentation. Getting it right in a storyboard first can save a lot of time during development and editing of your project. Storyboard template could be downloaded from <http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/tips-for-designing-video>.

It will be correct if the author ties his/her videos back to the activities in their online course. It is essential to ensure that students will actually watch the videos and to provide them with consolidation opportunities by linking the viewing of the video with a follow-up activity such as a short quiz, choice activity, or discussion post in your Moodle course.

It is necessary to remember about other important matters, such as developing a script before you start recording and understanding the implications of Copyright to a video project.

During research some suggestions concerning building up "Storytelling" of didactic videos have been set (Figure 5).

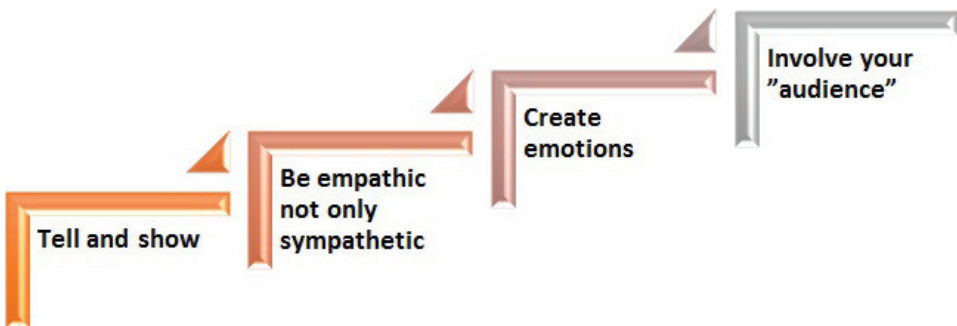


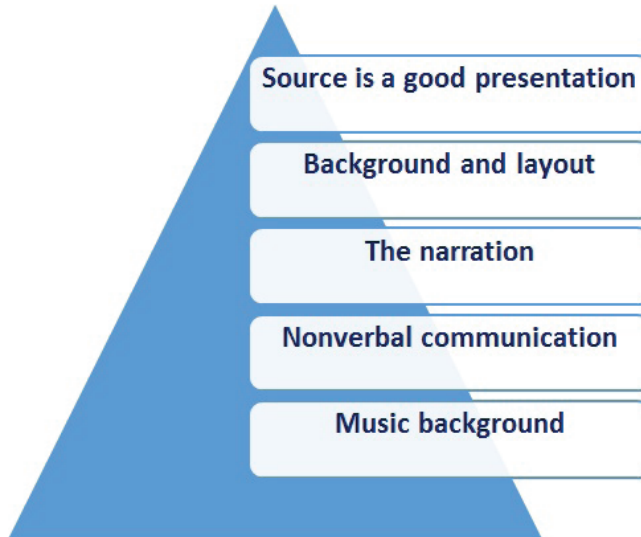
Figure 5. Suggestions concerning building up "Storytelling" of a didactic videos

Source: Jobs, 2008; Gallo, 2015; Reis, 2012.

### 3 basic rules are presented below.

- Text should summarize your narration and should be well structured.
- Synchronize text appearance and images animation with the narration in the slides.
- In the case of presentation for large auditorium never use large blocks of text, just emphasize your key ideas using short sentences (Reis, 2012).

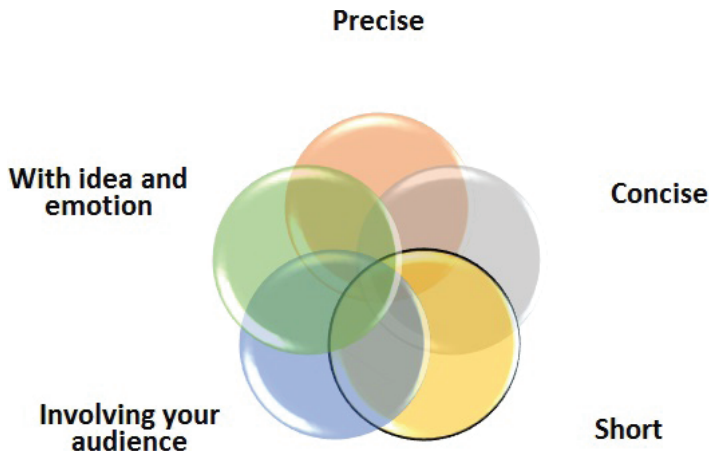
Figure 6 presents the main recommendations for authors regarding a didactic video.



*Figure 6.* Main recommendations for authors regarding a didactic video

Source: <http://uex.adobeconnect.com/p4am6jj52rw>.

Main requirements concerning the didactic video are shown in Figure 7.



*Figure 7.* Main requirements concerning didactic videos

Source: <http://uex.adobeconnect.com/p4am6jj52rw>.

Figure 8 contains the 6 basic communication skills.



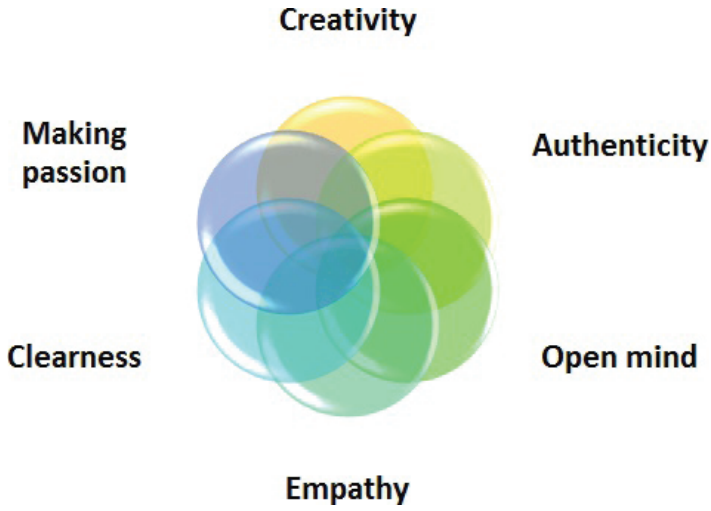


Figure 8. 6 basic communication skills.

Source: Reis, 2008, 2015.

Suggestions for authors of didactic videos are shown in Figure 9.

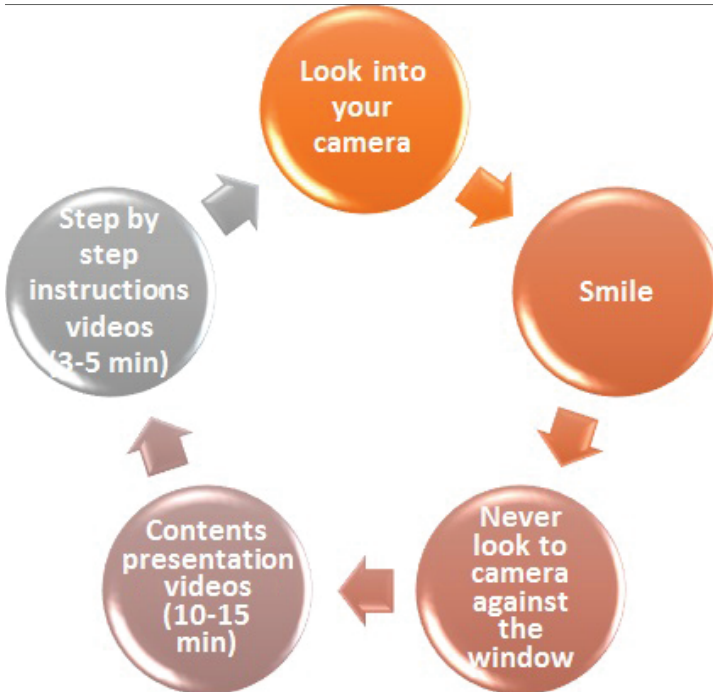


Figure 9. Suggestions for authors of didactic videos

Source: Reis, 2008, 2015.

## Conclusions

This paper presented some temporary, preliminary results of research, conducted within WP4 “Selection and testing new IT tools,” module 01 “Tools for making didactic videos” by researchers of the IRNet consortium from the University of Silesia (Poland), Coordinator, Constantine the Philosopher University (Slovakia), Borys Grinchenko Kyiv University (Ukraine), Dneprodzerzhinsk State Technical University (Ukraine), and The Graal Institute (Portugal). During this study the researchers elaborated several scientific papers as well as recorded a number of videos, which in the future could be used in the project MOOC “New ICT tools for effective use in education” for the use of teachers, students, researchers, tutors, mentors and others. In the next stage, the researchers will examine and study the assessment by experts from different countries and universities around of the world. Final results will be published in next papers and manuscripts.

## Acknowledgments

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### **Artykuł na temat bardziej odpowiednich i efektywnych narzędzi ICT (TIK).**

#### **Kategoria: narzędzia do tworzenia filmików dydaktycznych**

##### Streszczenie

Niniejszy artykuł opisuje niektóre wstępne efekty wdrożenia pakietu roboczego nr 4 „Wybór i testowanie nowych narzędzi informatycznych” w ramach międzynarodowej sieci badawczej IRNet i badaczy z partnerskich instytucji z Polski, Słowacji, Ukrainy i Australii. Wyniki te dotyczą analizy i badania określonych kategorii narzędzi ICT (TIK) do tworzenia filmików dydaktycznych. Cały pakiet został podzielony na pięć głównych etapów. Multimedia w nauczaniu odgrywają ważną rolę, umożliwiają stosowanie różnorodnych form prezentacji informacji, które można wykorzystywać jednocześnie. Kombinacja tekstu, dźwięku, obrazów, animacji, filmików oraz hiperłączy ma zaletę polegającą na korzystaniu z obydwu głównych kanałów – kanału wizualnego i werbalnego – dla dokonywania efektywnej prezentacji i wideo. W artykule tym przedstawiono także cechy efektywnego filmu dydaktycznego oraz przykłady programów komputerowych, które mogą być wykorzystywane w tym celu. Autorzy zaprezentowali ranking narzędzi ICT (TIK) oparty na ocenie jakościowej i ilościowej oraz pewne rekomendacje w zakresie cech dobrego filmu dydaktycznego. Przeanalizowali błędy, które są często popełniane przez użytkowników podczas tworzenia filmików dydaktycznych.

**Słowa kluczowe:** technologie informacyjno-komunikacyjne (TIK), narzędzia TIK, filmy dydaktyczne, satysfakcjonujący model oceny, międzynarodowa sieć badawcza

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### **Дискуссионная публикация на тему наиболее актуальных и эффективных инструментов икт. Раздел: инструменты для создания дидактических видео**

##### Аннотация

В статье описываются некоторые предварительные итоги выполнения рабочего пакета 4 (РП4) «Выбор и тестирование новых ИТ-инструментов» в рамках международной исследовательской сети IRNet исследователями из учреждений-партнеров Польши, Словакии, Украины, Австралии. Эти результаты относятся к анализу и изучению некоторых категорий ИКТ-инструментов для создания дидактических видео. Весь период работы по данному пакету был разделен на несколько основных этапов 1–5. Роль мультимедиа в обучении является значительной, так как она предлагает различные форматы представления информации одновременно. Сочетание текста, аудио, изображений, анимации, видео, а также гиперссылок имеет преимущество использования обоих из двух основных каналов – визуального и вербального – для презентации эффективным способом. Особенности эффективного представления и примеры компьютерных программ, которые могут быть использованы для этой цели, также указаны в статье. Авторы представили список ранжирования на основе качества и оценки количества

выбора ИКТ-инструментов и предложили некоторые рекомендации для создания хорошего дидактического видео, а также проанализировали некоторые частые ошибки пользователей в процессе разработки дидактических видео.

**К л ю ч е в ы е с л о в а:** информационные и коммуникационные технологии (ИКТ), средства ИКТ, дидактические видео, сатисфакционная модель оценивания, международная исследовательская сеть

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**Documento de debate sobre las herramientas ict más adecuadas y eficaces.  
Categoría: herramientas para hacer videos didácticos**

**R e s u m e n**

El artículo describe algunos resultados preliminares de la aplicación del paquete de trabajo 4 (WP4) “Selección y examen de las nuevas herramientas TIC” dentro del marco de la red internacional de investigación IRNeT e investigadores de entidades colaboradoras de Polonia, Eslovaquia, Ucrania, Australia. Estos resultados se encargan de analizar y estudiar algunas categorías de las herramientas TIC, destinadas a la creación de videos didácticos. El período completo del paquete se dividió en varias etapas de la 1–5. El papel de multimedia en el aprendizaje es importante ya que ofrece varios formatos de presentación de información simultáneamente. La combinación de texto, audio, imágenes, animación, video así como hipervínculos tiene la ventaja de usar los principales canales – el visual y el verbal – destinados a la creación de videos didácticos de manera eficaz. Se muestran en este trabajo características de presentaciones reales y ejemplos de programas de ordenador los cuales pueden ser usados con este fin. Los autores han expuesto una lista de clasificación basada en la evaluación de la calidad y la cantidad para elegir las herramientas TIC y han dado varios consejos sobre cómo hacer unos buenos videos didácticos y analizaron los errores más frecuentes cometidos mientras elaboraban videos didácticos.

**P a l a b r a s c l a v e:** tecnologías de la información y comunicación (TIC), herramientas TIC, videos didácticos, Modelo de Evaluación del Hábito de Satisfacción, red internacional de investigación





Information and Communication  
Competencies in Higher Education







**Artur Kocharyan**

Ukraine

## **Conditions of Effective Development of Information and Communication Competencies of Teaching Staff of the University**

### **Abstract**

The article summarizes the results of the pilot study on the implementation of the model of information and communication competencies of the university teaching staff that was conducted at Borys Grinchenko Kyiv University, Ukraine, and describes the basic stages of the research and the conditions of an effective implementation of the model. The article examines ways of improving the quality of higher education in Ukraine in the context of European quality standards for university educational space. The European standards and guidelines are considered in relation to internal quality assurance. The author examines the model of ICT competencies of teaching and research staff and describes structural components of this model: motivational target component, organizational and procedural component, contents and operational and technological component, diagnostic and effective components. The article suggests tools to measure the level of educators' formation in the ICT competence of teaching and research staff. The tools are considered in accordance with the form activities of teaching and research staff. The tools are formed in accordance with the recommendations of UNESCO Standards and Quality Assurance in the European Higher Education Area, namely: understanding and awareness of the role of ICT in education, and basic use of ICT tools.

**Key words:** quality of higher education, ICT competence, corporate standards, measurement tools

## Introduction

In a situation where all aggressive modern information and communication technologies (ICT) have an impact on the economy of the world and there are market demands for graduates' new competencies, modern universities have to change and (or) adapt their educational policies in order to prepare competitive professionals who will possess the aforementioned skills. Agents of such changes should be the scientific and teaching staff of the university.

Due to the transformation of education which is happening now in Ukraine, the traditional role of a scientific and pedagogical employee changes. The modern scientific staff member should be able to: select and use ICT for teaching students; organize cooperation and communication between participants in the educational process; design electronic educational resources and electronic environment so as to be a facilitator and an assistant who helps students thoroughly comprehend the material; take into account in the learning process students' needs and characteristics, cognitive learning styles, new services and tools for effective collaboration and communication, and finally have skills of the 21<sup>st</sup> century.

**The purpose of this article** is to generalize the effective implementation of the model we have developed concerning the information and communication competence of the university teaching staff.

## Research Methodology

### Analysis of Recent Research and Publications

Our analysis of psychological and educational literature, and teaching practice showed a growing number of studies, the subject of which was the development of information and communication competence of teachers. In Ukraine, the issues of forming ICT competence and training offered to the teaching staff in the scope of educational use of ICT are discussed by V. Bykov, M. Zhaldak, A. Kolomiets, N. Morze, V. Osadchyi, L. Panchenko, O. Spirin, and others.

Analysis of the Standards and Guidelines for Quality Assurance in the European Higher Education noted that the main activities of a teacher in the modern university should focus on creating high quality content and using educational environment, including electronic media. The impact of technology on the occurrence of macro-trends and the reform of higher education in Ukraine supports the hypothesis of an urgent development and implementation of standards of information and communication competence of teachers in terms of European integration processes of modern higher education. The issue of effective information and communication

competence (ICT competence) of teaching staff is important in terms of improving the quality of education in general and the achievement of European indicators of quality of higher education.

### **General Method of the Study of Information and Communication Competencies of Teaching Staff at the Humanistic Specialty of Traditional Universities**

Theoretical and methodological basis of the study made provision for the organization of educational process in the system of Postgraduate Education in Ukraine and in the context of lifelong learning (Protasova, Klokar, Kremen, Oliinyk), Information Society and Computer oriented environment (Bykov, Hurzhii, Zhaldak, Kukhareenko, Morze, Pietukhova, Spivakovskiy, Lane, Liyoshi, Kumar), Competence approach in training (Morze, Ovcharuk, Smyrnova-Trybulska, Spirin, Khutorskyi), personal-oriented and activity approach to teaching and theory of motivation (Vyhotskyi, Halperin, Elkonin, and others).

The aim of our study was to develop a model of ICT competencies of the teaching staff at humanistic specialties of traditional universities. The study was carried out from 2011 to 2015.

During this stage of the experiment (2011–2012), the questionnaire was designed to determine the level of formation of ICT competence of the teaching and research staff; a survey was conducted and levels of ICT competencies of humanities teaching staff were determined using monitoring tools. The aim of this phase of the study was to diagnose the state of formation of the ICT competencies of teaching staff in order to conduct further formative stage of the experiment and test the hypothesis of the study.

During the formative stage of the experiment (2012–2015) a model based on the hypothesis of ICT competencies of humanities teaching staff of a classical university was developed. Experimental work was carried out at the Borys Grinchenko Kyiv University.

## **Research Results**

### **Justification of the Models of Information and Communication Competencies of University Teaching Staff**

Our goal was to create a model of building the organizational and pedagogical conditions of development of ICT competencies of academic teaching staff in terms of e-learning environment.

The proposed model includes several components defined in accordance with the general theory of structure (Kirdyakina, 2010; Kocharyan, 2014; Morze, 2016):

- *motivational target component*, which includes goals and objectives of the educational process;
- *organizational and procedural component*, which defines the principles of the development process of ICT competencies, organizational and pedagogical conditions for this process, influence on learning outcomes;
- *contents and operational and technological component*, which defines the content of learning activities forming the levels of ICT competence specifying organizational forms and methods of infrared competence; and
- *diagnostic and effective components*, which define criteria and performance indicators of ICT competencies of teaching staff, examination and analysis of the effectiveness of the process.

### **Motivational Target Component Model of ICT Competence**

Internal and external reasons mastering ICT have a significant impact on the implementation of the motivational based component development model of ICT competencies of scientific and pedagogical staff. According to the development model, we have developed ICT competence of teaching and research staff. The motivational component of this model consists of foreign and domestic purposes. The external motivation of the staff is to develop their own ICT competence, which is due to the social order of the information society. The internal motivation of the ICT competence of a member of teaching and research staff is to improve their own professional activities.

It should be noted that the development of ICT competence is highly influential and has financial incentives, such as increase in the competitiveness of teaching and research staff on the labor market, career development, upgrading certification, and receiving bonuses, prizes, and awards for innovation.

The organizational and procedural component of the educational process from the perspective of system approach is considered by us to be a set of interrelated components inside that maintains the integrity of the development model and allows you to reach the goals. In this component there occurs an indispensable combination of approaches to the implementation of the model, organizational and pedagogical conditions, and factors of influence.

We agree with and have included research results by N. Soroko, L. Chernikova, V. Kheili, L. Velli, who emphasize the fact that during the construction of models of ICT competence there should be considered andragogic principles of adult learning, competitive and personally oriented approach (Hawley, 1999; Vember et al., 2014).

### **Organizational and Procedural Component of the Model of ICT Competence**

Important elements of the organizational and procedural component are educational and methodological support, and scientific and methodological support. In our view, basic organizational and pedagogical conditions that have a decisive

impact on the effectiveness of infrared competence of teaching and research staff are as follows:

- introduction of a system of training and science-based multi-level multi-phased model of ICT competencies of teaching staff;
- differentiation and integration of content, forms, and methods of ICT competencies of teaching staff in accordance with its three-tier structure; and
- implementation of continuous scientific and methodological support of ICT competencies of teaching staff based on and using established educational environment (its electronic components).

It should be noted that a variety of causes and factors have a significant impact on the development of ICT competence. Generic names of most principled positions are:

- common features of adult education (focus on the result, the need for justification, independence, etc.);
- professional features of the teaching staff (level of professionalism and professional development stage, professional psychological characteristics); and
- age, individual psychological and gender features.

### **Content, Operational, and Technological Components**

This component of the model we have developed defines educational content by means of levels of formation and structural components of the ICT competencies of teaching staff. This component model provided the curriculum, developed and tested by Borys Grinchenko Kyiv University.

The curriculum consists of three levels and begins monitoring the input level of ICT competence formation of scientific and pedagogical staff. After input monitoring and determining the level of ICT competence formation of scientific and pedagogical worker, a training program that is tailored to the certain level of ICT competence starts.

Base level consists of four modules. After the base training program, a member of research staff will be able to:

- create and use in the electronic documents, presentations, graphs, charts, work with databases;
- work with digital photos and audio files;
- search and find relevant information via internet search services; and
- use e-mail.

The advanced level of semantic and operational-technical component of the model of development of ICT competencies of teaching staff consists of three modules. Upon completion of the advanced level of the training program in basic scientific skills, the teaching staff will be able to:

- use Wiki, create their own portfolio using digital photos, audio, and video;
- use resources of social network;

- create and maintain their own blog;
- use social geoservices, online storage of documents and files;
- jointly create and edit documents on-line;
- create knowledge maps;
- find, use, create and upload their own podcasts;
- use Internet resources for online communication; and
- use programs to increase productivity, manage a calendar and notes.

The professional level, contextual, operational, and technical component of the model of ICT competencies of teaching staff consists of thirteen modules. The result of passing the professional level study program is designing an e-training course on the subject (a module) for teaching and research staff.

### Diagnostic and Effective Components

In our opinion, the monitoring of the basic level of formation of ICT competence should be performed by means of an online survey of the teaching staff. The questionnaire was formed in accordance with the recommendations of UNESCO Standards and Quality Assurance in the European Higher Education Area, namely: understanding and awareness of the role of ICT in education, basic use of ICT tools (Cullen et al., 2003; Morze, 2014; Smyrnova-Trybulska, 2015).

According to the model developed by us, there are following measurement tools of the level of formation of the ICT competence of teaching staff (Table 1).

Table 1.

*Tools to measure the level of educators' formation in the ICT competence of teaching staff*

	Base level	Advanced level	Professional level
	Understanding the role of ICT in education and their use		
Measurement tools	1. Online survey to determine the level of awareness of teachers about the availability of documents on education policy at the university or the state and their role in the activities of the university. 2. Participation in seminars (full-time or remote) on educational policy of the university.	1. Survey of students for use in the profession of innovative educational policy. 2. Survey of teachers in understanding ways to use innovation in the profession of education policy. 3. Survey of students to determine the role of ICT in education and identify students' requests to enrich the e-university environment. 4. Teacher's e-portfolio: availability of data on participation in some group of educational initiatives.	1. E-portfolio: availability of information on participation in the group to create new educational development, a strategy for ICT and their use.

ICT			
Measurement tools	<ol style="list-style-type: none"> <li>1. Tests for independent verification of levels of basic tools (created by the university, IT-academy).</li> <li>2. Some components of e-learning courses (electronic educational course).</li> </ol>	<ol style="list-style-type: none"> <li>1. Certified electronic educational course, which is a necessary condition for the use of complex ICT tools.</li> <li>2. Teaching materials are based on the use of e-tools.</li> </ol>	<p>Usage of Wiki portal. Own blog of the teacher. Usage of social networks for education. Teacher's e-portfolio.</p>
Educational activities			
Measurement tools	<ol style="list-style-type: none"> <li>1. Survey of students about the quality of fragmented use of ICT.</li> <li>2. E-testing students' educational achievements.</li> <li>3. Availability of electronic course in LMS Moodle.</li> <li>4. Questioning teachers in understanding the effectiveness the use of ICT in practice.</li> </ol>	<ol style="list-style-type: none"> <li>1. Statistics of usage by students of electronic course, placed on LMS Moodle.</li> <li>2. Links in electronic course on Institutional repository resources.</li> <li>3. Links on open e-resources.</li> <li>4. Links on open learning courses (MOOC).</li> <li>5. E-science publications.</li> <li>6. Survey of students on teacher satisfaction with the proposed e-resources.</li> <li>7. Evaluation of training programs: a list of recommended resources.</li> <li>8. Availability of certified electronic courses on each disciplines that teacher teaches.</li> <li>9. Assessment of systematic use of electronic course resources: reports on e-dean and electronic gradebook of specific electronic course.</li> <li>10. Availability of annotations to certified electronic course on the Wiki portal.</li> <li>11. Assessment of systematic use of resources in the university environment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Creation of an open electronic courses (MOOC) and statistics of their members.</li> <li>2. Organization of email communication and collaboration (including educational projects) in social networks and on the basis of virtual communication (skype, video conferences, webinars, etc.).</li> <li>3. Joint projects on the Wiki portal.</li> <li>4. Teacher's e-portfolio.</li> <li>5. Use of ICT for administration of the educational process.</li> </ol>

		Scientific activities		
Measurement tools		<ol style="list-style-type: none"> <li>1. Survey for teachers' awareness on the use of scientific communication: repositories, scientometric databases, e-libraries, e-journals, as well as opportunities and participation in online conferences.</li> <li>2. Number of publication in Institutional repository.</li> <li>3. Citations index in Google Scholar.</li> </ol>	<ol style="list-style-type: none"> <li>1. Number of international publications.</li> <li>2. Number of appearances at international conferences.</li> </ol>	<ol style="list-style-type: none"> <li>1. Participation in Intercollegiate and international research projects.</li> <li>2. Teacher's e-portfolio.</li> <li>3. Number of joint international publications with scientists from other universities.</li> <li>4. Citations index in international scientometric databases.</li> <li>5. Organization and conduct of online conferences, seminars.</li> </ol>
		Advanced teachers training		
Measurement tools	The certificate of training for ICT.	<ol style="list-style-type: none"> <li>1. E-portfolio.</li> <li>2. Participation in distance training courses in Ukraine.</li> <li>3. List of graduated non-formal learning.</li> </ol>	<ol style="list-style-type: none"> <li>1. E-portfolio.</li> <li>2. The list of graduated open professional online learning courses (MOOC).</li> <li>3. Training for colleagues on the use of ICT.</li> <li>4. Online consultations, conducting webinars out of the experience.</li> </ol>	

The purposes of the monitoring are the creation of basic level conditions of the formation of ICT competence to be realized by the teaching and research staff in accordance with international standards, and the identification of so-called "weak spots" that they need to learn; after the survey members of the research staff must realize the need for further training to improve their rating and successful professional career.

The monitoring of the advanced level of ICT competence is effected through quality assessment of electronic training courses (ETC), a survey of students and teachers, content and use of institutional repository, and indexing scientific publications, for instance in Google Scholar. The purpose of the online survey is to identify the level of student success and satisfaction from learning with an ETC created by teachers. At the same time the online survey of teachers is performed to identify their level of satisfaction with their professional activities (Morze, 2014; Smyrnova-Trybulska, 2015).

The professional level of formation of ICT competence involves the monitoring of the quality of personal learning environment of a member of teaching and research staff, and students with whom he or she works, the effectiveness of ICT in the educational process to implement cooperation, communication, professional development, participation in professional societies, and developing life



competencies and skills of the 21<sup>st</sup> century. A comparative assessment of existing international scientometric databases with printed (including electronic) works of teaching and research staff (Web of Science, Scopus, Russian Science Index and others.) (Morze, 2014; Smyrnova-Trybulska, 2015).

## Conclusion

Due to the transformation of education in the new environment and market requirements to prepare competitive specialists, the traditional role of the modern university teaching staff (broadcasting and reproduction of training materials) is replaced by a number of new roles. The modern university teaching staff is able to: select and use electronic resources for student learning; organize cooperation and communication between the participants of the educational process; design electronic resources and electronic educational environment, new services and tools for effective collaboration, communication; and possess the skills of the 21<sup>st</sup> century. Therefore, the university teaching staff must meet a certain level of ICT competence.

The model of ICT competencies of teaching and research staff provides the continuity of learning and self-education, based on the exchange of experience through participation in educational networking communities, forums, and projects, or distance learning, but also enables the teacher to work on further development of ICT competence. This model of ICT competencies of teaching staff at humanistic specialties of traditional universities can be implemented in the educational system in the development of educational environment of the institution.

This model, in our opinion, can be successfully implemented on the following conditions:

- motivation of teaching staff to develop their ICT competence;
- approved corporate standards of teaching staff at the university, where criteria for the formation of ICT competence were specified; and
- a systematic approach to the implementation of this model.

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## **Warunki efektywnego rozwijania kompetencji informacyjnych i komunikacyjnych kadry dydaktycznej szkoły wyższej**

### Streszczenie

Niniejszy artykuł podsumowuje wyniki pilotażowego badania wdrożenia modelu kompetencji informacyjnych i komunikacyjnych uniwersyteckiej kadry dydaktycznej, które zostało przeprowadzone na Uniwersytecie im. Borysa Grinchenki w Kijowie na Ukrainie, oraz opisuje podstawowe etapy badania i warunki efektywnego wdrożenia modelu. Artykuł relacjonuje sposoby poprawy jakości szkolnictwa wyższego na Ukrainie w kontekście europejskich norm jakości dla przestrzeni szkolnictwa wyższego. Europejskie normy i wytyczne są rozważane w zestawieniu z wewnętrznym systemem zapewniania jakości. Badane są modelowe kompetencje kadry dydaktycznej i naukowej w zakresie ICT (TIK) oraz opisywane są strukturalne elementy tego modelu: element celu motywującego, element organizacyjny i proceduralny, element treści, element operacyjny i element technologiczny, element diagnostyczny i element efektywny. Artykuł proponuje narzędzia służące do pomiaru wykształcania przez pedagogów kompetencji w zakresie ICT (TIK). Narzędzia te uznawane są za zgodne z czynnościami kadry pedagogicznej i badawczej w zakresie tworzenia opisanych kompetencji, ponieważ zostały zbudowane zgodnie z zaleceniami UNESCO dotyczącymi norm i zapewniania jakości w obszarze europejskiego szkolnictwa wyższego, mianowicie z zaleceniami dotyczącymi znajomości i świadomości roli ICT (TIK) w kształceniu oraz podstawowego wykorzystywania narzędzi ICT (TIK).

Słowa kluczowe: jakość szkolnictwa wyższego, kompetencje ICT (TIK), standardy korporacyjne, narzędzia pomiarowe

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### **Условия эффективного развития информационных и коммуникационных компетенций преподавателей университета**

#### **Аннотация**

В статье приведены результаты экспериментального исследования по вопросу реализации модели информационно-коммуникационных компетенций преподавательского состава университета, который был проведен в Киевском университете имени Бориса Гринченко, Украина, и описываются основные этапы исследования и условия эффективной реализации модели. В статье рассматриваются пути повышения качества высшего образования в Украине в контексте европейских стандартов качества университетского образования. Европейские стандарты и руководящие принципы рассматриваются в отношении внутреннего контроля качества. Изучается модель ИКТ компетенции педагогов и исследователей, описаны структурные компоненты этой модели: мотивационно-целевой компонент, организационный и процедурный компонент, содержательный, эксплуатационный и технологический компонент, диагностический компонент и компонент эффективности. В статье предлагаются инструменты для измерения уровня ИКТ-компетентности педагогов и исследователей. Инструменты рассматриваются в соответствии с формой деятельности преподавателя и исследователя. Инструменты формируются в соответствии с рекомендациями стандартов ЮНЕСКО по обеспечению качества в Европейском пространстве высшего образования, а именно: понимание и осознание роли ИКТ в образовании, основы использования средств ИКТ.

**Ключевые слова:** качество высшего образования, ИКТ-компетенции, корпоративные стандарты, инструменты измерения

Artur Kocharyan

### **Condiciones del desarrollo efectivo de las competencias informáticas y comunicativas del personal docente en la universidad**

#### **Resumen**

El artículo resume los resultados del estudio experimental llevado a cabo por Borys Grinchenko en la Universidad de Kyiv, Ucrania, que se centra en la ejecución del modelo de competencias informáticas y de la comunicación del personal docente en la universidad. También describe las etapas fundamentales del estudio y las disposiciones de una ejecución eficaz del modelo. El artículo analiza las formas de mejorar la calidad de la educación superior en Ucrania de acuerdo con las normas Europeas de calidad dentro del ámbito educativo de la Universidad.

Las normas y directrices europeas se consideran en relación con la garantía interna de calidad. Donde se estudia el modelo de competencias docentes TIC en el personal docente e investigador y describe factores estructurales de este modelo: factor con fin motivacional, factor de organización y procedimiento, contenidos y factores tecnológicos y de funcionamiento, factores de diagnóstico y eficacia. El artículo propone medidas para evaluar el nivel de formación en las competencias TIC del personal docente e investigador. Las medidas se tienen en cuenta de acuerdo a las actividades del personal docente e investigador. Las medidas se forman se elaboran de acuerdo con las reco-

mendaciones de la Normativa UNESCO y la Garantía de Calidad en el área de Educación Superior Europea, concretamente: conocer y comprender el papel de las TIC en la educación, y su uso básico.

**P a l a b r a s c l a v e:** calidad de la educación superior, competencias TIC, normas corporativas, herramientas de medición



Study on Networking  
and Educational IT Space





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Poland

## **On Networking The Analysis of Selected Aspects**

### **Abstract**

In the information society, the existing traditional ways of communication are changing, often in favour of digital forms. What is also transformed are the forms of teaching and educating, which are substituted by distance education with the use of networks of various types. The study focuses on the theoretical and practical determinants of network functioning. In this study, some e-challenges are analyzed in the context of new prospects of the informational-educational space based on the global network of Internet. The definitions are presented as well as some exemplary types of network. Moreover, the collaboration and self-training network, and its aims are focused on. Two cases are provided as examples – the Internet platform “Doskonalenie w sieci /Improvement in the Net/” and the international research network IRNet, in the activity of which the authors of the presented article take active part.

**K e y w o r d s:** education, networks, teaching, ICT

### **Introduction**

In the contemporary world, it is more and more difficult to imagine the daily functioning without such appliances as a computer and its varieties, such as a tablet or a smartphone. Moreover, possessing such equipment is definitely not enough without a permanent Internet connection. The growing accessibility

to the World Wide Web results in being online everywhere and at any time. The ongoing miniaturization of the computer (as understood so far) enhances mobility, while the personalization of appliances practically makes people hardly ever separate from them. The amount of such equipment and the omnipresence of information technologies bring about new social phenomena, such as information and communication overload (Żebrok, 2014, p. 124), information intoxication, or digital exclusion. What is emphasized with growing frequency is the phenomenon of alienation of people who do not join the information current. New disciplines have emerged of scientific exploration as well as some new notions – such as ecology of information (Eryomin, 2015).

Over the last years, the traditional forms of educating, training, acquiring knowledge and qualifications have changed rapidly into the distance education mode with the use of computer networks and the Internet. The characteristic feature of such education is shifting the main burden of educating from the teacher to the learner. In contrast to traditional methods, there is no need for direct contact between the master and the disciple. The latter perfects his/her skills in a convenient form, time, and space by accessing the resources of the Net or those stored in different data storage devices (Smyrnova-Trybulska, 2013). Due to their significance, topicality, and popularity, the issues of e-learning are paid more and more attention. A lot of research is done and many scientific conferences are organized ([www.dlcc.us.edu.pl](http://www.dlcc.us.edu.pl)).

The article is aimed at analyzing the theoretical and practical determinants of network functioning as well as at presenting the information on the activities of teachers' collaboration and self-training network and on the international research network IRNet.

The presented text consists of several parts. The first one is devoted to the analysis of the theoretical determinants of network functioning in the contemporary society. The starting point was an attempt at situating education in the information society. Then, the essence of the network and networking is focused on and an overview of some frequently used networks is presented.

The next part consists of a report from the activity of the pilot project entitled “*Sieci współpracy i samokształcenia w powiecie cieszyńskim /Collaboration and self-training networks in Cieszyn County/*” as well as of the presentation of some studies on the functioning of selected teachers' networks.

The final part presents the activity of the international research network IRNet.



## Education in the Information Society

For centuries, time and space have been the main hindrances for information exchange. By increasing the access to extensive information resources, new media have changed this radically and enabled communication on a global scale. Among other things, the information society (IS) is being created in this way. What is most frequently indicated among the features of such a society is the wide access to the Internet as well as the compatibility of computer systems, the software, and communication services. One of the major qualities of IS is the stress on personalized appliances, interactivity, networking, and the unceasing search for new technological solutions, which often have no sense from the financial or rational standpoint (Castells, 2008, p. 23).

M. Castells describes the information society in the following way:

- information constitutes its main raw material;
- technologies affect information, not the other way round;
- new technologies are omnipresent and they have intensive influence on the society:
- network logic – a set of relations in which new information technologies are applied – comes into being;
- flexibility of structures occurs, which enables the change, modification, and reconstruction of network elements;
- organizational change and fluctuation are ongoing; and
- technologies merge into one highly integrated system (Castells, 2008, pp. 79–80).

However, J. Morbitzer claims that due to the increasing significance of well-educated specialists in modern societies, the term “information society” is more and more often used interchangeably with the notion “knowledge society.” Yet, it should be remembered that information cannot be identified with knowledge (Morbitzer, <http://www.wsp.krakow.pl/konspekt/konspekt8/morbitzer8.html>).

The significance of these issues was already highlighted in 1996 by the National Council for Radio and Television Broadcasting in the assumptions of the state politics: “The countries which will enter the era of information society will collect the biggest harvest. They will indicate the way for the others. However, the countries which will linger or will undertake half-hearted activities might – over a period shorter than a decade – face investment breakdown and a crisis on the labour market” (The National Council for Radio and Television).

The system of education is subject to constant changes and this process most frequently involves the application of ICT tools. This is highlighted by E. Smyrnova-Trybulska, the co-author of this article (Smyrnova-Trybulska, 2013), who emphasizes the significance of new technologies in the functioning of a society. This phenomenon substantially affects education, pointing at the need

of preparing the young generation for the use of new media, tools, and methods associated with information and communication technologies. Such a situation necessitates not only the change of teaching contents, and introduction of new methods and forms of learning, but also some organizational changes, consisting in the introduction of modern technological solutions to all school classes (Smyrnova-Trybulska, 2013b).

Educational institutions make a lot of effort to search for modern teaching methods. They are meant to fulfill the civilization requirements of the contemporary world and to prepare the members of school communities for life in the information society. Teachers are a group of professionals who need constant training. What becomes a huge challenge for them is keeping up with the changing surroundings. The enormous growth of knowledge triggers off the need for permanent education, for “being on time.” This concerns the factual knowledge, broadly understood information competencies, the skill of acquiring information, and, which seems most important, the ability to get all this across. The dynamic development of ICT necessitates teachers’ constant increasing their qualifications and acquiring new competencies – therefore, a lot of them have completed university education in several disciplines, including the certified qualifications in the use of new technologies. In fact, the skill of using information technologies is a requirement in any promotion procedure.

In contemporary school, a computer with Internet access is not a wonder any longer. Each member of the school community (teachers, learners, administration staff) also uses the telephone. This brings about new problems and challenges as these appliances are not used only for communication any more but have become multifunctional tools for taking photographs, recording the sound and vision, with a multitude of applications and usually with Wi-Fi access. The need has emerged to provide regulations, specify the principles of using such equipment, and take care for the safety of learners and teachers. Schools face new challenges – data protection, anti-virus protection, and protection against hackers’ attacks. However, the majority of teachers stress that there is no withdrawal from such a model of functioning of the contemporary world.

What poses a problem is such a preparation of teachers for the new reality so that they could constantly precede learners, not only just “understand what their learners are talking about.” All this makes teachers appropriately prepared for new challenges, including the changing form of education and training. This draws attention of the co-author of this article E. Smyrnova-Trybulska, who analyzes and comments on the indispensability of a system approach to preparing teachers in the field of ICT (Smyrnova-Trybulska, 2013b, pp. 168–180).

## What Are Nets? Some Theoretical Issues

According to The Great Internet Dictionary of Polish, a net is:

- ...all the activities or relationships aimed at catching someone or taking control over someone, or
- the worldwide information system which consists of interconnected computers ... (The Great Dictionary of Polish).

The Oxford Dictionaries contain several definitions of network and some sample sentences (<http://www.oxforddictionaries.com/definition/english/network>):

1. An arrangement of intersecting horizontal and vertical lines: a spider constructs a complex network of several different kinds of threads
2. A group or system of interconnected people or things: 'the company has a network of 326 branches', 'a trade network'
  - 2.1. A complex system of railways, roads, or other routes: the railway network
  - 2.2. A group of people who exchange information and contacts for professional or social purposes: a support network
  - 2.3. A group of broadcasting stations that connect for the simultaneous broadcast of a programme: [as modifier]: network television
  - 2.4. A number of interconnected computers, machines, or operations: a computer network
  - 2.5. A system of connected electrical conductors.

As a verb:

1. [with object] Connect as or operate with a network: compared with the railways the canals were less effectively networked
  - 1.1. British Broadcast (a programme) on a network: the Spurs match which ITV had networked
  - 1.2. Link (computers or other machines) to operate interactively: more and more PCs are networked together, (as adjective networked) networked workstations
2. [no object] (often as noun networking) Interact with others to exchange information and develop professional or social contacts: the skills of networking, bargaining, and negotiation.

Networking is a phenomenon which gets into social focus with growing frequency. What seems to increase fast is the number of political, economic, or educational activities, institutions, and associations in the network form (Żmijski, as cited in Elsner, 2013, p. 29). This phenomenon consists in linking people in a more or less formal way and it results from the theory that a group can do more (synergy is often mentioned). These effects are achieved by the application of modern forms of media, and the choice of appropriate information and communication technologies. Networking requires a lot of self-awareness, and clearly specified aims and strategies, but the effort associated with network organization pays back

– it is possible to fulfil many tasks together, which cannot be done by individual resources.

Networking is an activity which allows for establishing contacts, exchanging views, accessing information and for cooperation bringing about the expected results. It enables the process of achieving the desired results together in a long-term, systematic way, based on trust and mutuality. The network has a flat organizational structure based on the principles of self-regulation and self-organization. There is no typical head management and the interpersonal relations are based on the principle of partnership. There is no hierarchy typical of educational institutions either (Elsner, 2013, p. 49).

Among its characteristics, education through the Internet has such features as shifting the burden onto learners and self-improvement on one's own. These solutions seem irreversible as in the modern world the expected effects are achieved through team work, frequently with people of different nationalities, professions, and cultures, and solving complicated problems is possible only owing to well-organized group work (Žebrok, 2014, p. 115). It should be remembered that organizing within the network should be a grassroots initiative. What is worth quoting here is a definition of learning communities (*Professional Learning Communities – PLC*): “PLCs create networks to perform what their name suggests – learning from practice. PLCs meet regularly and the meetings are dedicated to the learners' work and their process of learning” (DuFour, 2004, pp. 6–11).

The strategy for supporting supra-national collaboration within the European Social Fund at the level of the European Commission is manifested e.g. by encouraging and enabling the creation of a network of collaboration, mutual learning, and exchange of experiences among the EU countries in the framework of the so-called Learning Networks. They are grassroots initiatives of the member states, which are active in some particular areas and within which the participants have the possibility of exchanging experiences, good practices and of joint work on the solutions to some problems. Some psychological, pedagogical and organizational aspects of communication in a virtual team are analyzed by Smyrnova-Trybulska and other authors (Smyrnova-Trybulska, 2009; Morze, Varchenko, Smyrnova-Trybulska, 2015; Issa, Isaias, Kommers, 2016).

The majority of people in the contemporary world are interrelated in net structures – they consciously join different types of networks (Nasza Klasa /Our Class/ and Facebook are just two recent examples). This type of logic can be seen in the initiatives of the Ministry of National Education, which has suggested some new solutions for teacher training.

The fact that societies are organized more and more around the network draws attention of M. Castells: “Networks constitute the new social morphology of our societies and the spreading logic of networking substantially changes the functioning and results in the processes of production, experience, authority and culture” (Castells, 2008, p. 467).

Some examples of notions referring to the metaphor of the net and networking are presented in Figure 1, whereas the classification is exemplified by the distinction into economic, virtual, and social networks, which is provided below.

*Economic (business) networks* are composed of a set of relations between the participants of the economic game. The actors are: an entrepreneur / a firm, an industrial company, an organization, the state government, a supra-national institution. The collective actors are industrial areas or regions and the types of relations between actors are competition, collaboration, control.

*Virtual networks* consist of different firms. Each of them enters some particular interactions with other partners on the market. All have a certain group of clients and a relatively small infrastructural base. The virtual organization is a temporary net of independent enterprises, linking key competencies, making use of market bargains, applying information and communication technology.

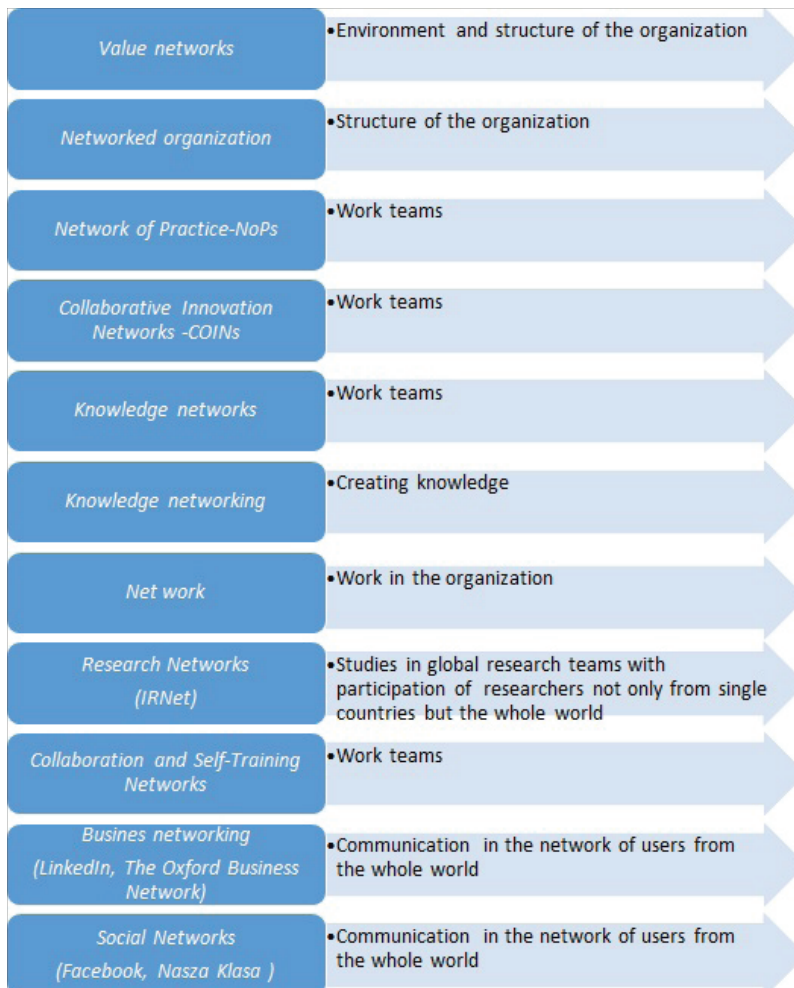
*Social networks* constitute a group of social individuals called actors and the relations between them. An actor can participate as a person, group of people, organization, subsidiary of a firm. An association is a set of relations which link two actors. Social networks can be divided into the networks concerning the interior of a firm and those concerning external relations. Social Network Analysis (SNA) is aimed at illustrating and analyzing social networks on the basis of the data defined by the user.

A network is a system enabling contacts, the exchange of views, access to information, and cooperation, which altogether facilitate achieving the desired results in a long-term, systematic way based on trust and mutuality. A network is the space where participants can be provided with factual and methodological support as well as the knowledge adjusted to their needs. One of the principles followed by network participants says that if one wants to get something from the net *one has to give something to this net*. Among other things, collaboration networks assume voluntariness of participation, loose associations, maintaining mutual relations, economic and legal independence of the members. What constitutes the foundations of the members' activity are the contracts and agreements between the subjects. Network contacts are based on cooperation and have no geographical limitations (Elsner, 2013).

The characteristic features of education through the Internet are: shifting the burden onto learners and self-training. Yet, networking, the organizing within the network, should be a grassroots initiative.

It seems worth to quote here the definition of Professional Learning Communities (PLC): "Professional Learning Communities form networks in order to perform what their name suggests – learning through practice. PLCs meet regularly and their meetings are dedicated to learners' work and their process of learning" ([http://apn.mscdn.pl/index.php?option=com\\_content&view=article&id=70&Itemid=104](http://apn.mscdn.pl/index.php?option=com_content&view=article&id=70&Itemid=104)).

Most of the people in the contemporary world are linked within network structures and consciously join networks of different types. One of major classifications of business networks is the one suggested by S. Łobejko: *strategic, regional, operational networks* (Łobejko, 2010, p. 33). Another classification distinguishes *economic, virtual, and social networks*. These are social networks which have become particularly popular over the last years (*Nasza Klasa* or *Facebook*). There are many more, for instance: *Instagram, Twitter, VKontakte, Odnoklassniki*.



**Figure 1.** Some examples of notions referring to the metaphor of the net and networking (notion and aspect)

S o u r c e: Own elaboration on the basis of Paweł Stęпка, Konrad Subda, Wykorzystanie analizy sieci społecznych (SNA) do budowy organizacji opartej na wiedzy /Application of SNA in building an organization based on knowledge/, E-mentor No 1 (28)/2009.

The ideas of networking are used e.g. by social portals; however, this is most visibly manifested by business networking, understood as a net of lasting *business* relations. Cherishing the contacts, entering relations with the broadest circle of entrepreneurs representing different branches enhances effective exchange of information and the kindness-based climate of business. This can be exemplified by *LinkedIn* or *The Oxford Business Network*.

The following are some examples of research networks: ResearchGate, SEEN (*SE European Bird Migration Network*), Scientific Network MSN at the Institute of Economic Sciences of the Polish Academy of Sciences, Public Administration & Local Government Research Network. The activity of research networks is discussed in the further part of the article – the case of the international research network IRNet is presented.

There are well-functioning network programs in the EU (*CEEPUS, Visegrad, Erasmus Student Network*). However, they are not a subject of this study.

What is compliant with the logic of networking are the initiatives of the Ministry of National Education, which has suggested some new solutions in the field of teacher training.

## Collaboration and Self-training Networks

The studies on educational systems and the factors which determine their effectiveness conducted by McKinsey&Company indicate that the most efficient systems promote, among other things, the decentralization of the process of teacher training. This takes place through creating small teacher groups, in which people exchange experience, observe each other's work, provide feedback, elaborate new ideas, and solve educational problems. Owing to this, they can react quickly and efficiently to the new challenges in the frequently changing reality (Mourshed et al., 2012).

As the authors mentioned above have predicted, what will change in the information society are the forms of work organization and social life patterns – this will result from the decentralization and popularization of “telework” done at home, flexible working hours, and self-employment. The ongoing integration of work and home life, working time, leisure and private life will be of crucial significance for social or psychological bonds and relationships and for the model of life (The National Council for Radio and Television, 1996).

According to M. Hajdukiewicz, a collaboration and self-training network is a team of about 20 teachers or head-teachers from various schools or kindergartens who cooperate in an organized way. In the author's opinion, such a team should aim at sharing knowledge and skills, acquiring new competencies, fulfilling the tasks



together, team searching for the ways of handling problems, establishing contacts, and in consequence – undertaking collaboration (Hajdukiewicz, 2012).

*Collaboration and self-training networks* constitute a new formula of teachers' cooperation. They enhance the exchange of experiences, new solutions, and competencies. They involve activities based on partnership and mutuality. As Danuta Elsner claims, a network is a group of people who want to act together in the way specified by themselves for the implementation of an aim determined by themselves as well or an aim which can be modified or changed at any time (Elsner, 2013, p. 48).

The organizational and legal foundations are provided by the following regulations.

- *Rozporządzenie Ministra Edukacji Narodowej w sprawie placówek doskonalenia nauczycieli /The Directive of the Minister of National Education on teacher training institutions/* (Journal of Laws 2012 item 1196). These regulations indicate that, among obligatory public tasks of training centers of national reach run by the minister responsible for education, there is the support for public training institutions, psychological-pedagogical consultation centers (including specialists centers), pedagogical libraries and teachers-methodology consultants, in organizing and conducting a collaboration and self-training network for teachers and head-teachers.
- *Rozporządzenie Ministra Edukacji Narodowej w sprawie szczegółowych zasad działania publicznych poradni psychologiczno-pedagogicznych, w tym publicznych poradni specjalistycznych /The Directive of the Minister of National Education on detailed regulations for the activity of psychological-pedagogical centres, including public specialist centres/* (Dz.U 2013 poz. 199 /Journal of Laws 2013, item 199/). The centers fulfill their tasks mostly by providing support for teachers, tutors of educational groups and specialists. This is mostly done in the form of organizing and conducting a collaboration and self-training network for teachers, tutors, educational groups, and specialists who cooperate in an organized way in order to improve their work, especially by exchange of experiences.
- *Rozporządzenie Ministra Edukacji Narodowej w sprawie szczegółowych zasad działania publicznych bibliotek pedagogicznych / The Directive of the Minister of National Education on detailed regulations for the activity of public pedagogical libraries/* (Dz.U. 2013 poz. 369 /Journal of Laws 2013 item 369). The tasks of a library concern organizing and conducting support. The support consists in organizing and conducting a collaboration and self-training network for teachers who cooperate in an organized way in order to improve their work, especially by the exchange of experiences.

The burden of organizing a new system of teacher training should be shared by the three institutions mentioned above.

What is worth indicating here are the regulations concerning the standards of education preparing for the teacher's profession. The directive imposes the



following requirements on teachers: a teacher can independently acquire knowledge and develop professional skills associated with pedagogical (didactic, educational, and care-related) activity, making use of different sources (in Polish and in foreign languages) and modern technologies. In the field of information technology, a teacher has basic knowledge and skills concerning information techniques, text processing, use of spreadsheets, use of databases, application of presentation graphics, using information network services, obtaining and processing information, as well as the skill of diversified use of information technology in pedagogical work (Dz.U. 2012 poz. 131 /Journal of Laws 2012 item 131/).

This can be exemplified by the network <https://www.doskonaleniewsieci.pl/>. This Internet platform is a tool prepared for the implementation of teachers' support and the support for schools. It came into being within the project of the European Social Fund entitled "The system of teacher training based on complex support for schools." The access to the platform is provided by the Center for Development of Education for all the institutions of the educational system in order to implement the activities which are free of charge and are aimed at increasing the quality of work of Polish schools and kindergartens. The website of the project provides information on the aims, assumptions and activities within the project (<http://www.ore.edu.pl/wspieranie>, <http://www.doskonaleniewsieci.pl>).

The general goals of a network presented in Figure 2.

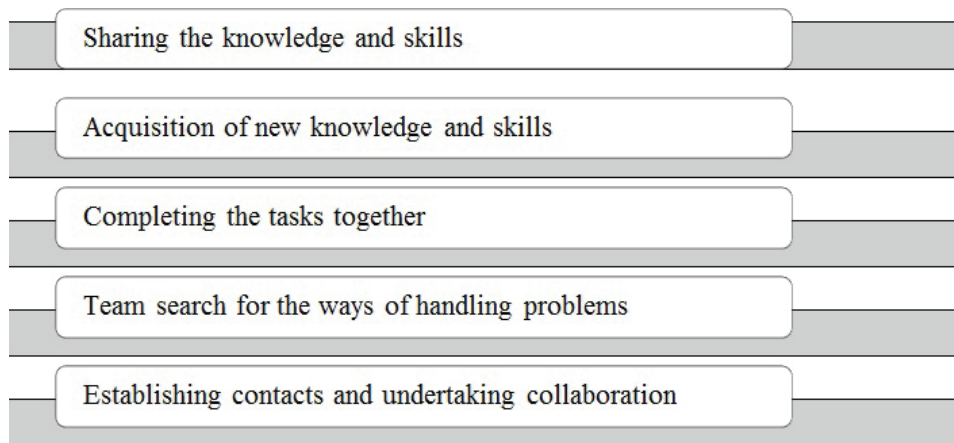


Figure 2. The general goals of a network "Doskonalenie w sieci //Improvement in the Net"

Source: <https://www.doskonaleniewsieci.pl/>.

2013–2015 was a period of unceasing development and improvement of the platform so that it could be more efficient in achieving its goals. The intra-mail and the fora allow for communication of 20 thousand users within the platform. All of them, irrespectively of their role, have access to the information and news-

letters published on the platform as well as to the designing and participation in asynchronous trainings, conducting and reading blogs, sharing files – several thousands of various materials, publications, articles, etc. The results concerning the effectiveness of the network will be presented in the author's next publications.

## Research Methodology

What is presented below are the diagnosis results of the project “Innowacyjny system wspomagania szkół w powiecie cieszyńskim /*An innovative system of school support in Cieszyn County*/.” The analyses were conducted from March to August 2014 – the period in which the project functioned. The organization of the research involved participant observation, interviews with coordinators, talks with network users. This was supported by the analysis of documents and written recordings on [www.doskonaleniewsieci.pl](http://www.doskonaleniewsieci.pl). The applied technique was a diagnostic poll.

The research comprised all teachers who took active part in the networks within the pilot project. Two networks were selected for analysis “Praca z nowoczesnymi technologiami /*Work with modern technologies*/” and “Jak radzić sobie ze szkolną absencją /*How to handle school absence*/.” Both networks involved 20 teachers and the work of each net was managed by a coordinator. What took place were four meetings of all participants, three meetings with an expert, one online conference. For diagnostic reasons, an electronic questionnaire was conducted with the help of the portal [www.doskonaleniewsieci.pl](http://www.doskonaleniewsieci.pl). The results were aimed at potential alterations in the network organization.

## Research Results

The studies were carried out in order to learn the opinions on the implementation of particular project tasks and the project itself. The obtained information was to facilitate the introduction of possible changes in the project. The detailed research results have been presented in the publication “Szkoła wobec wyzwań współczesności. Sieci współpracy i samokształcenia /*School in the face of contemporary challenges. Collaboration and self-training networks*/.”

The types of expectations were divided into three parts according to self-assessment of competencies. 8 people obtained low scores (1–2), 14 people obtained average scores (3) and 15 people got high scores (4–5) (Figure 3).

It was easily noticed that the needs and expectations concerning the network are also differentiated due to self-evaluation. What seems surprising is that in the highest score group (5 points) three people out of seven expect qualifications and certificates. With no doubt, this is not what the assumptions of the network provide. In the group of low self-evaluation (2 points) the same is expected only by one person. What draws attention is the frequently mentioned problem of school absence. It is indicated by 8 people, who signal the necessity of practical solutions, which conforms their understanding of the essence of network.

Table 1.  
*Self-evaluation of teachers*

Self-evaluation of teachers	Number
high self-evaluation	15 (4-5)
average self-evaluation	14 (3)
low self-evaluation	8 (1-2)
Total	37

Source: Own work.

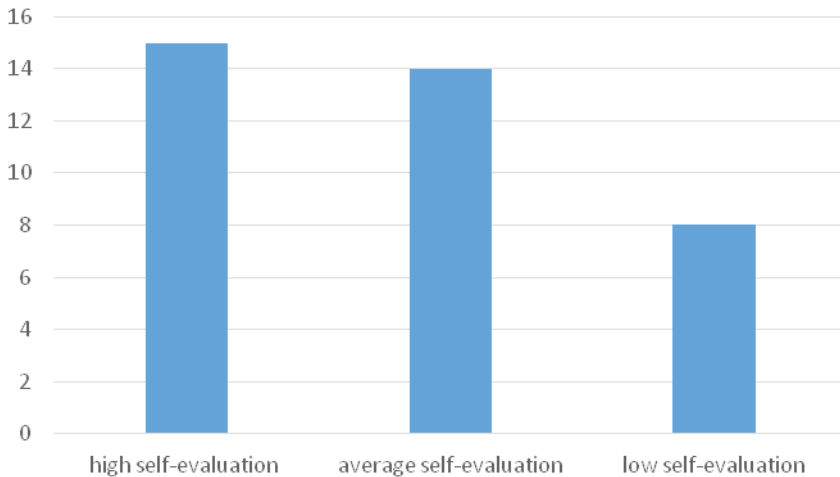


Figure 3. Self-evaluation of teachers

Source: Own work.

The analysis of needs diagnosis. The largest group ( $M_o=3$ ) assesses their competencies in networking as medium. The medium value ( $M_e=3$ ) divided the group into two parts – there are as many observations above as there are below it.

Even though participation in the project was imposed on a large number, teachers point at the advantages of taking part in the network. They claim that such cooperation enhances their competencies and provides chances for contacts

with other teachers. They emphasize the integration of the teaching environment and possibilities of an exchange of experiences. What is also stressed is that their skills concerning the subject matter of the network are raised and the participation allows for viewing the discussed issues from a different perspective. What should be also highlighted is a good atmosphere which facilitates an exchange of views and experiences.

At the same time, the observation confirms very low awareness of the project aims and of the essence of networking. The participants did not fully understand what they took part in. There was no sufficient information on the project. Teachers often mistook notions, expected certificates or other written confirmations – something quite different from what the project assumed.

What seems to be a drawback is the hurry in which the project was implemented and the fact that the participants were often randomly selected. The imposed subject matter was not interesting for some teachers, either. Moreover, it was constantly emphasized that teachers are overburdened with various training. Head-teachers force them to take part in many projects; therefore, it is hard to find time for content-oriented preparation to classes.

As a conclusion, it should be recognized that networks constitute an educational form with a lot of potentialities. The requirements comprised in the provided legal acts will necessitate (from institutions and teachers) the use of this form of training. However, implementing it requires time, an information campaign, and appropriate preparation and attitude of the participants.

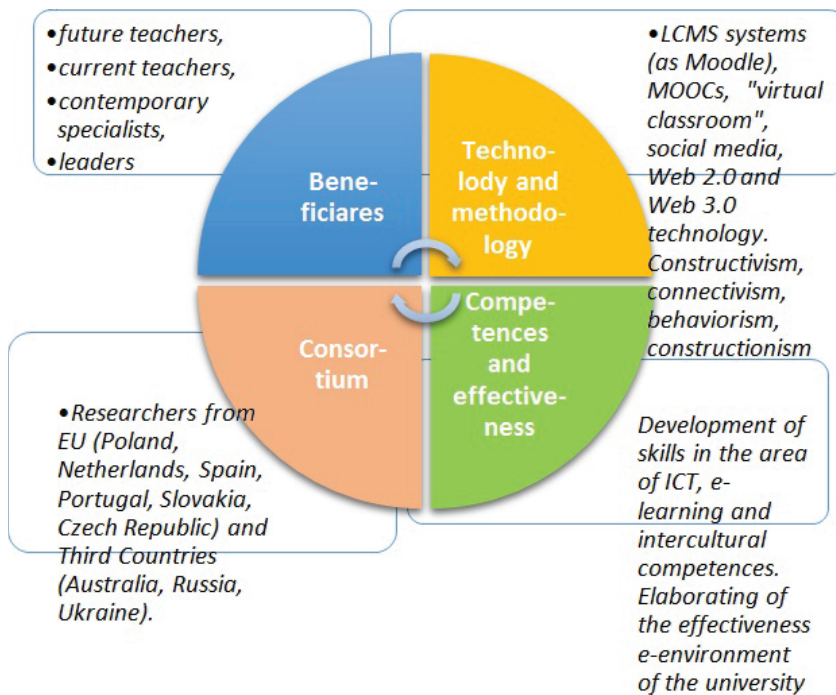
Undoubtedly, the Polish school education needs changes. The application of information technologies is aimed at improving the quality of training and reducing the bureaucratic barriers. However, a rather gloomy picture emerges from teachers' narrations: "Thinking and teaching are the last things for which there is space in schools today. We mostly fulfil the assumption, we plan reports and report plans, we manage the risk and finances, protect personal data, maintain the bureaucratic machine" (Gadacz, 2015).

Another practical example of a network is the research network IRNet ([www.irnet.us.edu.pl](http://www.irnet.us.edu.pl)), in which one of the authors of this article takes active part as its coordinator.

## **International Research Network IRNet**

Developing and implementation of the system designed to develop IT competencies of contemporary specialists, in particular future teachers, current teachers, leaders, based on the systematic use of selected Internet technologies, such as some LCMS systems (e.g. Moodle), Massive Open Online Courses, "virtual

classroom” technology, social media, other selected Web 2.0 and Web 3.0 technology, positively contributes to the development of IT skills and intercultural competencies. *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](http://www.irnet.us.edu.pl)) is a project financed by the European Commission under the 7<sup>th</sup> Framework Programme, within the Marie Curie Actions International Research Staff Exchange Scheme. Grant Agreement No: PIRSES-GA-2013-612536. Duration of the project: 48 months 1/01/2014 – 31/12/2017. The conceptual model of the IRNet project is presented in Figure 4.



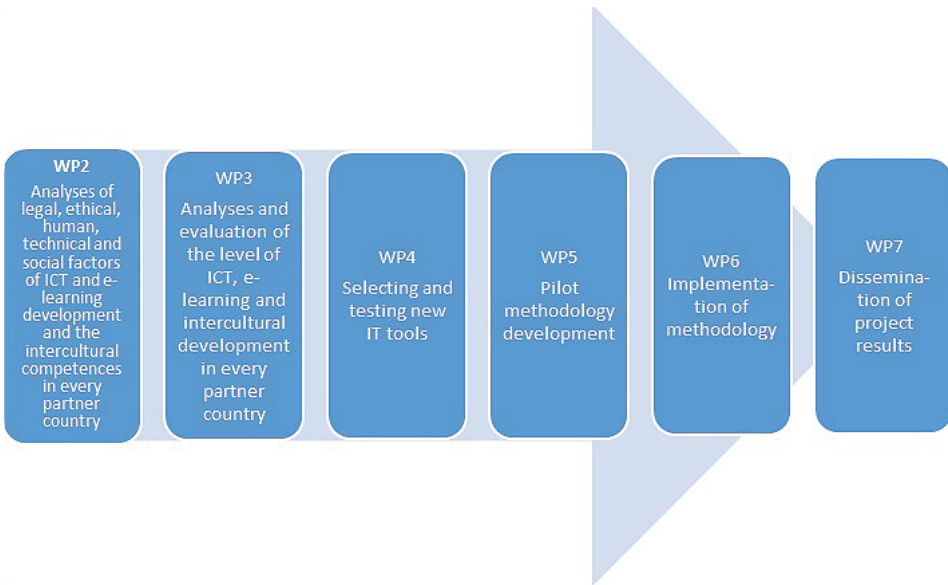
*Figure 4.* The conceptual model of the IRNet project

Source: Own elaboration.

The IRNet project aims to set up a thematic multidisciplinary joint exchange program dedicated to research and development of new tools for advanced pedagogical science in the field of ICT instruments, distance learning, and intercultural competencies in the EU (Poland, the Netherlands, Spain, Portugal, Slovakia) and Third Countries (Australia, Russia, Ukraine). The program will strengthen the existing collaboration and establish new scientific contacts through mutual secondments of researchers. The main objectives of the project are: 1. to exchange expertise and knowledge in the field of innovative techniques of edu-

cation between the EU and Third Countries and to suggest effective strategies of implementing new tools in the educational profession; 2. to analyze and evaluate social, economic, legal conditions, as well as methodologies and e-learning techniques being developed in the European and Third Countries involved.

The project implementation is divided into seven work packages WP1-WP7. Each work package has a specified title (Figure 5) and contains *objectives, tasks, deliverables and eight months duration*.



**Figure 5.** Work packages structure

S o u r c e: Own elaboration.

Methods of pedagogical research include:

- quantitative: (a) pedagogical monograph (research papers), (b) method of individual cases, and (c) method of diagnostic survey;
- qualitative: (a) depth interview, (b) qualitative analysis of the text (documents), and (c) observation.

TECHNIQUES OF EDUCATIONAL RESEARCH are: (a) observation, (b) interview, (c) questionnaire, (d) study and analysis of documents, and (e) content analysis.

THE MAIN RESEARCH TOOLS are: (a) interview questionnaire, (b) questionnaire, (c) survey (Google Drive, LimeSurvey), (d) observation tools, and (e) development of the subject dictionary, etc.

Among more important activities of International Research Network are secondments and research trips of researchers from European countries to third countries and from third countries to European countries, research trip and visiting



a partner university, discussions during meetings, (video)conferences, seminars, workshops, in remote mode as well as on project website ([www.irnet.us.edu.pl](http://www.irnet.us.edu.pl), Figure 6), Facebook (<https://www.facebook.com/IRNet-1669593856645370/>, Figure 7), and Twitter ([https://twitter.com/irnet\\_project](https://twitter.com/irnet_project)).

The screenshot shows the IRNet project website. At the top, there is a header with the IRNet logo (a globe with 'IRNet' text), the project title: "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", and the European Union flag. Below the header, a navigation bar contains links: HOME, PARTNERS, WORK PACKAGES, NEWS & EVENTS, DELIVERABLES, DISSEMINATION, IRSES DOCUMENTS, GALLERY, FORUM, CONTACT. The main content area features the University of Silesia logo and name, a search bar, and a "Location" section with contact information: "University of Silesia, ul. Bankowa 12, Katowice, e-mail: admission@us.edu.pl, phone: +48 32 359 20 71". A large photo of a diverse group of people is displayed with the caption "Programmes taught in English". The "Home" section includes project details: "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", "Project financed by the European Commission under the 7th Framework Programme, within the Marie Curie Actions International Research Staff Exchange Scheme", "Grant Agreement No: PIRSES-GA-2013-612536", "Duration of the project: 48 months 1/01/2014 - 31/12/2017", and a "Project summary" link. On the right side, there are social media links for Facebook ("Find us on facebook") and Twitter, and a "Gallery" section with a photo of a meeting.

Figure 6. IRNet project website

Source: [www.irnet.us.edu.pl](http://www.irnet.us.edu.pl).

IRNet project website contains such categories as Partners, Work Packages, News & Events, Deliverables, Dissemination, IRSES Document, Gallery (more than 100 Photo Reportage), Forum, Contact, which are permanently updated.

Project profiles on Facebook and Twitter show all more interesting and important project events, thus promoting and disseminating all activities of the International Research Network.

The more detailed concept and results of WP2, WP3, WP4 have been described in more than 100 publications of the researchers, participants of the research network and IRNet project (Smyrnova-Trybulska, 2014; Smyrnova-Trybulska et al., 2014, 2015; Kommers et al., 2014, 2015; Noskova et al., 2015), other (<http://www.irnet.us.edu.pl/tools/deliverables>).

Figure 7. IRNet project profile on Facebook

S o u r c e: <https://www.facebook.com/IRNet-1669593856645370/>.



## Conclusions

What has been analyzed in this study are a few theoretical and practical determinants of the functioning of some selected categories of network; furthermore, some information has been presented on the activity of a collaboration and self-training network and the international research network IRNet. The authors have undertaken an attempt at exploring a number of goals, aspects, factors, and expected results of the functioning of certain network categories, and they have specified many further steps of research activity.

## Acknowledgments

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Eugenia Smyrnova-Trybulska, Przemysław Żebrok

## **Praca w sieci Analiza wybranych aspektów zastosowań**

### **Streszczenie**

W społeczeństwie informacyjnym zmieniają się tradycyjne sposoby komunikacji, często na rzecz form cyfrowych. Zmieniają się również formy nauczania i kształcenia, które są zastępowane zdalnym nauczaniem za pośrednictwem różnego typu sieci. Artykuł ten skupia się na teoretycznych i praktycznych czynnikach warunkujących funkcjonowanie sieci. Przeanalizowano w nim pewne wyzwania związane z Internetem w kontekście nowych perspektyw informacyjnej przestrzeni edukacyjnej opartej na globalnej sieci internetowej. Przedstawione zostały definicje oraz pewne przykładowe rodzaje sieci. Skupiono się na sieci służącej współpracy i na sieci służącej samokształceniu oraz na ich celach. Jako przykłady przedstawiono dwa przypadki: platformę internetową i sieć „Doskonalenie w sieci / Improvement in the Net” oraz międzynarodową sieć badawczą IRNet, w działalności której autorzy zaprezentowanego artykułu biorą aktywny udział.

**S ł o w a k l u c z o w e:** edukacja, sieci, nauczanie, ICT (TIK)

Eugenia Smyrnova-Trybulska, Przemysław Żebrok

## **Сети Некоторые аспекты применения в образовании**

### **Аннотация**

В информационном обществе существующие традиционные способы коммуникации меняются, часто в пользу цифровых форм. Также трансформируются формы обучения и воспитания, которые замещаются дистанционным образованием с использованием сетей различных типов. Исследование фокусируется на теоретических и практических факторах, определяющих функционирование сети. В этом исследовании некоторые электронные проблемы были проанализированы в контексте новых перспектив информационно-образовательного пространства на основе глобальной сети Интернет. Были представлены определения, а также некоторые примерные типы сетей. Сотрудничество и самообучение в сети и ее цели были в центре внимания. Два случая были предоставлены в качестве примеров – платформа Интернет и сеть «Улучшение сети» и международная исследовательская сеть IRNet, в деятельности которой авторы представленной статьи принимают активное участие.

**К л ю ч е в ы е с л о в а:** образование, сети, обучение, ИКТ

Eugenia Smyrnova-Trybulska, Przemysław Żebrok

**Red de trabajo**  
**Análisis de aspectos seleccionados**

R e s u m e n

En la sociedad de la información, las formas tradicionales de información están cambiando mayormente a favor de los dispositivos digitales. Además, las formas de enseñanza y educación también están transformándose, siendo substituidas por la educación a distancia con el uso de varios tipos de redes. El estudio se centra en los factores teóricos y prácticos de la función de la red. En este estudio, algunos retos tecnológicos han sido analizados en el contexto de las nuevas expectativas del espacio informativo-educacional basado en la red global de internet. Las definiciones fueron presentadas además de algunos tipos de modelos de red en la red de colaboración y auto-entrenamiento y sus objetivos. Se dieron dos casos como ejemplos – la plataforma de internet y la red “Doskonalenie w sieci/ Mejora en la red/” la red de investigación internacional IRNET, actividad en la cual participaron en gran medida los autores de este presente artículo.

**P a l a b r a s c l a v e:** educación, redes, enseñanza, ICT, red de investigación internacional



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## **The Experience of the Creation of Educational IT Space of the Region**

### **Abstract**

The article deals with the modern approaches to the use of information and communication technologies in the educational process, extracurricular activities, and management at the regional level in order to enhance the creative potential of students, teachers, and administrators. The article has described the conceptual bases of creating an information-educational environment of the region as a platform for information and achievement exchange between educators and the administration of the region. It specifies the technology of implementing the content and technology component of the information-educational environment of the region and its main functional components. We suggest the implementation model of the effective management of educational institutions in the form of a unified system for collecting, processing, and storing valid statistical and operational information on the activities of pre-school, comprehensive educational institutions, and territorial units of education management (in districts and cities). The article has described the integrated tools and technologies that are designed to ensure the educational needs of both students and teachers. We also suggest the model of a single control center for the information-educational environment of the region that organizes support for its exploitation and development.

**K e y w o r d s:** Internet portal, regional educational network, informative web-resources, ZapoWiki, virtual educational communities

## Introduction

The globalization of social processes and the development of information society form new requirements for the system of education: to create conditions for territorial and chronological independence of gaining knowledge, to enable common creation of new knowledge, and to educate individuals so as to equip them with the ability to reflect, solve problems, interact, influence decision-making, enjoy peaceful co-existence, and present effective management of their lives.

The ability to learn has become the most essential skill for a modern personality. Correspondingly, the main task of general secondary education in the IT society is to teach how to learn (*The World UNESCO Report 2005*).

A teacher should not only master new technologies but also be able to apply them correctly and efficiently, and to define their role and position while teaching a range of school subjects (Morze, 2010).

This puts forward new tasks for the educational system as well as new requirements for the teacher, since introduction of IT into the educational process determines the appearance of both modern technical means, and of new forms and methods of teaching (Yanshina, 2005). The teacher becomes the key figure not only in the educational and pedagogic process, but also in the very process of computerization of education (Manako, 2009). To put it differently, this means mastering new skills by the teacher, as well as shaping the ability to choose the most efficient methods for coping with tasks in real-life situations, on condition of a permanently growing offer of textbooks, and educational computer programs and resources. Nowadays, teachers are likely not only to make choices, but also to make attempts to create new educational resources that would be capable of satisfying their pedagogical needs and students' educational demands (*The World UNESCO Report 2005*).

## The Fundamentals of the Creation of IT Educational Space of the Region

The educational policy of the Zaporizhzhia region could not stay aside the global and national tendencies. Thanks to the regional and national funding programs and the efforts of administration and local communities, secondary educational establishments (SEEs) of the Zaporizhzhia region have been equipped with computers and Internet access. By 2006, 100% of the SEEs of the Zaporizhzhia region had had not less than one fully equipped IT class and multimedia complex, as well as access to the Internet (Khivrych, Fedko, 2006). Computers and electronic

educational resources (informative, reference, didactic) enabled the advance of teachers and students in mastering and using informational and communicative technologies (ICT), and shaped new approaches to educational models. School educational communities started their formation in the majority of schools and they have gradually transformed into educational spaces (Bykov, 2008). The process of their shaping was determined by the establishment's vision of the tasks that the participants of educational and pedagogical process faced, as well as by the methods which that very establishment had chosen. That is why educational service provided with the help of ICT often failed to integrate or cooperate with another one, created even by a neighboring educational establishment.

The Department of Education and Science of the Zaporizhzhia Regional State Administration (DES ZRSA) and Zaporizhzhia Institute of Post-Graduation Pedagogical Education (ZIPGPE) had to solve the problems of the appropriate preparation of teachers for using ICT in the educational and pedagogic process.

Starting from 2007, the regional project group lead by the author of this paper began to consider the possibilities of creating the educational IT space (EITS) that was intended to meet the following requirements:

- to become a space for interaction between the subjects of the educational process – a teacher and a student;
- to create a platform for the exchange of information, achievements and advances, especially those connected with management and methodology of teaching, between regional educational establishments, district and municipal educational administrations, ZIPGPE and DES ZRSA;
- to maintain automation of managerial activity at all levels, and to enable an immediate analysis of databases and information in the system of education of the region in order to take efficient managerial decisions and to achieve socially significant results;
- to create conditions to help educational establishments solve educational and managerial tasks concerning the introduction and efficient use of EITS in the educational and pedagogic process; and
- to increase the efficacy of interaction between executive organs and local self-governing authorities, between educational establishments and the participants of educational and pedagogic process.

### **Regulatory and Methodological Grounds for the Creation of EITS**

The formation and development of EITS is performed within the present-day regulatory and legal framework, which prescribes the use of information systems of governmental authorities of Ukraine and the use of ICT in educational establishments. This includes the following Laws of Ukraine: "On education," "On general secondary education," "On pre-school education," and the Resolutions of the Cabinet of Ministers of Ukraine "On the creation of the united state electronic database of educational issues." The direction of automation of collecting and



processing information prescribed by the state statistical reporting on secondary educational establishments has been launched in the Zaporizhzhia region as the project “Information system of education management” (ISEM). It was approved by the orders of the Ministry of Education and Science of Ukraine: “On the introduction of the experiment ‘ISEM-2012’ in the general secondary educational establishments and in the organs of educational management,” “On the approval of the results of the experiment ‘ISEM-2012’ in the general secondary educational establishments and in the organs of educational management,” as well as by the letters of the Ministry of Education and Science of Ukraine of 02/09/2013 “On the submission of the mandatory state statistical report by SEE and the regional organs of educational management” and of 27/07/2015 “On the maintaining of functioning of the information system of educational management ‘ISEM’.”

The interaction and information exchange both within EITS and with other systems is performed on the basis of common methodological and technological principles and standards, taking into account possible financial expenses as well as possibilities to save finance and other resources. For instance, the software which is the basic component of ISEM does not require a separate server in every educational establishment, and it can work on every model of a computer. It can be mastered by school and educational governing staff quite quickly and easily, and can operate online (Khivrych, 2011).

The complex of ISEM enabled the creation of the unified system of collecting, processing, and storing information from the Zaporizhzhia region concerning educational establishments and territorial constituencies: districts and towns. Simultaneously, the problem of the supply of the district and municipal educational administrations with the full valid statistical and up-to-date information on the activity of SEE has been solved. This enables the performance of educational management on a higher level, and provides the opportunity to plan the expenses of the municipal and district budgets in the framework of the educational programs implementations more effectively. Besides, the use of this system helps optimize the activity of the educational governing organs, correct rationally and reasonably the directions for further development of the general secondary education in the Zaporizhzhia region, and maintain the corresponding level of control of the activity of the educational establishments of the region (Khivrych, 2011).

### **Framework Arrangements for the Creation of EITS**

In the process of creating EITS of the Zaporizhzhia region the principles of functionality, integrity, adaptedness, separatedness, and immensity were employed.

Since 2009, the project “The creation of the united educational IT space of the region” has been defined as a high-priority direction of the regional development.

The same year the concept of EITS of the region was elaborated. It covered:

- the unification of different concepts of the process of computerizing education in the region;

- the agreement on basic rules of interaction between the subjects;
- the effective use of the resources present in the regional educational system;
- the exclusion of unreasonable financial, organizational, and other expenses; and
- the achievement of qualitative changes in the fulfillment of new educational targets.

In order to maintain common methodological and technological principles and standards of interaction both within the regional EITS and with other systems, a set of documents determining the organizational, methodical, regulatory, and technological character of interaction has been adopted. These documents include decisions of the board, orders, and letters of the Department of Education and Science of Zaporizhzhia State Regional Administration (“On the efficacy of the use and on the influence of the modern IT on the educational process in the system of general secondary education,” 2006; “On the preparatory work concerning the creation of the common regional educational IT space,” 2007; “On the results of the creation of the common educational IT space of Zaporizhzhia region,” 2009; “On the updating of the data on the web-portal of the educational network and the formation of the electronic state reporting,” 2015).

It is stated in the organizational documents on the regional level that the coordination of work on the whole system is performed by the Department of Education and Science of Zaporizhzhia State Regional Administration, and the management of the creation and development of its components and separate information resources is maintained by the owners of these resources. The owners of IT resources (SEEs) that are united in EITS are fully responsible for the relevance of the provided information. The control of the organization of the submission process and the update of information in the components of EITS is performed on the managerial level of educational establishments and of the district and municipal educational management organs.

The united center of administration of the EITS of the region has been created. It organizes the work connected with the development, use, and maintenance of the system, including: immediate solutions of the current problems and issues by means of the organizational support and the elaboration of common working algorithm; the definition of authority, rights, duties, and responsibilities of the resources owners during the creation, use, support, and development of EITS; the formation of the list of the users of EITS of the Zaporizhzhia region; the agreement on the corresponding regulation of their access to the information resources.

Annually the board of Zaporizhzhia Regional State Administration takes the issues of EITS functioning and development into consideration. For example, the decision of 29 April 2015 prescribes the development of EITS by means of shaping the district and municipal educational online resources and pedagogical communities. This activity is performed according to the “Statement of the introduction and functioning of virtual educational communities of the Zaporizhzhia region,” which was adopted by the scientific and educational council of ZIPGPE.

### **Technological Framework for EITS**

EITS has been designed as a territorially distributed three-level (four-level in the future) information system which functions on the levels of a SEE, a district, and a region (and the state in the future), and has the following characteristics (Khivrych, 2011):

- it has a component structure and is user-friendly;
- it enables further development of the system and the design of new resources;
- it secures the possibility of interaction with the EITS of other regions, other institutions and organs, as well as integration with international systems;
- it has an information security system;
- it gives different levels of access to information resources to its users, according to their needs, assignments, and authorities;
- it excludes discrepancies in interaction; and
- it secures data consistency, etc.

The complex of ISEM has been designed with the use of twofold architecture. Special software, which can operate autonomously, is installed in the educational establishments. Simultaneously, due to the use of modern client-server technologies, the necessary information is transferred – with the help of the special exchange service – to the WEB-server, which is located in one of the safest and most secured data-centers in Ukraine. Users can get access to this server through any modern web-browser.

Such architecture of the complex provides the ability to keep databases in educational establishments and in the organs of educational management on the condition of temporary absence of the Internet connection. Data exchange between the basic and the top level is maintained with the help of both the Internet and mass storage devices. It made it possible to integrate into the system even those educational establishments that do not have Internet access or students, but their presence is necessary to give a full account in the state reporting.

The users of ISEM get access to necessary data locally and through the Internet. The amount of data that every user can operate is defined dependently on the rights granted by the administrator of the complex. While using the web-portal, guests can browse only a limited amount of data, whereas users in charge get an authorized password access on the basis of the encrypted data exchange protocols.

The system has four levels of access: the basic level, given to an educational establishment; the medium level, granted to district and municipal educational governing organs; the top level, available for the regional department of education; and the guest level that is applicable for parents, students, teachers, members of the community, etc.

## The Components of Educational IT Space of the Zaporizhzhia Region

The database of EITS of the Zaporizhzhia region is represented on the web-portal “Zaporizhzhia regional education network” by two resources: ISEM and “The educational on-line map of professional education in Zaporizhzhia region.”

### ISEM Components

ISEM components are as follows:

- the web-portal <http://zp.isuo.org>, which hosts the information on the secondary and pre-school educational establishments, including the information about every educational establishment, its facilities and resources, as well as the information about students, teaching and administrative staff, and state reports;
- the portal for electronic registration for entering a pre-school educational establishment (e-queue) (<http://reg.isuo.org>);
- the web-portal <http://mz.com.ua>, which is a system of electronic class registers and e-diaries; and
- <http://at.isuo.org> – an electronic system of teaching staff evaluation.

Active users of ISEM include headmasters, teachers, parents, and students of 595 (100%) secondary schools and 512 (100%) pre-school educational establishments, 32 members (100%) of educational governing staff of district and municipal administrations, the staff of ZIPGPE and DES ZRSA. All the users have acquired their IDs with different levels of access to the information hosted on the portal, and use its capacities according to their needs or functional duties (Khivrych, 2011).

The web-portal <http://zp.isuo.org> comprises a set of tools that are aimed at the automation of the managerial activity not only in educational establishments but also in educational governing organs of all levels. The united system of collection, processing, and storage of information on secondary and pre-school education provides the solution to the following issues (Khivrych, 2011):

- the supply of the managerial organs with full, reliable, and up-to-date information about the activity of educational establishments of the region;
- the avoidance of extra red tape for additional information collection;
- effective planning of budget expenses of all levels in the framework of the educational branch functioning and the implementation of the development programs;
- rational and reasonable correction of the directions for the further development of education on all levels – from a separate establishment to the region on the whole; and
- the implementation of the corresponding level of control of the activity of educational establishments and educational governing organs of lower levels.

The collection of information and updating the databases are performed in every educational establishment by means of the software complex <http://ekyrs.org>, which, if necessary, is updated by the developer and can be downloaded from the portal.

In every educational establishment of the region there is an appointed staff member responsible for creating and updating all the databases, specifically in respect of teaching staff, students, the language of teaching, educational profile, advanced studies, facilities, resources, etc. On the basis of the information which is input by the establishment, a draft of a timetable is automatically formed, as well as a state statistical report about an establishment is generated.

The Internet portal <http://zp.isuo.org> provides the opportunity to (Khivrych, 2011):

- generate all statistical reports on educational issues on the level of district or region;
- generate other reports or selections in different formats;
- search for necessary information on an establishment, its students and teaching staff; and
- get up-to-date information about an educational establishment, etc.

To supply the Internet portal with data on pre-school educational establishments and to form state statistical reporting on the issues of pre-school education, the software complex <http://dnz.ekyrs.org> is used. In January 2015 a state report on pre-school education was for the first time formed in semiautomatic mode by all the pre-school educational establishments online and was sent to the portal of Zaporizhzhia regional education network.

On the basis of the software environmental complex (<http://dnz.ekyrs.org>), a system of e-registration to a pre-school educational establishment has been designed (<https://reg.isuo.org/>), which makes it possible to keep tabs on the queue for entering pre-school educational establishments of the Zaporizhzhia region (PSEE).

With the help of the module “E-registration to pre-school educational establishments,” parents can register their child for kindergarten, and people in charge of either a municipal or district educational governing organ can control the queue and issue an assignment to the chosen PSEE.

At present, 80% of the PSEEs of the Zaporizhzhia region are connected to the system. E-registration has been fully introduced into 70% of the PSEEs. In other establishments the introduction of the system is in process.

In the framework of the development of the educational IT space of the region, the introduction of the system “Moi Znannia” (<http://mz.com.ua>) is being performed. It provides the opportunity to keep electronic class registers, e-diaries, and to grant parents and students access to the information about school grades and progress of a student. This resource is actively used by 20% of the educational establishments of the Zaporizhzhia region, and 40% are having a trial of the

system in separate classes. Due to the absence of the stable Internet connection and equipped school networks, separate educational establishments of the Zaporizhzhia region are still unable to launch the system “Moi Znannia” fully.

The trial version of the system “Electronic evaluation of teaching staff” (<https://at.isuo.org/>) is functioning in EITS now. It enables heads of educational establishments and members of district and municipal evaluation boards to perform complex evaluation of teaching staff activity and their correlation with the actual positions.

Since 2015, “Educational online map of profile education of Zaporizhzhia region” (<http://maposvita.pp.ua>) has been functioning in the framework of ISEM. It is an interactive map of the educational establishments of the Zaporizhzhia region, which gives information about their educational profiles. This resource is used by teachers, parents, students, and educational governing organs and has free access for users.

All the information in the educational network of the Zaporizhzhia region is kept up-to-date: the data is quickly updated by the educational establishments and is regularly controlled by the educational governing organs of the region. To perform this function, in every organ of government there is an appointed staff member whose duties include the following (Khivrych, 2011):

- the formation of the state report on the district, municipal, regional level;
- the control of keeping databases in educational establishments;
- regular submission of actual, up-to-date and true information of their level; and
- maintaining special software and updating it regularly.

ZIPGPE is responsible for:

- training and consulting certain staff members of district and municipal educational governing boards on the use of software complexes (<http://ekyrs.org> and <http://dnz.ekyrs.org>), and the use of the information in the work routine;
- training certain staff members in the basics of the work with the “Electronic registration to a pre-school educational establishment” module; and
- providing, if necessary, technical support to educational establishments and educational governing organs concerning the work with software complexes <http://mz.com.ua>, <http://reg.isuo.org>, <http://ekyrs.org>, <http://at.isuo.org>.

Regional EITS continues its development.

- The database is constantly expanding: private and night schools, pre-school, out-of-school, professional, and higher educational establishments are gradually joining the system.
- The number of users who can get access to the databases on different levels (students, parents, teaching staff, etc.) is constantly increasing.
- The program is being supplied with new modules that enable monitoring, analysis of educational processes, etc.

There is an immediate information exchange between the administrator of EITS in the educational governing organs and corresponding staff members in educational establishments the VoIP-service Skype. Up-to-date information about

the functioning of the Internet portal <http://zp.isuo.org> is published in a Facebook group (<https://www.facebook.com/groups/zp.isuo/>). Urgent issues and problems connected with technical support are solved with the help of a software complex AmmyAdmin (<http://www.ammy.com>).

### **Methodical Portal ZapoWiki**

Since 2008, the methodical portal ZapoWiki designed on the basis of WikiWiki technology has been functioning in the framework of EITS. This resource has been created with the aim of introducing the principles of social pedagogy and the Web 2.0 technology into the educational process of the regional educational establishments. Wiki-website ZapoWiki is constructed as a platform for:

- the activity of virtual pedagogical communities;
- webinars, contests, and network projects;
- trainings for teachers and students in the sphere of modern IT and ICT (network technologies Web 2.0 for students, network technologies Web 2.0 for teachers, Intel®Teaching for the Future (version 10.1), interactive means of teaching);
- the introduction of quest-technologies into the teaching process;
- the certification of educational materials of the Zaporizhzhia region teachers;
- a database of educational web-sites; and
- the creation of e-portfolios of teachers and students, etc.

More than 35,000 pages have been created on the portal, more than 20,000 files have been uploaded, and more than 10,000 teachers and students have registered there so far.

### **Virtual School of Programming**

The regional educational project “Virtual School of Programming” has been launched within the framework of EITS since 2011. The project presupposes the functioning of the online-resource “Unii Programist” (the Young Programmer), which is a system of automated check of the tasks on programming (<http://s28.zp.ua/fpc>). It is used to meet the requirements and needs of students and teachers all over the region. The mission of the resource is teaching students programming and perfecting their skills with the use of the elements of distance learning and holding Olympiads on programming. More than 3,500 usual and complicated tasks are available in this resource. About 2,000 of school students are its active users.

### **The School of Modern Knowledge**

Since 2014, one more project – “The school of modern knowledge” – has been implemented in the EITS framework of the region. This project is aimed at creating conditions to receive distance secondary education, and to maintain qualitative profile and pre-profile preparation of the students of the regional educational establishments. This resource ([zhu.edu.ua/mk\\_school](http://zhu.edu.ua/mk_school)) is created on the basis of the Moodle software complex.



As many as 230 e-courses have been registered in the resource, and 85 of them are supplied with the corresponding educational and didactical materials, which are available for browsing in the guest mode. These distance learning courses are elaborated by the members of regional creative pedagogical groups. The scientific-educational board of ZIPGPE has approved and recommended for use in the educational process more than 20 courses; among them one can find “History of Ukraine. 9<sup>th</sup> form,” “Ukrainian Literature. 9<sup>th</sup> Form,” “Chemistry. 10–11<sup>th</sup> Forms,” “Biology. 10<sup>th</sup> Form,” “Biology. 11<sup>th</sup> Form,” “Ecology,” “Biology and ecology. 10–11 Forms,” “Russian,” etc.

There is a distance learning course entitled “The development of electronic courses in Moodle platform” provided by ZIPGPE and aimed at training teaching staff to work in the Moodle space. In order to implement this project most successfully, a lot of preliminary work is being done at present, e.g. working on encouraging teachers to use Moodle and providing content to its distance learning courses.

### **Platforms for Distance Learning**

In order to maintain qualitative educational process in ZIPGPE during post-graduate education of teaching staff in general and IT teachers in particular, two platforms for distance learning have been created. They are the Chair of IT of ZIPGPE (<http://do.ciit.zp.ua>) and the educational unit of ZIPGPE (<http://91.189.131.226/moodle/>), where more than 120 e-courses presenting structured educational and methodical material have been created and published. These resources are designed with the use of the Moodle free software. The supply of the courses with the corresponding materials is performed by the teachers who are in charge of the courses.

Every ZIPGPE student has a unique login and password for authorization in the system. Individual logging in makes it possible to check and control students' work and progress, and to maintain a system of rating their self-study activities. Distance learning implements an individual approach into the studies and allows every student to define the time they need to master the educational material, to fulfill the tasks, and to pass exams or tests.

### **Virtual Pedagogic Communities in the EITS of the Region**

A very active and fruitful distant cooperation of 26 virtual school subject communities, 11 virtual communities of the chairs and departments of ZIPGPE, and 11 virtual communities of other types (those of speech therapists, librarians, IT specialists, educators, etc.) has recently been created on the ZapoWiki web-portal.

A lot of professional contests and festivals are held annually among teachers in order to develop virtual teaching communities, to encourage pedagogical creativity, to improve pedagogical excellence, to exchange the experience, and to spread the best teaching methods. The materials from these events are open to public (<http://>



zw.ciit.zp.ua/index.php/Обласний\_фестивальогляд\_освітніх\_веб\_ресурсів\_області,\_2015).

For instance, achievements and professional progress of IT teachers resulted in the designing of an electronic creative laboratory based on the ZapoWiki platform. This laboratory is formed on the grounds of different examples of IT teachers' activity that reflect their teaching work and maintain the technical support of the above mentioned online projects.

The creation of the electronic creative laboratory makes it possible to analyze a teacher's work in the period between evaluations, especially such activities as the participation in professional seminars, creative groups, round-table discussions, forums, conferences, professional contests, or educational exhibitions. The laboratory also enables the presentation of a teacher's creative report (lesson plans and materials, class events, photos and videos), printed and electronic publications, students' achievements, etc.

### **Web-resource Bank of EITS of the Zaporizhzhia Region**

So as to arrange and catalogue educational resources of the region, since 2014 a regional project of creating a web-resource bank has been introduced into the EITS framework. All resources created by the teaching staff, and checked and evaluated by teachers and educators are published in the ZapoWiki web-portal, in the section "Web-resource bank of Zaporizhzhia region" ([http://zw.ciit.zp.ua/index.php/Банк\\_веб-ресурсів\\_Запорізької\\_області](http://zw.ciit.zp.ua/index.php/Банк_веб-ресурсів_Запорізької_області)).

This bank is annually enriched with new interesting materials. The main condition for including a resource into this bank is that the resource is active, vivid, and constantly updated. Throughout 2015, 33 new web-resources were placed in ZapoWiki, among which there are blogs (teacher's, headmaster's, librarian's, deputy headmaster's, subject, etc.), websites (school sites, teachers' sites, teaching communities' sites), and portfolios. Moreover, this bank has a significant informative function, as it helps to announce upcoming teaching contests and events in the region.

In order to design a cloud-oriented educational space and to fill it with new web-resources, a new section – "The use of cloud technologies in education" – has been started in ZapoWiki. To maintain its development, a training "EITS of an educational establishment by means of Google Apps for Education" for teachers and headmasters was held in December 2015.

Since 2014 a unique system of domain names has been introduced in the osvita.zp.ua domain, based on the Google service with the use of licensed software Google for Education. This system gives every organization (a school, a department, a teaching community) an opportunity to have its own name of a web resource and an e-mail in the mentioned domain.

## Conclusion

The launching and full work of an educational portal of the region demands common efforts of the educational governing organs and educational establishments. However, the right policy of the regional educational governing organs, directed to the formation and development of educational IT space of the region, is confirmed by the following proofs:

- the 7<sup>th</sup> position of Zaporizhzhia region in the common state rating by the results of the External Independent Testing of the Quality of Education among the school graduates in 2015;
- usual 5<sup>th</sup>–7<sup>th</sup> positions in the state rating of subject Olympiads and contests; and
- numerous awards of educational establishments, teachers, and students in all-Ukrainian and international exhibitions, contests, competitions, etc.

Nowadays, EITS created in the region is developing and is one of the most prospective directions for:

- the information support of teaching and educating process, not only in secondary, but also in pre-school, out-of-school, professional, higher, and post-graduate educational establishments;
- the increase of the level and quality of the salvation of didactic tasks on the technological ground;
- the satisfaction of requirements in qualitative education of the population of the Zaporizhzhia region;
- the transfer of the learning process from the mechanical memorizing to the development of self-study skills;
- the creation of the most favorable conditions for the development of creativity and personality self-development in teachers and students;
- the processes of the humanization of education and of the creation of equal opportunities to get qualitative education notwithstanding social status, physical or individual peculiarities of a person;
- the elaboration of the platform for shaping the culture of cooperation and collaboration, and exchange of information about the achievements of social groups and individuals (Khivrych, 2012); and
- the integration into the united state space.

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Valentyna Khivrych

## Doświadczenie tworzenia informacyjnej przestrzeni edukacyjnej w regionie

### Streszczenie

Artykuł poświęcono rozpatrzeniu obecnych podejść do wykorzystywania informacyjno-komunikacyjnych technologii w procesie kształcenia, działalności pozalekcyjnej oraz zarządzania na poziomie regionalnym w celu podniesienia potencjału twórczego uczniów, nauczycieli i zarządców. Opisano koncepcyjne podstawy tworzenia informacyjnej przestrzeni edukacyjnej regionu jako platformy do wymiany informacji, osiągnięć i dokonań między pedagogami i zarządcami regionu. Określono technologię realizacji treściowego i technologicznego składnika informacyjnego środowiska edukacyjnego regionu oraz jego głównych składników funkcjonalnych. Zaproponowano model skutecznego zarządzania instytucjami edukacyjnymi w formie jednolitego systemu gromadzenia, przetwarzania oraz przechowywania ważnych informacji statystycznych i operacyjnych dotyczących czynności prowadzonych w przedszkolach, w instytucjach edukacyjnych każdego szczebla i w jednostkach samorządu terytorialnego ds. zarządzania edukacją (w okręgach i w miastach). Opisano zintegrowane środki oraz technologie mające na celu zaspokojenie zarówno potrzeb uczniów, jak i nauczycieli. Zaproponowano także model jednego centrum kontroli dla informacyjnej przestrzeni edukacyjnej regionu, uwzględniający wsparcie w zakresie jego użytkowania i opracowywania.

S ł o w a k l u c z o w e: portal internetowy, regionalna sieć edukacyjna, informacyjne zasoby internetowe, ZapoWiki, wirtualne społeczności oświatowe

Valentyna Khivrych

### **Опыт создания информационного образовательного пространства региона**

#### **Аннотация**

Статья посвящена рассмотрению современных подходов к использованию информационно-коммуникационных технологий в учебно-воспитательном процессе, внеклассной деятельности и управлении на уровне области для повышения творческого потенциала учащихся, учителей и управленцев. Описаны концептуальные основы создания информационного образовательного пространства области как платформы для обмена информацией и достижениями между педагогами и управленцами области. Уточнена технология реализации содержательной и технологической компоненты информационного образовательного пространства области, его основные функциональные составляющие. Предложена модель реализации эффективного управления учреждениям образования в виде единой системы сбора, обработки, хранения валидной статистической и оперативной информации о деятельности дошкольных и общеобразовательных учебных заведений и территориальных единиц управления образования (районов и городов). Описаны интегрированные средства и технологии, направленные на обеспечение образовательных потребностей, как школьников, так и учителей. Предложена модель единого центра управления информационным образовательным пространством области, который организует сопровождение по его эксплуатации и развитию.

**К л ю ч е в ы е с л о в а:** Интернет-портал, областная образовательная сеть, информационные веб-ресурсы, ZapoWiki, виртуальные образовательные сообщества

Valentyna Khivrych

### **La experiencia de creación del ámbito educativo de la región**

#### **Resumen**

El artículo trata sobre nuevos métodos educativos que utilizan las Tecnologías de la Información y Comunicación en el proceso educacional, actividades extraescolares y la gestión a nivel regional para aumentar el poder creativo de estudiantes, profesores y personal administrativo. El artículo describe las bases conceptuales de la creación de un entorno informático-educativo de la región, como una plataforma interactiva para lograr así el intercambio de información y progreso entre los educadores y el personal administrativo de la región. Esto precisa la aplicación del contenido y las funciones tecnológicas de la tecnología en el entorno informático-educativo de la región, así como una plataforma que sirva para intercambiar información y ver el progreso de los componentes funcionales entre educadores y personal administrativo de la región y su explotación y desarrollo.

Proponemos un modelo de aplicación de un control efectivo de las instituciones educacionales de manera que haya un sistema homogéneo a la hora de recopilar, procesar y guardar la información

estadística y funcional válida sobre: las actividades de preescolar, instituciones educativas generales y unidades territoriales de gestión educativa (en municipios y ciudades). El artículo describe los métodos integrados y las tecnologías que se diseñan para garantizar las necesidades educativas de profesores como alumnos. También proponemos un modelo de un único centro de control del entorno informático-educativo de la región, que disponga de apoyo para su uso y desarrollo.

**P a l a b r a s c l a v e:** portales de internet, red educativa regional, recursos informativos de internet, Zapo Wiki, comunidades educativas virtuales



# IV

Research on Formal and Informal Use  
of ICT and E-learning in Secondary School







**Wojciech Jan Zuziak**

Poland

## **Creatively and Informally: Scratch and the Remix Culture**

### **Abstract**

The purpose of this paper is to demonstrate the focus of education on creativity achieved by the use of coding (“code to learn”), in view of modern pedagogical theories. Social interactions between young creators are an important factor. The paper describes an initial stage of the research on the phenomenon of the remix of simple computer games created by the community of users in the Scratch environment. It presents selected problems of young creators connected to sharing their own work with other community members: authorship acknowledgement, formal acknowledgement for the first author placed on derived products (games), reactions of the first author to the creative development of their ideas, or influence of school grades on the will to share the project. There will be further research on the achievements of the same group of students aged 15 to 16 after a series of lessons concerning creating computer games in the Scratch environment.

**K e y w o r d s:** education for creativity, connectivism, constructionism, code to learn, Scratch, culture of remix

### **Introduction**

What is creativity in the net – a network of creators or maybe something else?  
How to share your own creativity under certain rules and with respect for other

people's (co-authors') work? Out-of-school and from home. Informally or even occasionally. In an interesting way. In a new formula.

What is the culture of remix as proposed by the Massachusetts Institute of Technology, Media Lab (USA)? Is a young programmer creative or not? Does he or she learn how to code or does he or she code and learn along the way?

In part one of the paper, the author briefly describes the definition of creativity and creative work. Subsequently, the author presents the characteristics of a web cooperation environment for young creators.

In part two, connectivism and its critique lead to a proposition how to construct knowledge in a connective way.

Part three is a description of the Scratch environment, the idea of remix, and the "code to learn" idea.

In the last part, the results of the initial survey among students aged 15–16 are presented. The research tackles the question of sharing one's own coding projects with other members of young creators' community.

## **Creativity, Education for Creativity**

In the mid 20<sup>th</sup> century Morris I. Stein wrote that "the creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point in time" (Stein, 1953, p. 18). By "novel" Stein means that the creative product does not exist previously in precisely the same form. It arises from a reintegration of already existing materials or knowledge, but when it is completed it contains elements that are new (Stein, 1953, p. 311).

Władysław Tatarkiewicz in his work entitled *The history of six definitions (Dzieje sześciu pojęć)*, analyzing the transformation of the definition of creativity, understands it broadly as pancreationism. This concept emphasizes that creativity is not related only to outstanding realizations and talents of a very small group of people; instead, everyone can be creative if one does not limit themselves to repeating and copying, but gives something back (Limont, 2010, p. 265).

A creative work of young people requires a proper environment: an environment in which they would be able to use the works of others, but also give something to others, give something back, make a contribution.

An optimal environment seems to be the one that would always be accessible to young creators. On the one hand, it would allow them to work within the frames of formal education; on the other hand, due to its accessibility (preferably: 24/7) it should encourage students to do their individual – informal, sometimes occasional – work.

The environment of an active creator should allow not only for activities forced by school education (finishing work from the lesson, preparing additional homework) but also for those triggered by the social context of work creation: the need for comment reaction, encouragement or critique, the need for reaction to presented work or reaction for the co-users' ideas.

An active creator would immediately notice the possibility to develop the recently viewed work or to present their peer's idea. An environment of an active creator should enable them an immediate creative reaction – an immediate start of work.

Modern ICT tools, the Internet with its social context, and a properly chosen material form solid foundations of education for creativity.

We can point directly to:

- web applications (operating in a web browser) – as easy ICT tools that do not require installation or update;
- the Internet – as such – and its social context provided by Web 2.0; and
- solving interesting problems connecting information technology (algorithmics), music, animation, and computer games – as the material able to engage a young creator.

What binds the two first elements listed above is the Internet as the area of social interactions and as a transmission medium in a more technical sense.

## We Connect to Create

### Connectivism

One of the tasks of education – including education for creation – is to prepare students to live in the world we are now unable to imagine and to work in professions that have not yet been invented. Nowadays, students have to be aware that they will learn throughout their whole lives and that probably they will change their places of professional (assigned) jobs frequently. This will also cause the need for constant education.

Does school based mostly on the memory and generic approach prepare students to function in the future world? Does teaching by the “memorize, pass, forget” method still make sense in the world where the so-called “useful” knowledge resources (used for work and learning) can no longer be grasped by the human mind?

People should combine their learning abilities and a critical source analysis with the ability to access quickly the resources that have long been stored beyond their minds: in an analog or (today mostly) digital way. Only this kind of combination may result in a professional or academic development of an employee and a student. This nurturing of connections is called connectivism.

The authors of connectivism – George Siemens and Stephen Downes – having analyzed the limitations of other modern pedagogical theories, propose a new concept of learning. The starting point is the fact that technology has a significant influence on our lives, on the way we communicate and the way we learn (Polak, 2010).

In the connective vision of learning the pressure is on “know-where” instead of “know-what” or “know-how,” especially because a part of today’s knowledge rapidly becomes useless in the face of new discoveries (Siemens, 2005).

Siemens describes this phenomenon using the notion of the “half-life knowledge.” It is the time span from when knowledge is gained to when it becomes obsolete. Half of what is known today was not known 10 years ago. The amount of knowledge in the world has doubled in the past 10 years and is doubling every 18 months according to the American Society of Training and Documentation (ASTD) (Siemens, 2005).

Connection is the central metaphor of the learning process in connectivism (Polak, 2010). Nurturing the connections themselves is equally important as the number of resources accessible to us, their condition and the specific abilities of an individual, making it easy to use them. Nurturing the connections must be a creative process; it must become the time for *learning*, and even the time to *create learning*, *create knowledge*.

### **The Critique of Connectivism**

Janusz Morbitzer represents the critical approach to connectivism. He accuses this notion of being built on two false premises:

- knowledge is located on the Internet, and
- the metaphor of learning generates connections between network nodes.

Moreover, he claims that the latter silently assumes the former (Morbitzer, 2013a, pp. 37–38).

Morbitzer states that knowledge is an individual interpretation of selected fragments of reality saved in human minds. He quotes Peter F. Drucker (1909–2005), who claims that wisdom and knowledge are not located in books, computer programs, or the Internet. What is there is information. Wisdom and knowledge are always embodied in humans: they are gained and used by the person learning (Morbitzer, 2013a, pp. 37–38).

Also Maciej M. Sysło denies the possibility of knowledge existing beyond humans, undermining, like Morbitzer, the assumptions of connectivism. Sysło therefore defines the role of education as training the competence in the development of one’s own knowledge (Sysło, 2010).

Can the development of one’s own knowledge be conducted in a connective way? Can knowledge – as the individual interpretation of selected fragments of reality saved in human minds – be developed as a result of connecting with the web? Yes, of course.

### **Constructing Knowledge in a Connective Way?**

Morbitzer himself notices a chance of combining connectivism with constructivism. According to him, connectivism based on technological premises is only a way to get information with IT tools, whereas constructivism is the necessary intellectual aspect – the belief in the power of the human mind, which is essential for understanding, interpreting, and converting information into knowledge (Morbitzer, 2013b).

He further advocates against fearing constructivism, which is still a theory, and encourages not to resign from using the brain as the most powerful tool to create and process information (Morbitzer, 2013b).

Taking into account constructivism supported by connectivism, we must not forget that – with the development of communication technologies and unprecedented access to external sources – the role of a teacher changes. A teacher is no longer “an oracle.” Their words may quickly undergo the students’ critique based on the most recent knowledge from current sources.

Teachers should be aware of the shift in their role in the process of teaching and learning. Teachers nowadays become guides, advisors, animators of the situation where students begin to learn on their own. They can have disputes, based on sources, with students. Then learning (as a process) “happens” in a situation of an argument.

Let us consider the three factors that have been mentioned so far. That is the constructive approach to education with the strong (connective) use of the web for creating favorable situations to develop creativity. Therefore, we have everything to bring up the environment proposed by the Massachusetts Institute of Technology, Media Lab (USA): *Scratch – Imagine, Program, Share*.

## **Digital Fluency of Creators**

### **Scratch**

Resnick’s team has designed a free environment for young creators. Scratch is a free programming language and online community where you can create your own interactive stories, games, and animations. Scratch has been created especially for children aged 8 to 16, although it is being used by people of all age groups in over 150 countries, and it is available in over 40 languages (Scratch – About).

“Scratch builds on the constructionist ideas of Logo (...). To help users make their projects personally engaging, motivating, and meaningful, Scratch makes it easy to import or create many kinds of media (images, sounds, music)” (Maloney et al., 2010, p. 3).

The origin of Seymour Papert's theory of constructionism lies in constructivism. According to this theory, the most effective method of creating new skills is including pupils or students in actions during which they can create a specific and interesting product. In this sense, it expands constructivism, which emphasizes solving problems practically, using not only mind but also hands (Lapeš & Tocháček, 2012, p. 22).

Papert claims that doing is a good way to learn, but we learn best of all by the specific kind of doing that consists of constructing something outside of ourselves. Children who are building a tower, writing a story, constructing a working robotic device, or making a video game are all examples of constructing, and the list goes on indefinitely (Papert, 1999, p. XIII).

The author of this paper – taking into consideration his own experience as an IT teacher – values the educational potential of Scratch that shows in:

- no fee for using the environment;
- decent Polish language version of the product;
- availability of the version in both on-line and off-line mode;
- availability for operating systems: Microsoft Windows, Mac OS X, and Linux;
- lack of error notifications – commands should fit each other by a shape of the puzzle on which they are saved;
- eye-catching interface, attractive to kids at the age of 8 and older;
- constantly growing community of users; and
- possibility of project remixing.

Scratch unites programmers from the whole world and enables them to express themselves in languages comprehensible to them (not necessarily in natural languages).

### **Digital Fluency and Learn to Code, Code to Learn**

For Mitchel Resnick from the Massachusetts Institute of Technology, Media Lab (USA), the modern “digital fluency” should mean designing, creating, and remixing, not just browsing, chatting, and interacting (Resnick et al., 2009, pp. 60). He states that it is comfortable for many young people to send text messages, play online games, and browse the Internet. However, he wonders whether it really makes them fluent with new technologies. Young people interact with digital media on a regular basis. Yet, very few of them are able to create their own games, animations, or simulations. Resnick compares them to people who are able to read, but not write (Resnick et al., 2009, p. 62).

While teaching (or learning) to code, we simultaneously teach (learn) by means of coding. Resnick concluded it in the slogan: Learn to Code, Code to Learn. He also sees the biggest challenges for the future in not in the technological field but in the cultural and educational ones. He notes that a change in the way we think is required in order for people to start to see coding not only as a good job

opportunity, but also as a new form of expressing oneself and a new context for learning (Resnick, 2013).

Resnick thinks that in the process of learning to code, people learn many other useful things and he enumerates for example: “strategies for solving problems, designing projects, and communicating ideas. These skills are useful not just for computer scientists but for everyone, regardless of age, background, interests, or occupation” (Resnick, 2013).

When teaching algorithmics and coding at school, we teach children and young people to solve problems creatively and express themselves in the language of the 21<sup>st</sup> century.

### **The Culture of Remix**

Scratch users share their ideas by creating remixes of projects. On the Scratch Web site they are provided with a social context. This allows users to share their Scratch projects, receive feedback and encouragement from their peers, and learn from the projects of others (Maloney et al., 2010, p. 3).

Resnick and his co-workers mention that, in the beginning, some Scratchers felt upset about other users remixing their projects. They felt as if others were stealing their work. There were many discussions held on the website’s forums about the importance of sharing and the ideas behind open source communities (Resnick et al., 2009, p. 65). The goal of Scratch originators is “to create a culture in which Scratchers feel proud, not upset, when their projects are adapted and remixed by others” (Resnick et al., 2009, p. 65).

The complete information about the evolution of a shared project is stored as a „remix tree” (Figure 1), which grows out from the base project.

In February 2016, the Pizza Chef project by ttseng gathered:

- 307160 views,
- 817 remixes (derived products) marked on the remixtree,
- 1179 marks as “favourite” (stars),
- 1480 marks as “beloved” (hearts), and
- 1262 comments.

These figures indicate the power of web interactions among young creators. Interestingly, one of the remixing members of the community was Scratchteam (<https://scratch.mit.edu/users/Scratchteam/>) – the team of Scratch creators from the MIT.

It goes as far as to say that the figures can imply grades in the web of young creators. Such grades give the creator a fuller picture of how the project is received by the community than the teacher’s grade.

All user-generated content that creators submit to Scratch is licensed to and through Scratch under the Creative Commons Attribution-ShareAlike 2.0 license. This allows others to view and remix the content of each creator. This license also allows the Scratch Team to display, distribute, and reproduce the content of

creators on the Scratch website, through social media channels, and elsewhere (Scratch Info, 4.3).

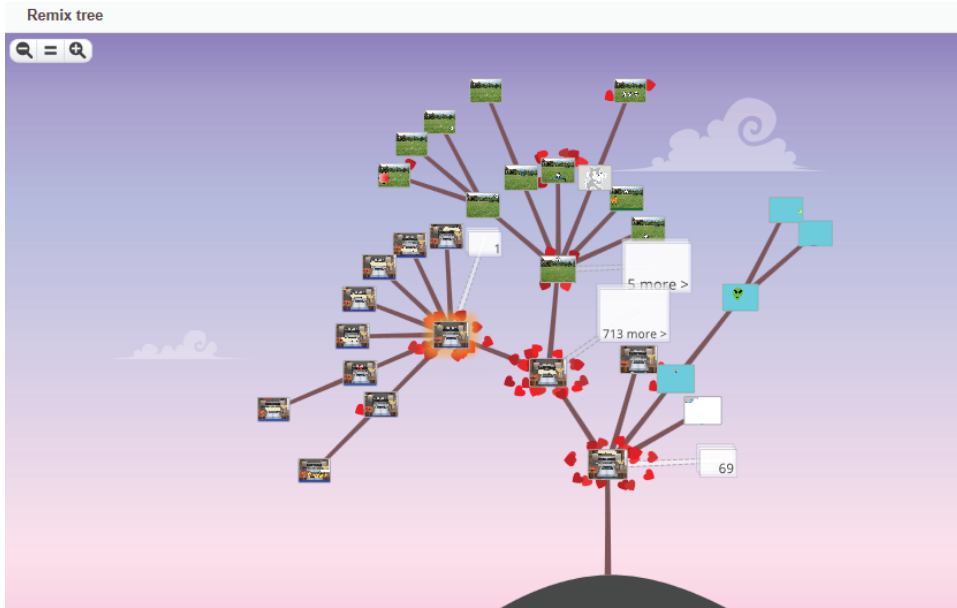


Figure 1. Remix tree of the *Pizza Chef* project by ttseng

Source: <https://scratch.mit.edu/projects/10015802/remixtree/>.

We should remember that the goal of the actions described here is not to educate a horde of excellent programmers. The goal is to use coding as a specific background, which allows the arrangement of a situation in which a student in order to write (create) a fragment of working script (a fragment of working program code) needs to acquire knowledge or gain new skills.

Moreover, a student can use the projects of other members of the community and modify them creatively, comment on them and mark them as favorite or beloved, thus providing their creators with a valuable feedback.

## What Kind of Creator Will You Be? – Initial Research

### Introduction

In autumn 2015, the middle school third-graders (girls and boys, 15–16 years old) were asked about their opinion concerning sharing their work with other young creators. Eighty-five students of a single school participated in the online survey.



The school is located in Bielsko-Biała – the city with 180 thousands inhabitants, the capital of the region called Podbeskidzie in southern Poland.

This was an initial research. An implementation of a series of lessons concerning creating computer games in the Scratch environment started afterwards. Other students' survey was scheduled for the end of the series of lessons – spring 2016.

The initial research results presented below are a reflection of young creators' views at the beginning of their adventure of creating their own computer games. It was a completely new experience for the majority of them.

The author, comparing the initial research results to the ones scheduled for spring 2016, wishes to examine whether the students' work on their own games, their efforts in creating and making the games will change their views on sharing their coding projects with other members of the young creators' community.

### **How Willingly Will You Share Your Work?**

In part one of the survey the students had to assume they were the authors of a simple computer game created in the Scratch environment, who were offered to share their game so that other creators would be able to use their ideas.

They were asked to answer a question about how willingly they would share their work (in the given situation).

They used the following scale to provide their answers: from 0 (I don't want to share, I'll do it if I have to) to 5 (I'll willingly share). Table 1 shows the students' answers.

Table 1.

*How willingly would you share your work (in the given situation)?*

Answer	Number of answers	Percent of answers
0 (I don't want to share, I'll do it if I have to)	6	7.06
1	3	3.53
2	10	11.76
3	23	27.06
4	20	23.53
5 (I'll willingly share)	23	27.06
Total	85	100.00

Source: Author's research.

Over 7% of the students chose the answer 0 – they would not like to share their game created in the Scratch environment (in the given situation).

Over 22% of the students chose the answers 0, 1 or 2 – we may assume that they do not support the idea of sharing their work.

However, almost 78% of the young creators would share their work with others (answers 3 or 4) or would even do that willingly (answer 5).

### What Is Important to You as a Creator?

In part two of the survey the students had to imagine that the game they had created was made available to other young creators who could modify it and try to boost it.

First, they had to answer the question about how important it was to them to have their authorship formally acknowledged.

They could choose their answers from the following scale: from 0 (It isn't important to me) to 5 (It's very important to me). Table 2 shows the students' answers.

Table 2.  
*How important is it to you to have your authorship formally acknowledged (the information about you as the author of the game)?*

Answer	Number of answers	Percent of answers
0 (It isn't important to me)	4	4.71
1	6	7.06
2	8	9.41
3	18	21.18
4	29	34.12
5 (It's very important to me)	20	23.53
Total	85	100.00

Source: Author's research.

Answers 3, 4 or 5 – indicating that the authorship acknowledgement is an important matter – were chosen by almost 79% of the students.

Another question concerned the value of a formal acknowledgement that might be placed on derived products created on the basis of the student's game.

The students could choose an answer from the following scale: from 0 (It isn't important to me) to 5 (It's very important to me). Table 3. shows the students' answers.

The percentage of answers 3, 4 or 5 – indicating the importance of a formal acknowledgement placed on derived products – is over 70%.

The third question of part two concerned the creative development of the student's game.

They could use the following scale to answer the question: from 0 (It isn't important to me) to 5 (It's very important to me). Table 4. shows the students' answers.

Table 3.

*How important to you is it to have a formal acknowledgement placed on derived products (games created on the basis of your game)?*

Answers	Number of answers	Percent of answers
0 (It isn't important to me)	7	8.24
1	6	7.06
2	12	14.12
3	24	28.24
4	26	30.59
5 (It's very important to me)	10	11.76
Total	85	100.00

Source: Author's research.

Table 4.

*How important to you is it that another person can creatively develop your ideas, correct your mistakes, in other words boost your game?*

Answers	Number of answers	Percent of answers
0 (It isn't important to me)	5	5.95
1	0	0.00
2	8	9.52
3	19	22.62
4	31	36.90
5 (it's very important to me)	21	25.00
Total	84	100.00

Source: Author's research.

Answers 3, 4 or 5 – indicating that the chance for a creative development of their game by others is an important matter for the students – were chosen by almost 85% of the students.

It is worth comparing the answers to the third question presented above with the fourth question of part two, in which the students were asked to grade the level of their satisfaction (or its lack) if the work of another person (based on their game) turned out to be more interesting (better).

This time the students could choose an answer from the scale which ranged from –5 (I'll be very displeased), through 0 (I'll be indifferent), to 5 (I'll be very pleased). Table 5 shows the students' answers.

What is notable is a large number of answers between “displeased” and “indifferent” (–2, –1 and 0): over 48%.

Table 5.  
*Grade the level of your satisfaction (or its lack) if the work of another person (based on your game) turns out to be more interesting (better)*

Answer	Number of answers	Percent of answers
-5 (I'll be very displeased)	8	9.41
-4	7	8.24
-3	3	3.53
-2	10	11.76
-1	16	18.82
0 (I'll be indifferent)	15	17.65
1	1	1.18
2	8	9.41
3	4	4.71
4	4	4.71
5 (I'll be very pleased)	9	10.59
Total	85	100.00

Source: Author's research.

The last question of part two was an open one. The students were asked to write a short message to those, who would like to creatively develop their game. Table 6 contains the most characteristic students' answers divided into categories.

Table 6.  
*What message would you give to someone who would create their own game on the basis of yours (create a remix)?*

Category mark	Category description	Number of answers	Percent of answers
A	Encouragement to work, congratulations, joy of using their game (by remixing)	31	36.47
B	Request for saving the information about the original author of the game or where the idea comes from	13	15.29
C	Negative comment about the people using the game	10	11.76
D	Other answers (including the answer: I don't know)	12	14.12
E	A lack of answer	19	22.35
	Total	85	100.00

Source: Author's research.

Over 36% of the students expressed their positive attitude towards the creators who would develop their game, that is – create derivate products according to the remix rules.

Almost 12% of the students would not be pleased about their game being used by other people, which they expressed by giving answers like: “I want her to remove the game” or “Next time I would like her to try to stick to her own ideas.”

### School Assessment and the Will to Share Your Work

In part three of the survey the students were asked about the will to share their work (game) that would be assessed at school.

The same question was asked three times. Each time the students had to grade their will to share their work (game) in the future depending on their school grade for it. Table 7 contains the answers to the last three questions of the survey.

The students had to use the following scale: from 0 (I don’t want to share my game) to 5 (I’ll be very happy to share).

School grades were divided into three categories:

- A (grades 1 and 2) – the lowest grades,
- B (grades 3 and 4) – average grades, and
- C (grades 5 and 6) – the highest grades.

Table 7.

*The school grade and the will to share your game*

School grades category	Grading the will to share your game: from 0 (I don't want to share my game) to 5 (I'll be very happy to share)					
	0	1	2	3	4	5
A (grades 1 and 2)	57	8	9	4	3	4
B (grades 3 and 4)	9	12	24	24	11	5
C (grades 5 and 6)	2	2	5	12	24	40

Source: Author’s research.

It is interesting to analyze the changes in the distribution of the grades from 0 to 5 in each of the three school grades categories (A, B and C). It is shown in Figure 2.

It can be noted that 57 out of 85 students (over 67%) do not wish to share their work if they get school grades from category A (grades 1 and 2 – the lowest grades).

For the grades from category B (school grades 3 and 4 – average grades) the distribution of the answers concerning the will to share their game is close to the normal distribution.

64 students (over 75%) would willingly share their work if they got school grades 5 or 6 (high grades).

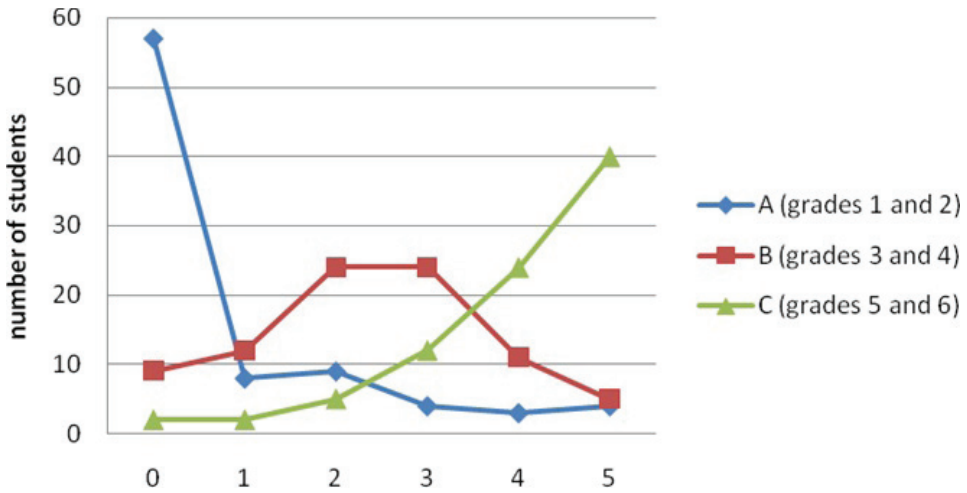


Figure 2. School grades and the will to share the game

Source: Author's research.

It goes as far as to say that the higher the school grade is, the more willing the students are to share (show off) their product.

Lower school grades may block the will to share the projects with other young creators. At the same time, a school grade (an element of formal education) may block further development of the projects, of which the primary production leaves a lot to be desired (was graded low).

## Conclusion

In this paper, the author presents the results of his initial research on the phenomenon of simple computer games remix in the Scratch environment. The author attempts to show the relation between education, i.e. modern pedagogical theories, and creativity. The research is based on the use of coding (“code to learn”).

The research will be repeated at the end of a series of lessons introducing the techniques of creating computer games in the Scratch environment to middle-school students. Young creators will have the chance to verify their ideas concerning sharing their work with other coders.

Even today we may indicate the areas worth attention during the second phase of the research that will target the same group of students, e.g.:

- determining the importance of the link between school grades and the will to share the students' products (games);

- sustaining or changing the students' opinion about those aspects of creating and sharing their products within the social web of creators, which were considered important (very important) by the students in the initial research or on the contrary – which were of little importance (no importance); and
- second analysis of the level of satisfaction (or its lack) if another person's work based on someone else's production turns out to be more interesting (better).

The author of this article would like to ask and encourage the readers to submit comments and suggestions concerning the problems of using coding in teaching children and teenagers for creativity.

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Wojciech Jan Zuziak

### **Twórczo i nieformalnie: Scratch i kultura remixu**

#### **Streszczenie**

Artykuł ma pokazać umocowanie edukacji ku twórczości, prowadzonej z wykorzystaniem programowania (code to learn), we współczesnych teoriach pedagogicznych. Ważne są społeczne interakcje młodych twórców. Artykuł opisuje wstępne badania nad zjawiskiem remixu prostych gier komputerowych tworzonych przez społeczność użytkowników w środowisku Scratch. Przedstawia wybrane problemy młodych twórców związane z dzieleniem się własną pracą z innymi członkami społeczności: uznanie autorstwa, formalne podziękowanie pierwszemu autorowi umieszczone na produktach pochodnych (grach), reakcje pierwszego autora na twórcze rozwinięcie jego pomysłu przez innego twórcę czy wpływ oceny szkolnej na chęć dzielenia się własnym projektem. Opisane tu badania grupy uczniów w wieku 15–16 lat będą powtórzone na zakończenie cyklu lekcji poświęconych projektowaniu i tworzeniu gier w środowisku Scratch.

**Słowa kluczowe:** edukacja ku twórczości, konektywizm, konstrukcjonizm, code to learn, Scratch, kultura remixu

Wojciech Jan Zuziak

### **Творчество неформальность: Скратч и ремикс культура**

#### **Аннотация**

Целью данной работы является демонстрация связи обучения творчеству, проведенного с использованием кодирования (код учиться) и современных педагогических теорий. Социальные взаимодействия между творческими молодыми людьми являются важным вопросом. В статье описывается начальный этап исследования явления ремикса простых компьютерных игр, созданных сообществом пользователей в среде Скретч. Она представляет выбранные проблемы молодых авторов, связанные с обменом их собственными продуктами с другими членами сообщества: признание авторства, официальное подтверждение для первого автора, размещенное на созданных продуктах (игры), реакция первого автора на творческое развитие его идей или влияние школьной оценки на решение поделиться проектом. Исследование на группе студентов в возрасте от 15 до 16 лет, описанной здесь, будет повторяться как подведение серии уроков, касающихся создания компьютерных игр в среде Скретч.



К л ю ч е в ы е с л о в а: обучение креативности, коннективизм, конструктивизм, Скретч, культура ремикса

Wojciech Jan Zuziak

### **Creativa e informal: Scratch y la cultura de mezclas**

#### Resumen

El objetivo de este documento es demostrar el vínculo de la educación con la creatividad, dirigido con el uso de la codificación (el código para aprender) para teorías pedagógicas modernas. Las interacciones sociales entre creadores jóvenes son un asunto importante. El documento describe un preludio a la investigación sobre el fenómeno de nueva mezcla de juegos de ordenador sencillos creados por la comunidad en el entorno Scratch.

Presenta problemas seleccionados por los jóvenes creadores conectados para compartir sus propias creaciones con otros miembros de la comunidad: el reconocimiento de autoría, el reconocimiento formal para el primer autor situado en productos derivados (juegos), las reacciones del primer autor al desarrollo creativo de sus ideas por otro creador, o la influencia de la evaluación del colegio/de los alumnos sobre la voluntad de compartir el proyecto. La investigación sobre un grupo de estudiantes de entre 15 y 16 años aquí descrita, será repetida como la conclusión de una serie de clases relacionadas con la creación de juegos para el ordenador en el entorno Scratch.

**Palabras clave:** educación para la creatividad, conectivismo, construccionismo, código para aprender, Scratch, cultura de mezclas



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## **The Development of Student Key Competencies while Studying Computer Science in Secondary School**

### **Abstract**

This paper discusses the key competencies in the 21<sup>st</sup> century in the context of a transition to a new humanistic paradigm of education as well as the results of the PISA 2012 study “Creative Problem Solving.” Contradictions between traditional skills and 21<sup>st</sup> century competencies of a school graduate are analyzed. The article also discusses contradictions between social needs of a person with a highly developed intellectual, spiritual, and moral potential, and an insufficient development of theoretical and methodological bases of the student’s key competence development, as well as between the traditional methods of computer science teaching and the necessity to solve problems during the educational process supported by the use of ICT. The results of the application of ICT teaching methods based on the principles of humane pedagogy are presented, and their effectiveness is confirmed.

**K e y w o r d s:** key competencies, reflectivity, humane pedagogy, personal development, ICT

### **Introduction**

#### **Research Problem**

The 21<sup>st</sup> century is a time of an increasing flow of information, technologization, and automation of the society’s information space. It is a time in which

personality traits have become crucial and they determine willingness to provide an answer to new challenges of civilization; these traits include the abilities to make quick decisions, collaborate, use ICTs, think critically, take on responsibility, be proactive, and work on projects. That is why one of the priority directions of educational development is the transition to a new humanistic paradigm of education and innovation, which will ensure the growth of the intellectual, spiritual, moral, and cultural potential of a society and an individual. The keystone of the educational paradigm is the set of innovative competencies of the 21<sup>st</sup> century.

The development of population's IT literacy affects the abilities to review effectively and critically, and to create information using various digital technologies. The basic elements of computer literacy include: cultural, cognitive, constructive, communicative, confidential, creative, critical, and civil ones. According to the Institute of the Future (Tikhomirova, 2014), the skills that will be required of a person in 2020 for them to be successful may include: unusual thinking, social intelligence, computational thinking, innovative and adaptive thinking (an ability to think outside of the predetermined path), intercultural competence, the ability to process and summarize a large amount of data quickly, the ability to work with modern media, the ability to work remotely, and the possession of knowledge not limited to a narrow specialization. It is an obvious and indisputable fact that the value of computer science and academic discipline is growing in the educational process. Education needs to address more complex and creative tasks, which require critical, reflective thinking about practical problems using computer technologies.

The problem is that in the information society of today, the innovative-humanistic educational process has a number of contradictions between traditional skills and the abilities of a 21<sup>st</sup> century graduate. One of them is a societal need for a person with highly intellectual, spiritual, and moral potential versus the insufficient development of theoretical and methodological foundations for teaching students, and another one is traditional methods of teaching science versus the need to solve innovative, creative, problematic tasks of the humanities educational process when using new information and communication technologies (ICT).

### **Research Focus**

The research hypothesis is an assumption that introducing computer science to secondary school students – via a scientifically sound methodical system based on humanistic pedagogy – will improve the quality of student knowledge and the effective formulation of their subject and key competencies. Additionally, it will promote self-realization, fulfillment of their potential, and the formation of a worldview and humanistic value orientations. It will develop reflective mechanisms of thinking and encourage the harmonious development of people from the younger generation, who are capable of not only a creative approach to solving specific life situations, but also integrating the acquired knowledge to further their own self-education and self-development. Thus, the relevance of this work lies in

the need to upgrade teaching methods and education to a new level. On this basis, **the aim of our work** is to explore ICT and reflective competencies: two of the key competencies of the 21<sup>st</sup> century in the innovative educational environment of the secondary school.

## Research Methodology

### General Background of Research

In the information society, modern education faces the key question: does the school offer the possibility to acquire the competencies necessary for the person of the 21<sup>st</sup> century? PISA 2012 presented the results of the research. The aim was to find the answer in the survey completed by more than 85,000 students from 44 countries.

It is undeniable that the current education system is built on the idea of academic achievement. The PISA 2012 researchers claim that this idea has to be corrected. The aim of the new quality of teaching is to develop metacognitive and creative skills as well as skills of effective thinking in unfamiliar situations, self-controlling skills, planning, implementation strategies to address the problems of self-identity in interaction with the unknowns, and initiative (PISA 2012).

To live, learn, and work successfully in an increasingly complex, information-rich and knowledge-based society, students and teachers must utilize technology effectively. Within an educational setting, technology can enable students to become:

- capable information technology users;
- information seekers, analyzers, and evaluators;
- problem solvers and decision makers;
- creative and effective users of productivity tools;
- communicators, collaborators, publishers, and producers; and
- informed, responsible, and contributing citizens (ICT competency standards for teachers, 2008).

According to the materials of the educational program “The partnership in support of the 21<sup>st</sup> century skills” there are three types of skills: learning skills and innovations; skills in information data, means of communication, and technologies; professional and life skills. Considering that the basis of study in the 21<sup>st</sup> century is the development of critical thinking, competencies have been divided into three main groups: ICT, reflective, research (Kovalenko, 2014; Luksha, 2010; The key competences for Europe 2016, Intel: The way to success 2014).

The main characteristic of ICT **competencies** is the ability to work with information data, using them for solving problems and tasks in the professional field as

well as in everyday life, for the acquisition of new knowledge and further education, and the development of one's own capabilities. One of the main manifestations of **reflective competencies** is understanding, self-esteem, self-control, and self-control activities. **Research competencies** have the following qualities: the ability to analyze, synthesize, and formalize; the ability to identify and formulate problems and tasks; the ability to forecast and model activities or experiments (Sholom, 2011; Lipman, 1998).

In addition, **the problem-solving competence** – an individual's ability of the active participation in cognitive processes of thinking and solving problematic situations (situations in which the method of solution is not is that obvious) – is classified by PISA 2012 as the most important competence of the person in the 21<sup>st</sup> century. This ability involves the willingness of the person to implement their own reflective capacity while solving non-standard interactive problems (PISA 2012).

The implementation of personality competence is based on three aspects: the nature of the problem situation, cognitive processes of problem solving, and the context of the problem. It is them, as we suppose, that must serve as a modernization of educational methodological approaches (PISA 2012).

1. According to the problem's basis, it could be either an interactive (information data to be disclosed by studying the problem) or a static problem (all the necessary data for a solution to the problem disclosed in the task).
2. In the problem's context, installation has been distinguished from orientation. Installation involves the selection of targets for the peculiarities of the work with the technological device (technology or non-technology). The direction determines the environment where this problem will be solved (personal or social).
3. The cognitive processes of solving problems are as follows: study and comprehension of information data; presentation and formulation (construction of a model representation of the problem situation; formulation of hypotheses about relevant factors and the relationship between them); planning and implementation; monitoring and reflectivity (progress monitoring, reaction to feedback, reflective understanding of the decision, information data, adoption of a strategy) (PISA 2012).

Particular attention should be paid to the last process – a metacognitive superstructure, the culmination of ongoing personality cognitive processes. The researchers have shown that only 25% of the students could solve the problem tasks that required a high level of reflection (PISA 2012). A reflective competence – which is a complex structure – consists of different types of reflection: the cooperative built on the knowledge of the structure and the role of the positional organization of collective interaction; communication, based on representations of the inner world of another person and the reasons for their actions; personality, which is based on the actions, behavior and image of its own self; intellectual capacity, and the ways of working with it (Stepanov & Pokhmelkina, 1991; Mukii, 2012).

The theoretical analysis shows that the key skills of a new innovation and humanistic paradigm of the 21<sup>st</sup> century secondary education consist of two important components, which need special attention and further research. These are ICT and reflective competencies. Empirical research into personality traits has allowed us to organize innovative pedagogical methods of work, tools, and training in computer science. Our aim is to prepare students for the effective ability to live in a changing world. In order to form a highly educated, creative, and harmonious personality with a new type of thinking, which has the main skills and competencies of the 21<sup>st</sup> century, we have developed a **methodical system of computer science secondary school training** for the development of the personality of a potential student.

**The common aim of the methodical system** is the harmonious development of personality with a new type of thinking, which provides for the development of humanity, spirituality, morality, and a humane attitude to the world, humane qualities, as well as an intellectual reflective mechanism to broaden the humanistic orientation of the student. **The objectives** are to develop students' skills and abilities to perform basic operations with data objects and to achieve the key competencies of the 21<sup>st</sup> century, the reflexivity of the individual, which provides for the development of:

- reflective thinking,
- reflective abilities,
- humanism,
- humane qualities,
- values,
- formation of humanistic outlook, and
- skills of reflective and humane behavior.

**The training facilities** are as follows: educational software tools, object-oriented software systems, educational demonstration equipment, artificial intelligence systems, object-oriented environment and facilities developed for educational purposes (Mukii & Siurin, 2012; Mukii, 2014; Morze & Protsenko, 2012; Morze & Kuzminska, 2011; Morze, 2002).

Thus, the nature and characteristics of the methodical system of studying computer science, based on the principles of humane pedagogy, lies in the fact that the problematic reflective learning is the foundation of the whole educational process (Mukii & Siurin, 2012; Mukii, 2014). In the context of this training, the child becomes a researcher of their inner world, the values of society, fine human qualities, actions, and others. Problematic tasks set by the teacher in front of their students are imbued with the ideas of humanity, humanism, kindness, and wonderful affirmation in human relations. As a consequence, the result of this educational activity is the development of IT and reflective competencies of a student (Mukii, 2013).

## Features of the Methodical System of Teaching Computer Science

These theoretical assumptions were made on the basis of organizing and creating educational, computer-based teaching and learning tools for computer science with a view to the harmonious development of informative and reflective student competence.

*The first sign* of the methodical system is the organization of the information science lesson based on reflective and humanistic learning. An instructional design of ICT lessons in reflective humanistic educational environment should have the following elements:

- “A Reflective Card of a Student’s Success” – which is a basic thing and visualization of reflective self-humanistic educational trajectories of the student, created with the teacher at the beginning of a computer science study course, using modern ICT tools;
- special reflective methods and reflective techniques including such methods as: reflective game, modeling, reflective polylogue, reflective equilibrium, reflective inversions, semiotic method;
- “A Reflective Map of an ICT Lesson” – a spreadsheet to create and fill in, which is a reflective analysis of the teacher’s lesson for its improvement in the future; and
- training tools in a reflective and humanistic environment.

*Another feature* of this environment is the introduction of educational and methodical complex means for reflective-humanistic ICT teaching, which consist of two groups of special tools, namely: educational materials, information and communication environment harmonious development.

The first group includes the following:

- guidelines for the organization of lessons and project activities based on humane pedagogy using ICT;
- guidelines for the use of the Internet for harmonious development;
- a workbook called *The School of Kindness* for studying the topic *The Word Processor* – a set of practical tasks for classwork and homework; by implementing them the student not only acquires the skills to apply basic tools of the word processor, but also reveals their own humanistic outlook through a reflective analysis of texts (stories, parables, poems);
- developments of humanistic reflective competence problems – a type of technological problems, where the use of ICT is obligatory as a tool as well as the solution which promotes ICT competence, and a cognitive, reflective, spiritual, humanistic potential of the student. The main humanistic orientation of the result – to solve the problem – is a motivation and a stimulation of the student to: reflect on ways of solving social and other problems of mankind, and search for a meaning and strategy of their own life; build individual life trajectory by means of creative choice, instead of a consumer lifestyle. The advantage of such problems lies in the fact that students acquire certain skills; namely, they

- allocate various connections between components and related knowledge,
- schematize the explored ways to solve problems of the organization and methods of action, and
- produce various criteria and rules on which they can regulate and implement their own training activities.

The second group of information and communication environment of the harmonious development of the student includes the following elements:

- a designer of a reflective lesson created using ICT – a web page with hyperlinks, which is a description of reflective learning techniques and a set of Web services, making it possible to implement these techniques in the process of learning science. This element of educational and methodical tools allows the teacher to quickly and effectively solve the problem of didactic lesson design stages to develop students' ICT and reflective competencies;
- a student's magazine with a self-reflective fixing of lesson's activities ("reflective journal of the class") – an online questionnaire created using Google Drive forms, its aim being to examine the educational process by the teacher and by the students;
- "A reflective blog of the student's success" – a blog giving a possibility of a child's reflectivity development, published in a Word document after practical work in a computer science classroom. This blog has a table, in which the student has the possibility to continue the following sentences: I learned today... it was interesting in ... It was hard to... I realized that ... Now I can ... I felt that ... I bought ... I learned ... I got ... I could ... I try ... I was surprised ... the lesson gave me ...for my life ... I wished ...
- "The card of the student's success" ("The electronic card of the student's success") – a blog or an online-board, created with using Web-services, which shows plans and results, which were a student's academic success in computer science;
- electronic tools to diagnose the personal potential of students – tools for collection, processing, analysis, data presentation reflective and humanistic research potential of the individual, developed using modern ICT;
- a web-platform "Planet of reflective technology" (hosted by <http://planeta-reflexii.blogspot.com/http://planetareflexii.blogspot.com>) – the aims of using this online platform are: to create, to develop reflection as a key mechanism for implementing the intellectual and humanistic orientation of the individual; to place teaching materials for the development of students' reflectivity at different stages of the lesson; to systematize web services for implementing the process of teaching science to develop students' reflective capacity; and
- a web-blog "A teacher's reflective diary" – maintaining and completing the diary leads to the teacher's reflective analysis of the conducted lessons and activities, their own professional skills, information about competitions, con-



ferences, seminars. For an example of such a diary, see <http://taisiyamukii.blogspot.com/>.

### **Instrument and Procedures**

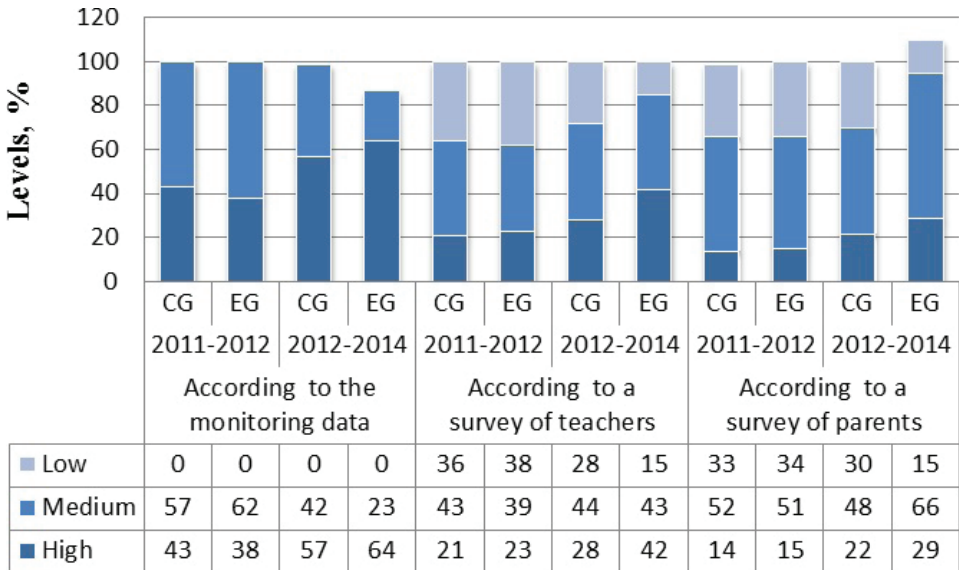
For the psychodiagnostic complex, an empirical study of reflective spheres of students' personalities was developed. It includes:

- methods by A. V. Karpov and V. V. Ponomariova "The meaning of the degree manifestation of the personality's reflectivity" – a definition of reflectivity development levels;
  - the questionnaire by A. S. Sharov "Reflexivity in a vital human activity" – a definition of the temporary measure, the characteristics of the scope of functioning and regulatory trends of reflexivity;
  - the questionnaire by M. Grant "Studies of assessing the level of intensity and focus of subject's reflection" – a comparison of self-reflection and socio-reflection;
  - diagnostic testing of valuable orientations by M. Rokich – a determination of significant values for the respondents;
  - the diagnosis of the motivational structure of the personality by V. E. Milman – defining a leading motivational direction of the students;
  - test itself-actualization – a definition of personality's capabilities for actualization;
  - the self-test questionnaire by V. V. Stolin, S. R. Panteleeva;
  - Cattell questionnaire "16 personal factors" – a definition of personal qualities and characteristics;
  - the questionnaire "The style of self-regulation of behavior" by V. I. Morosanova – an identification of self-regulation skills relevant to students;
  - the questionnaire by J. Holland – a definition of professional orientation of the person; and
  - the technique to study the level of empathy trends by I. M. Yusupov – determining the presence of empathy in students.
- To study the formation of ICT competencies we used the following:
- the application for ICT teachers and class teachers: "The motivation for learning and creative activity of students with regard to ICT";
  - the parents' questionnaire: "Learning motivation and creative independent activity of pupils by means of ICT";
  - the survey of secondary school students: "The impact of using modern ICT tools on the development of the student's individuality";
  - the method of the analysis of student achievement assessments in computer science lessons; and
  - the analysis of the impact of students' participation in district, city, regional, national, and international ICT competitions.

## Research Results

An educational experiment was conducted in secondary schools from 2011 to 2014. The experiment involved 252 pupils at the age of 10 to 17. The aim of the experiment was to determine the level of formation of informative and key competencies of children.

1. The results of the study of the dynamics of academic success and motivation for creative activities at the control stage of the experiment are shown in Figure 1.



*Figure 1.* Level of educational achievements of high school students in computer science at various stages of the experiment. CG – control group, EG – experimental group.

Source: Own work.

The analysis of the data shows that during the experiment, between 2012 and 2014, the indicator of a high level of academic achievement in the experimental group increased by 26%, while the same indicator in the control group increased by 14%. Computer science learning and creativity motivation by means of ICT tools increased by 19% in the experimental group, and by 7% in the control group according to the teachers’ survey. According to the parents’ survey, it increased by 14% in the experimental group, and by 8% in the control group.

The comparative analysis of intellectual development level, including the phases of students’ diagnostic reflectivity and monitoring, was carried out using statistical criteria from the package “Teaching Statistics 6.0” including the Cra-

mér–von Mises criterion and Welch’s t-test. The empirical value in the Cramer–Welch test is  $Temp = 2.3571$ , and it is larger than the critical  $T_{0,05} = 1,96$ , with probability 95%. It can be argued that the differences in the results in the control and experimental groups are statistically significant.

2. The results of the students’ reflective competence development after the introduction of a methodical system of teaching computer science based on humane pedagogy were higher in quality, which is clearly shown in Figure 2.

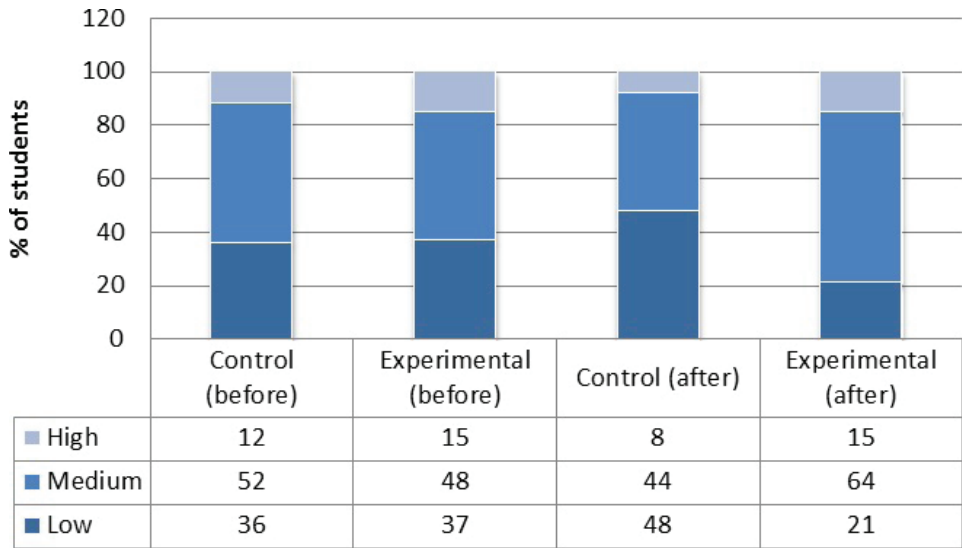


Figure 2. The level of reflective competence development at different stages of the experiment.

Source: Own work.

Apparently, the stages of reflectivity diagnostic results in the control and experimental groups are close enough. The percentage of the students who achieved a high level of reflection in the control and experimental groups are 12% and 15%, while the average value indices are 4 and 3.9 respectively.

Testing statistical hypotheses using static criteria (Wilcoxon–Mann–Whitney, Cramer–Welch) gives a reason to believe that the experimental and control groups were tailored correctly. The selection criteria were fulfilled by the algorithm (Novikov, 2004). Thus, the empirical significance criterion Wilcoxon–Mann–Whitney  $W_{emp} = 0.2863$  is below the critical  $W_{0,05} = 1.96$ , empirical value criterion Cramer–Welch  $Temp = 0.2781$  is below the critical  $T_{0,05} = 1.96$ , so for both of these criteria the samples are comparable and reflect the significance level of 0.05.

3. An important indicator of the level of key competencies development is the level of the child’s creative abilities development. The results of the study of

creative abilities of the students at the confirming and control stages are shown in Figure 3.

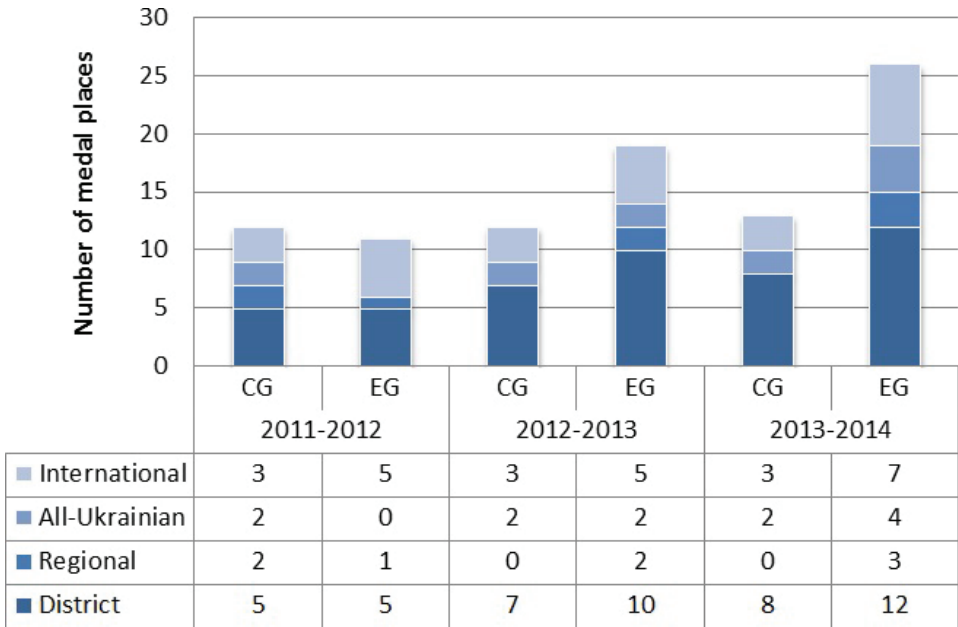


Figure 3. Dynamics of successful performance of students in computer science competitions at different stages of the experiment.

Source: Own work.

As we see from the analysis of the impact of the students’ participation in district, city, regional, national, and international ICT competitions and from the analysis of applying ICT for teachers and class teachers: “The motivation for learning and creative activity of students with regard to ICT,” the number of students-winners at different levels increased significantly ( $p\text{-value} < 0,05$ ). The number of the winners of the district competitions increased from 5 to 12 people, of the regional – from 1 to 3 students, of the all-Ukrainian – from 0 to 4, of the international ones – from 5 to 7. When comparing these data with the data from the control group, we can see that there are qualitative changes in the attitude of the students to the participation in competitions. This indicates an increase in the level of the students’ motivation for creativity and self-realization.

Basing on the results of the study, we can see that the method developed by us is effective and can be recommended for use in teaching computer science in high schools. As a result of the experiment and the implementation of the methodology described above, the hypothesis of the study was confirmed, as well as the methodical system of educating secondary school pupils was worked out and improved taking into account the principles of humane pedagogy.

## Conclusions

In conditions of global informatization, the role of computer studies as a science and academic discipline is increasing significantly, helping build students' philosophy and thinking. The studies by domestic and foreign scholars have shown that computer science is a backbone subject, which is the basis of a modern learning process, becoming also the basis for educational and information industries.

The role of computer science as a school subject is to focus on the formation of key competencies and skills of the 21<sup>st</sup> century, and to teach the effective use of modern information and communication technologies, which is necessary for everyone if they want to have a successful life and work in modern society. The theoretical analysis shows that there are two important components that require special attention and further research, which are the basis of the key skills in a new innovation and humanistic paradigm for the secondary education in the 21<sup>st</sup> century. These are informative and reflective competencies. The empirical study of the personality characteristics has allowed us to create innovative pedagogical methods of work and computer science teaching tools to prepare students for an effective life in a changing world.

In order to form a highly educated, creative, and harmonious personality, a new type of thinking, and skills and key competencies of the 21<sup>st</sup> century, we have developed a methodical system of teaching computer science in high schools, which results in the development of each student's personal potential. The nature and characteristics of the methodical system of studying computer science, based on the principles of humane pedagogy, lies in the fact that problematic reflective teaching becomes a foundation of the whole educational process.

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Taisiia Mukii

### **Розwój kluczowych kompetencji uczniów w trakcie nauczania informatyki w szkole średniej**

#### Streszczenie

W artykule przedstawione zostały: kluczowe kompetencje XXI wieku w kontekście przejścia do nowego humanistycznego paradygmatu kształcenia oraz wyniki PISA 2012 w badaniu „Creative Problem Solving” (kreatywne rozwiązywanie problemów). Analizie poddano sprzeczności między tradycyjnymi umiejętnościami absolwenta szkoły i kompetencjami oczekiwanymi/potrzebnymi w XXI wieku. Omawia się także sprzeczności pomiędzy społeczną potrzebą w zakresie osób o wysoko rozwiniętym potencjale intelektualnym, duchowym i moralnym a niewystarczającym rozwojem teoretycznych i metodologicznych podstaw doskonalenia kluczowych kompetencji uczniów oraz pomiędzy tradycyjnymi metodami nauczania informatyki a potrzebą rozwiązywania problemów procesu kształcenia podczas wykorzystywania ICT (TIK). W artykule zrelacjonowano wyniki stosowania metod nauczania informatyki opartego na zasadach humanistycznej pedagogiki. W rezultacie udowodniona została jej efektywność.

**Słowa kluczowe:** kluczowe kompetencje, refleksyjność, humanistyczna pedagogika, rozwój osobowości, ICT (TIK)

Taisiia Mukii

### **Развитие ключевых компетентностей учащихся в процессе изучения информатики в средней школе**

#### Аннотация

В статье рассматриваются ключевые компетентности XXI века в контексте перехода к новой гуманистической парадигме образования, а также результатов PISA-2012 в исследовании «Creative Problem Solving». Анализируются противоречия между традиционными навыками выпускника школы и компетентностями XXI века; между традиционными методами преподавания информатики и необходимостью решения инновационных проблем образовательного процесса в условиях широкого использования ИКТ. Представлены результаты применения методической системы обучения информатике в средней школе, построенной на принципах гуманной педагогики, доказана её эффективность.

**Ключевые слова:** ключевые компетентности, рефлексивность, гуманная педагогика, развитие личности, ИКТ

Taisiia Mukii

## **El desarrollo de las competencias clave de los estudiantes mientras estudian ciencias de la informática en el instituto de secundaria**

### **R e s u m e n**

Este documento discute las competencias claves del siglo XXI en el contexto de la transición hacia un nuevo paradigma humanístico de la educación, así como los resultados del estudio de 2012 de PISA: «La resolución de problemas creativos». Se analizan las contradicciones entre las habilidades tradicionales y las competencias del siglo XXI de un graduado en la escuela. También discute la contradicción entre la necesidad pública en una personalidad con un alto desarrollo intelectual, espiritual, moral y potencial y un desarrollo insuficiente de las bases teóricas y metodológicas de las competencias claves para el desarrollo de los estudiantes, entre los métodos tradicionales de la enseñanza de ciencias informáticas y la necesidad de solucionar problemas del proceso educativo en condiciones del uso de las TIC. Los resultados de la aplicación de los métodos de enseñanza informática basados en los principios de la pedagogía humana están demostrados, su efectividad está confirmada.

**P a l a b r a s c l a v e:** las competencias clave, reflexividad, pedagogía humana, desarrollo personal, TIC



# V

## Reports





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Anna Szafrńska-Gajdzica, Ewelina Doluk**

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**Report on the Implementation of WP3 “Analyses  
and Evaluation of the ICT Level, E-learning and  
Intercultural Development in Every Participating  
Country” in the Framework of the IRNet Project**

## Abstract

This article, prepared by an international team of authors – researchers from different scientific areas, connected with ICT, e-learning, pedagogy, and other related disciplines – focuses on the objectives and some results of the IRNet international project. In particular, this article describes the research tools, methods, and some procedures of the WP3 “Analyses and Evaluation of the ICT Level, E-learning and Intercultural Development in Every Participating Country”: Objectives, Tasks, Deliverables, and implementation of research trips. Except that, the article presents more important events, such as (video)conferences, seminars, workshops, an e-round table debate; among these events are ICTE 2014, DLCC 2014, “New Educational Strategies in Modern Information Space,” “High-tech information educational environment,” during which some more important results of the project research were presented. The list of publications includes 32 papers and a manuscript with WP3 results. Researchers from Poland, Russia, Ukraine, the Netherlands, Spain, Slovakia, Portugal, Czech Republic, and Australia analyzed the results of WP3 in the context of the next stages and Work packages of IRNet project – International Research Network.

**Key words:** International Research Network IRNet, ICT, E-learning, Competencies

## Introduction

The IRNet project aims to set up a thematic multidisciplinary joint exchange program dedicated to research and development of new tools for advanced pedagogical science in the field of ICT instruments, distance learning, and intercultural competencies in the EU (Poland, the Netherlands, Spain, Portugal, Slovakia, Czech Republic) and Third Countries (Australia, Russia, Ukraine). The program will strengthen existing collaboration and establish new scientific contacts through mutual conducted research and secondments of the researchers. The main objectives of the project are: (a) to exchange expertise and knowledge in the field of the innovative technologies of education between the EU and Third Countries, and suggest effective strategies of implementing new tools in their profession; and (b) to analyze and evaluate social, economic, and legal conditions, as well as methodologies and e-learning technologies being developed in the European and Third Countries involved.

One of the IRNet project 1–7 Work Packages is WP3: “Analyses and Evaluation of the ICT Level, E-learning and Intercultural Development in Every Participating Country” (9–16 months), which has been successfully implemented by the IRNet consortium.

Among more important WP3 Objectives we enlist:

- the analysis of the methodological background and main approaches to conducting international investigations on ICT, e-learning, and intercultural competencies in order to work out a system of measuring instruments appropriate for the research at the international level;
- the analysis and evaluation of the level of ICT, e-learning, and intercultural developments in every participating country applying the system of measuring instruments approved; and
- the comparison of the results obtained and drawing conclusions about barriers in ICT, e-learning, and intercultural competencies, taking into consideration descriptions of the national specifics of law, human, social, ethical, and technological factors of their implementation drawn at the previous WP.

## General Progress of the Project

### WP3 Tasks

Work Package 3 tasks include several tasks, which are compatible with WP3 objectives.

**Task 3.1:** Elaboration of the conception of a system of instruments which will make it possible to obtain reliable and comparable data about ICT development, e-learning, teachers’ and students’ practices and attitudes towards ICT in their learning and professional life as well as their intercultural awareness.

**Task 3.2:** The comparison of the data obtained with the information elicited and generalized at the previous stage about the legal, ethical, human, technological, and social factors that will help discriminate the factors influencing ICT and e-learning competencies, and intercultural awareness.

**Task 3.3:** The choice of the number of respondents and participants in the research according to the demand to obtain objective and profound information about ICT development, e-learning and intercultural competence in every participating country. The analysis of the data by the statistical methods proving their significance, reliability, and objectivity.

**Task 3.4:** Participation in events, such as conferences, workshops and roundtables, in particular ICTE 2014 at the University of Ostrava (Czech Republic).

**Task 3.5:** Organization of a conference “Education of children and youth in culturally diverse environments 2014,” a conference “Theoretical and Practical

Aspects of Distance Learning 2014: E-learning and Intercultural Developments in Different Countries,” and a Workshop at the University of Silesia (Poland).

**Task 3.6:** Conducting a meeting in Australia (in presence and remote form).

During the period the following deliverables were achieved for WP3:

**D 3.1:** Scientific papers in the ICTE 2014 Conference proceedings were published.

**D 3.2:** A discussion and an e-round table debate “Analyses and Evaluation of the ICT and e-learning and intercultural competencies in Australia, Czech Republic, Netherlands, Poland, Portugal, Russia, Slovak Republic, Spain and Ukraine” were conducted by CU.

**D 3.4:** A scientific working paper “Contrastive Analyses and Evaluation of the ICT, e-learning and intercultural competencies in Australia, Czech Republic, Netherlands, Poland, Portugal, Russia, Slovak Republic, Spain and Ukraine” was published.

**D 3.5:** A monograph “E-Learning and intercultural developments in different countries” was published.

A deviation from the deliverables plan:

**D 3.3:** (Month: 10) A monograph “Education of children and youth in culturally diverse environments” is currently in preparation and will be published in 2016.

### **Secondment of the Borys Grinchenko Kyiv University (BGKU), Dniprodzerzhinsk State Technical University (DSTU), Herzen State Pedagogical University of Russia, St. Petersburg (HSPU) to University of Silesia (US) (October 2014)**

The transfer of knowledge activities during this secondment was focused on the e-learning environment in US. The participants from DSTU, BGKU, and HSPU analyzed e-courses, studied their structure and design features, as well as basic principles, forms, and methods of the effective use of ICT and e-learning. The researchers discussed the issues concerning the elaboration of instruments that would be able to provide reliable and comparable data on the development of ICT and e-learning, as well as educational activities of teachers and students, the ratio of ICT in learning and intercultural relations. Models of master’s and teacher’s ICT competencies and instruments for evaluating the level of their formation were proposed.

Workshops:

1. A workshop “Implementation of the e-learning at the Faculty of Philology, University of Silesia” (7/10/2014).
2. A workshop “How to use digital sources” in Scientific Information Center and Academic Library (7/10/2014).
3. A workshop “Digital tools used in the research on nanotechnology and bioinformatics” (23/10/2014).

4. An international scientific conference “Theoretical and Practical Aspects of Distance Learning: E-learning and Intercultural Competences Development in Different Countries,” US, Poland (13–14/10/2014).
5. A workshop “Digital Humanities – IT Tools in Higher Education” (14/10/2014).
6. A seminar “Education of children and youth in culturally diverse environments 2014” (16/10/2014).
7. A workshop “Development of distance learning courses supported by the Distance Learning Center” (23/10/2014).

### **Secondment of the University of Silesia (US), the University of Ostrava (OU) to Curtin University (CU) (October–November 2014)**

The transfer of knowledge activities during this secondment was focused on the analysis of the methodological background and the main approaches of conducting the international investigations on ICT, e-learning, and intercultural competencies in order to work out a system of measuring instruments appropriate for the research at the international level.

Workshops:

1. A workshop and a round table debate “Analyses and evaluation of ICT, e-learning and intercultural competencies in Australia, Czech Republic, the Netherlands, Poland, Portugal, Russia, Slovak Republic, Spain and Ukraine” (26/11/2014), and an on-line videoconference conducted by CU, Australia.
2. A visit to Curtin University’s Hub for Immersive Visualisation and eResearch (HVE), a workshop “Western Australian visualisation, virtualisation and simulation” (11/11/2014).

### **Secondment of DSTU, BGKU, HSPU to Lisbon Lusíada University (LU) (January–February 2015)**

The transfer of knowledge activities during this secondment was focused on several aspects: elaborating the methodology of collaborative research within the current work package; analyzing the e-learning policy and environment in LU; preparing several workshops and virtual seminars; aiming at working out the methodology and preparing research instruments.

Workshops:

1. A virtual seminar “Use of ICT and e-Learning tools in academic environment,” Lusíada University (29/01/2015). Seminar was broadcast on the Internet, recorded in Adobe Connect Room.
2. A project workshop “E-Learning technologies in Lusíada University” (02/02/2015).
3. A project workshop “Dissemination of project materials: broadcasting and web-publishing” (02/02/2015). Main activities and events during the workshop were as follows: a master class of Professor A. Reis “Producing multimedia

- presentations,” recommendations on recording video and audio for e-learning and other educational purposes; recording a multimedia presentation with the help of Professor A. Reis; analyzing mistakes and improving results.
4. An e-workshop “How to improve your didactic videos” (06/02/2015). All members of the IRNet project participated in presence and in remote environment. The e-workshop was conducted by Professor A. Reis. The participants produced versions of multimedia presentation with narration and contributed to a video recorded for the workshop. The result of the first stage was a normal narrated presentation ([http://youtu.be/0ZBk97F\\_3qo](http://youtu.be/0ZBk97F_3qo)). At the second stage the same presentation was improved with the use of multimedia (<http://youtu.be/90-98516IHA>). As a result of the third stage, a presentation was demonstrated during the workshop using complementary narration techniques, nonverbal techniques, and some multimedia improvements. During the workshop all participants discussed the aspects of improving multimedia presentations, video recording for educational purposes and shared opinions on future collaborative MOOCs. It was decided that the materials produced during the workshop will be used in the further elaboration of a MOOC.
  5. A workshop, conducted by a scientific consultant of WP3 Professor T. Noskova (HSPU), entitled “Levels of e-learning and educational environment of higher educational institution” (19/01/2015).
  6. A workshop, conducted by Professor N. Morze (BGKU), devoted to the measurement of professors’ ICT-competencies (22/01/2015).

### **WP3 Research Methodology**

During the secondment to LU, the general methodology of WP3 was completely elaborated, discussed, and reviewed. The main objective of WP3 was connected with defining the system of indicators for e-learning development and ICT competencies. The overview of the methodology is presented in Figure 1.

Firstly, *the main effects (benefits) of e-learning and ICT in education* need to be described, in particular:

- improvement of the quality of educational services,
- formation and development of competencies of the knowledge society, and
- increase of the competitiveness of an institution in the global scientific and educational space.

It was assumed that the effects (benefits) of e-learning and ICT in education are manifested in:

- expansion of space-time coordinates (increase of scientific and educational process comfort, focus on lifelong learning goals);
- personalization of educational activities, individual expectation in e-learning;
- formation of new scientific and educational relations, cooperation, intercultural competencies;
- empowerment of self-realization in educational and professional activities, support of initiatives;



- increase of the openness degree of scientific and educational environment, expanding the influence of the university to external cultural environment; positioning of the actors in the research and education community; and
- enhancement of self-organizational effects that support sustainable development of the educational environment of the university and its participants.

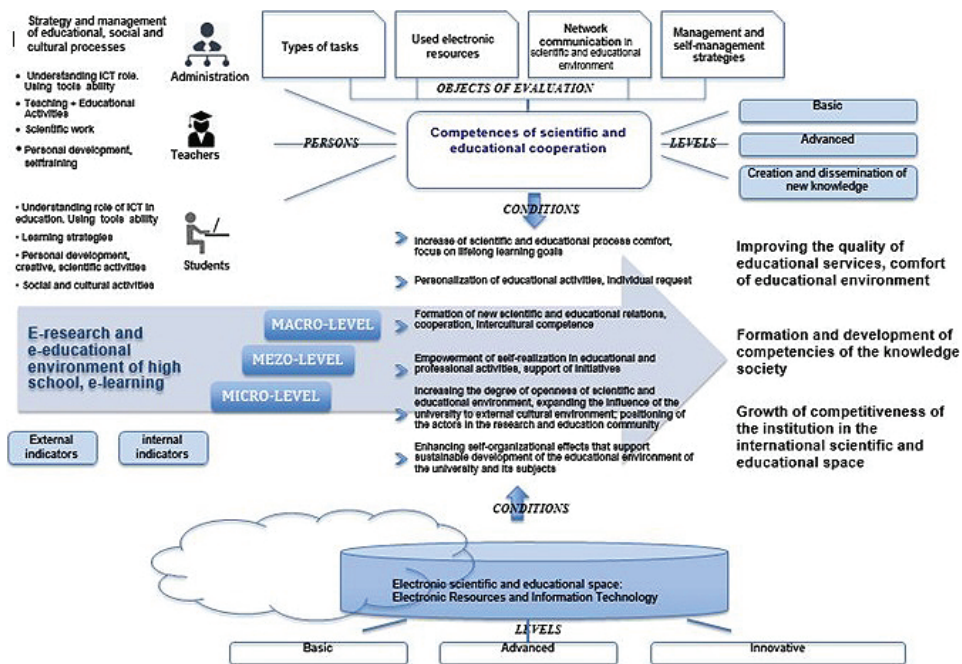


Figure 1. Scheme of WP3 Methodology.

Source: Own elaboration.

Manifestation of qualitative results of e-learning and ICT in education depends on a system of conditions:

- degree of e-learning environment development (*electronic space* – electronic resources and information technology; *interactions* while solving scientific and educational problems);
- level of competencies for major e-learning environment participants (faculty members, students, staff responsible for e-learning management).

E-learning environment of high school is considered at three levels:

- *micro level* (achieving educational objectives at the level of a discipline, an e-course),
- *meso level* (solving scientific and educational problems in the corporate environment of the university; interdisciplinary communication, cooperation, exchange of experience), and

- *macro level* (achieving scientific and educational objectives by integrating the external scientific and educational environment).

E-learning and ICT competencies are considered at three levels: basic level, advanced level, and innovative level.

Various activities in e-learning environment participants both *form* and *manifest* their *competence*, meeting the long-term requirements of training a specialist for the knowledge society.

E-learning and ICT competencies can be indicated by:

- objectives of different types of activities,
- electronic scientific and educational resources,
- network communication in the scientific and educational environment, and
- management strategies of scientific and educational activities in the information environment of the university.

#### **What are the aspects of activities in e-learning environment?**

For academic teachers these aspects of activities are as follows:

- acquisition of information tools and understanding the role of ICT in education;
- teaching + upbringing activities;
- scientific work; and
- personal development, self-training.

For students these aspects of activities are as follows:

- acquisition of information tools and understanding the role of ICT in education;
- learning activities;
- self-development, self-realization, research, scientific activities; and
- social and cultural activities.

#### **Hypothesis of the WP3 study**

E-learning development and ICT contribute to:

- the quality of educational services,
- the development of knowledge society competencies, and
- the increase of the competitiveness of an institution in the global scientific and educational space.

The participants of the e-learning environment (academic teachers, students, administration) are involved in activities with the following objectives:

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

- the enhancement of self-organizational effects that support sustainable development of the educational environment of the university and its participants. To achieve these, the following conditions must be complied:
- An electronic space at no less than the advanced level should be created in an educational institution.
- A constant improvement of e-learning and ICT competencies should be performed; the preferred level of competencies is advanced.
- Changing requirements – determining competitiveness of an institution in the global scientific and educational space – are considered at every level of e-learning environment.

#### **Indicators for e-learning environment and e-learning competencies**

Sections of indicators are as follows:

1. indicators of university electronic scientific and educational environment (internal, external),
2. indicators of e-learning development level,
3. indicators of student's competencies, and
4. indicators of teacher's competencies.

#### **Research Instruments**

Two questionnaires were elaborated – for academic teachers and for students. Both questionnaires are to determine how students and academic teachers use the effects (benefits) of e-learning and ICT in education, that is – how these effects (benefits) are reflected in different aspects of their activities (see the methodology above). The questionnaire for students consists of 13 questions, and the one for academic teachers consists of 18 questions. Questionnaires were translated to all languages of the project participants, and Google Drive technologies were used to automate data collection and analysis. First results of the survey were presented on ICTE and DLCC conferences.

#### **Secondment of DSTU, BGKU, HSPU to the University of Twente (UT) (March–April 2015)**

The transfer of knowledge activities during this secondment was focused on collecting data with the use of elaborated questionnaires and analyzing the e-learning environment of UT.

Workshops:

1. A project seminar and workshops “Brainstorming WP3 Methodology,” “Social Media as a Contemporary Educational Instrument” (25/03/2015). The workshops included group work and round table debates, presentations of own research directions, results, and planned activities, a discussion on extracurricular activities of students in different countries, taking into account intercultural aspects, as well as planning collaborative publications and project dissemination activities.

2. A workshop “Future Social Media as a Catalyst in Learning Communities” (30/03/2015). The inaugural lecture was given by Professor P. Kommers. A follow-up was a workshop, during which contemporary trends in education – combination of learning, playing, and working – were discussed. Group works elaborated WP3 research framework, discussed research instruments, and shared ideas about education focused on practical aspects, professionalization, start-ups, and private business.
3. A workshop “How to implement the values for an educational reform” (01/04/2015). It focused on creating mind maps in mixed groups for finding ways of solving problems of their educational institutions.
4. Round table debates and a seminar “Modern approach to using ITC in education” (02/04/2015). Professor P. Kommers shared ideas about modern approaches to using ITC in education and to motivating students to learning themselves, and gave examples of his students’ projects.
5. A workshop “Social media” (03/04/2015). M. Both was an invited keynote speaker. During the workshop, the experience of using social media in marketing was shared. The participants engaged in group work; they worked with the materials, made a psychological profile of a target auditorium of social media representative, as well as shared ideas about the role of social media in education.
6. A project workshop “Presenting own research results” (07/04/2015). The workshop was aimed at discussion. The invited participant was dr A. Beldad.
7. A workshop with W. Pontenagel, a representative of the Open Innovation and Industry Connection Department of Kennispark Foundation, who shared a scheme of cooperation between the university and business as a two-way process: the university develops know-how, entrepreneurial spirit, and new companies, and the business looks for inspiration, shared infrastructure and scientific resource in the university (14/04/2015).

**Secondment of the University of Silesia (US), the University of Ostrava (OU), Lisbon Lusíada University (LU), the Constantine the Philosopher University in Nitra (UKF), the University of Extremadura (UEX), the University of Twente (UT) to the Herzen State Pedagogical University of Russia, St. Petersburg (HSPU) (April–May 2015)**

During the secondment to HSPU, the study concentrated on the main documents on international cooperation, including international agreements of the Herzen State Pedagogical University, the Russian legislation concerning the development of a knowledge society (from aid to e-learning as a means of building competencies) and the role played by higher education institutions.

An analysis of the education system in Russia was made through the study of legal and official university and faculty documents.

Numerous discussions were conducted during various project seminars, meetings, round table debates concerning elaborating a system of instruments which would be appropriate for application in every country participating in the project, and would make it possible to obtain reliable and comparable data about ICT development, e-learning, teachers' and students' practices and attitudes towards ICT in their learning and professional life as well as their intercultural awareness. A final version of the questionnaire for students was prepared (Polish, English, and Russian version), and questionnaires for academic teachers were improved. Besides, an on-line version of the surveys was improved with support of LimeSurvey system at the University of Silesia and made available at URL addresses:

<https://el2.us.edu.pl/ankiety/index.php/843461/lang-pl>

<https://el2.us.edu.pl/ankiety/index.php/843461/lang-en>

<https://el2.us.edu.pl/ankiety/index.php/754473/lang-pl>

<https://el2.us.edu.pl/ankiety/index.php/754473/lang-en>

Additionally, a survey among students and teachers of the University of Silesia was initiated on-line after an invitation sent via e-mail and distributed by means of the Forum within a distance learning course available on the faculty distance learning platform (<http://el.us.edu.pl/weinoe>).

Workshops:

1. A project meeting and a seminar (05/05/2015). A workshop "Propriety LMS system for e-learning," conducted by P. Aksutin, chair of informational and communicational technologies, assisted by Doctor N. Karpova, chair of informational and communicational technologies, was held in the computer classroom with participation of the students during their testing.
2. A workshop "Use of IT tools for learners with special needs," conducted by Vice-Dean dr O. Vylykh (29/04/2015) with the participation of the Dean of the Faculty of Special Pedagogy HSPU Professor A. P. Antropov, Vice-Dean of this Faculty, and project researchers.
3. A workshop "Contemporary equipment and IT tools in Physics research" (22/04/2015), conducted by best specialist of the Faculty of Physics HSPU with participating Professor Y. I. Anisimova, Vice-Dean Professor Y. A. Grochovatski, and project researchers.

### **Dissemination of Results (conferences, publications)**

From the very beginning of the project, the partnership used various dissemination tools to better exploit and improve the project objectives, results, and the transfer of knowledge. National and international conferences as well as publications constituted an important opportunity to share the project initial results and achievements with experts in the field. However, it must be emphasized that means are not fully exhaustive: the dissemination of the results obtained in the frame of the project work was the subject of many other activities, meetings, workshops, and presentations during visits in the host organizations.

## I. Conferences

The partnership of the network has organized and hosted four important conferences being in line with the project objectives. All of these events were attended not only by the network researchers, but also by external participants.

1. International Scientific Conference *Theoretical and Practical Aspects of Distance Learning: E-learning and Intercultural Development in Different Countries*, organized by US in Cieszyn, Poland (13<sup>th</sup>–14<sup>th</sup> October 2014).

The conference was dedicated to the following issues discussed during conference sessions: legal, ethical, human, technical, and social factors of ICT and e-learning development in different countries; efficient use of e-learning in improving the level of students' key competencies; intercultural aspects of higher education and the process of globalization; e-learning methodology, effectiveness and quality of e-learning in various areas of science and education, information and educational environment of blended learning, e-learning as an innovative method and technique in different systems of education; new role and possibilities of using e-learning for lifelong learning (LLL), teachers' and learners' competencies in distance learning and computer science, pedagogical and methodical aspects of cloud computing, successful use of e-learning in the training of professionals in the knowledge society, educational strategies to enhance learners' motivation in e-learning.

2. International Internet Conference *New Educational Strategies in Modern Information Space*, organized by HSPU, Russia (17<sup>th</sup>–28<sup>th</sup> November and 5<sup>th</sup> December 2014).

The conference was held in an interactive section of the website: <http://fit-herzen-conf.ru>). The outcome of the discussion was summarized during the round table held on 5<sup>th</sup> December 2014. The main topics of the conference were: electronic resources, network communication, and communication field of virtual learning environment strategy of teaching activities in high-tech information environment, technical and technological aspects of the high-tech information environment.

3. International Conference ICTE 2014 *Information and Communication Technology in Education*, organized by OU, Czech Republic, in Rožnov pod Radhoštěm (8<sup>th</sup>–11<sup>th</sup> September 2014)

The conference was intended for all those interested in effective use of information and communication technologies in education. It was a meeting place of experts and a venue for exchanging experiences with employing ICT in the following areas: integrating ICT into education, the e-learning phenomenon, software and hardware used in education, personalized learning, 21<sup>st</sup> Century Educational Technologies. Under the auspices of the conference a pre-symposium on mobile technologies in education was held at OU in Ostrava (8<sup>th</sup> September 2014).



4. The international scientific-practical conference *High-tech Information Educational Environment*, which was held on 12<sup>th</sup>–13<sup>th</sup> May 2015, at the Herzen State Pedagogical University of Russia. The Conference Committee Chairman was V. Laptev – the Vice-Rector for Scientific Research Programs, Herzen State Pedagogical University of Russia. High-tech information educational environment is a perspective educational environment, in which information and communication processes are deployed in both traditional and virtual (electronic) formats, causing qualitative changes in the scientific, educational, social, and cultural problems. The Conference Scope (conference sections):
- innovation in terms of informatization of educational activities,
  - IT in scientific research, and
  - socio-cultural effects of informatization.

## II. Publications

32 papers were published (4 prepared for printing) by members of the network; about 30% of those papers involve researchers from at least two different participating organizations (EU and third countries). All publications are the outcomes of networked research and results of an active exchange program.

1. 6 articles have been submitted to Special Issues of *International Journal of Continuing Engineering Education and Life-long Learning (IJCEELL)*, devoted to the IRNet Project:
  - 1) Kommers, P., Smyrnova-Trybulska, E., Morze, N., Issa, Tomayess, & Issa, Theodora: “Conceptual aspects: Analyses of the legal, ethical, human, technical, social factors of the development of ICT, e-learning and intercultural development in different countries setting out the previous new theoretical model and preliminary findings.”
  - 2) Noskova, T., Yakovleva, O., Pavlova, T., & Smyrnova-Trybulska, E.: “Students in the information environment: A study of educational and extra-curricular activities.”
  - 3) Noskova, T., Pavlova, T., Yakovleva, O., & Morze, N.: “Quality features of university information environment in its external indicators.”
  - 4) Yalova, K., Zavgrodnii, V., Romaniukha, M., & Sorokina, L.: “Challenges and prospects in development of e-learning system for IT-students.”
  - 5) Ogrodzka-Mazur, E., & Gajdzica, A.: “New professionalism of the teacher and education towards interculturalism.”
  - 6) Smyrnova-Trybulska, E., Noskova, T., Yakovleva, O., Pavlova, T., & Morze, N.: “New Educational Strategies in Contemporary Digital Environment” (D.3.6.)
2. Publications in ICTE 2014 (*Information and Communication Technology in Education*) Conference Proceedings, ed. Jana Kapounova, Katerina Kostolan-yova, University of Ostrava, Rožnov pod Radhoštěm, 2014, ISBN 978-80-7464-561-7:

- 1) Smyrnova-Trybulska, E., Ogrodzka-Mazur, E., Gajdzica, A., Noskova, T., Pavlova, T., Yakovleva, O., Morze, N., Kommers, P., & Sekret, I.: "Research Instrument to Study Students' Beliefs about eLearning, ICT, and Intercultural Development in Their Educational Environment in the Framework of the IRNet Project."
- 2) Morze, N., Spivak, S., & Smyrnova-Trybulska, E.: "Personalized Educational Environment – As One of the Trends of Modern Education."
- 3) Malach, A., & Malach, J.: "Reflection of programmed learning in pedagogical literature and professional community opportunities."
- 4) Huk, T.: "Use of Google tools in school. Limitations and opportunities."
3. Papers published in the monograph *E-learning and Intercultural Competences Development in Different Countries*, ed. Eugenia Smyrnova-Trybulska, University of Silesia, Katowice–Cieszyn, STUDIO NOA, 2014, ISBN 978-83-60071-76-2:
  - 1) Kommers, P., Smyrnova-Trybulska, E., Morze, N., Noskova, T., Pavlova, T., Yakovleva, O., Cubo, S. D., Pinto, P., Malach, J., Drlik, M., Issa, Tomayess, & Issa, Theodora: "Contrastive analyses and evaluation of the ICT and e-learning competencies in Australia, Czech Republic, the Netherlands, Poland, Portugal, Russia, Slovakia, Spain and Ukraine."
  - 2) Issa, Tomayess, & Issa, Theodora: "Is web development process teaching and training essential for small online businesses in Western Australia?"
  - 3) Morze, N., & Veselovska, O.: "Analysis of information society development in Ukraine."
  - 4) Korobochka, O., Sorokina, L., Romaniukha, M., Yalova, K., Zavgorodnyi, V., Nakaznyi, M., & Kuzmenko, N.: "Intercultural aspects of higher education in the Dnieprodzhierzynsk State Technical University, Ukraine."
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  - 2) Arias-Masa, J., Alonso-Díaz, L., Cubo-Delgado, S., Gutiérrez-Esteban, P., & Yuste-Tosina, R.: “Assessment of the use of synchronous virtual classrooms in higher education.”
6. 1 article published in the Scientific Journal *The New Educational Review*, 40(2), 2015, ISBN 978-83-8019-051-1:
  - 1) Morze, N., Spivak, S., & Smyrnova-Trybulska, E.: “Designing a Modern Cloud-Oriented Virtual Personalized Educational Environment.”
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8. 1 article published in the Scientific Journal *RELATEC Revista Latinoamericana de Tecnología Educativa*, 14(1), 2015, available at <http://relatec.unex.es/article/view/1855/1199>:
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  - 2) Alonso Díaz, L., Gutiérrez Esteban, P., Yuste Tosina, R., Arias Masa, J., Cubo Delgado, S., & Gemma Delicado: “Collaborative and networked learning based on the interactive Tutoring feedback model.”
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  - 4) Pavlova, T.: “Electronic resources for organisations students’ independent work. Basic requirements.”
10. 3 articles submitted and published in *High-Tech Educational Informational Environment*, Proceedings of the International Scientific Conference, ed. V. Laptev, May 12–13 2015, St. Petersburg, 2015, ISBN 978-5-94777-392-7 (In Russian):
  - 1) Smyrnova-Trybulska, E.: “Information and Educational Environment of the University: A Case Study.”

- 2) Svec, P., Drlik, M., Capay, M., & Tomanova, J.: “Virtual Learning Environment and e-learning courses evaluation.”
- 3) Gutiérrez-Esteban P., Alonso-Díaz, L., Lucero-Fustes, M., Delicado-Puerto, J., Arias-Masa, J., Cubo-Delgado, S., Yuste-Tosina, R., & Iglesias Verdegay, E.: “Pedagogical Innovations in the Extremadura University ICT Sector: A Significant Area for Investment.”

## Project Management

### Overview of the Activities Carried out by the Partnership; Identification of Problems Encountered and Corrective Action Taken

The main objective of this period was to assure a successful start of the network. As the first activity, the kick-off meeting was held on 30<sup>th</sup> October 2013 (before the start of the project), organized by the Coordinator (US) via videoconference (Adobe Connect support). During this meeting the goals of the project and the objectives of each work package were pointed out, the plan of secondments was discussed, and the rules of participating in the IRSES project were reminded.

Monthly Steering Committee meetings were held via videoconferences, and the minutes and action lists circulated to all partners. On 12<sup>th</sup> October 2014 a Management Board meeting was held at US, Cieszyn with the participation of all partners representatives (BGKU, DSTU, HSPU) and beneficiaries (US, UKF, OU). The representatives of UT, CU, LU, UEx participated in the meeting in a remote mode.

The pre-financing, with the exception of a percentage of 4% that was retained by the Coordinator for management purposes, as decided in the Partnership Agreement, was distributed by US among beneficiaries of the project.

In February 2014, the website of IRNet including the most important information about the project was launched at [www.irnet.us.edu.pl](http://www.irnet.us.edu.pl). The website featuring branched structure, personification, and interactive services such as forum was created by the Coordinator (US). The website is regularly updated with new content and constitutes an access point for all project documentation, meeting minutes; moreover, it contains a photo gallery providing the participants with the opportunity to demonstrate their secondments and research activities. It also has a forum and a secure area for circulation of papers etc. between project participants. The logo of the network was designed.

In the period concerned (9–16 month IRNet Project, WP3), 42 secondments were realized: 24 secondments (involving 13 researchers) from the third countries to the UE countries organizations and 18 secondments (involving 13 researchers) from the UE countries to the third countries organizations.

33 papers were published by the members of the network and 4 important conferences were organized. The researchers also took part in numerous training events, such as workshops, seminars, and roundtables.

## Conclusions

In this paper the authors presented the objectives of the international project *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*, as well as WP 3: Analyses and Evaluation of the ICT Level, E-learning and Intercultural Development in Every Participating Country: Objectives, Tasks, Deliverables (coordinators of the WP3: Professor T. Noskova and the Herzen State Pedagogical University of Russia, St. Petersburg (HSPU, Russian Federation)). The international team of researchers from the University of Silesia in Katowice (US, Poland, Beneficiary 1 (Coordinator)), the University of Twente (UT, The Netherlands), the University of Extremadura (UEX, Spain), the Constantine the Philosopher University in Nitra (UKF, Slovakia), Lisbon Lusíada University (LU, Portugal), the University of Ostrava (OU, Czech Republic), Curtin University in Perth (CU, Australia), the Borys Grinchenko Kyiv University (BGKU, Ukraine), Dniprodzerzhinsk State Technical University (DSTU, Ukraine), and the Herzen State Pedagogical University of Russia, St. Petersburg (HSPU, Russian Federation) continue the study and research according the Project Documentation and the project scheduler; in near future, they will publish subsequent papers and manuscripts in the conference proceedings as well as in the scientific journal and the monograph.

## Acknowledgments

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### **Raport z wdrożenia pakietu roboczego WP3 „Analizy i ocena poziomu ICT (TIK), e-learningu i rozwoju interkulturowego w każdym uczestniczącym kraju” w ramach projektu IRNet**

#### Streszczenie

Niniejszy artykuł, opracowany przez międzynarodowy zespół autorów – badaczy z różnych dziedzin nauki związanych z ICT (TIK), e-learningiem, pedagogiką i innymi powiązanimi dziedzinami, skupia się na celach i wybranych, kluczowych wynikach międzynarodowego projektu IRNet. W szczególności artykuł ten opisuje narzędzia, metody i procedury badawcze pakietu roboczego WP3 „Analizy i ocena poziomu ICT (TIK), e-learningu i rozwoju interkulturowego w każdym uczestniczącym kraju”: cele, zadania, wyniki i realizację wyjazdów badawczych. Poza tym opisano w nim ważniejsze zdarzenia, takie jak: (wideo)konferencje, seminaria, warsztaty, internetowe debaty przy okrągłym stole, w tym ICTE 2014, DLCC 2014, „New Educational Strategies in Modern Information Space” (Nowe strategie edukacyjne w nowoczesnej przestrzeni informacyjnej) i „High-tech information educational environment” (Zaawansowane technicznie informacyjne środowisko edukacyjne), podczas których zaprezentowano ważne dla tego etapu wyniki badań prowadzonych w ramach projektu. Lista publikacji, będących pokłosiem badań, obejmuje 32 opracowania i manuskrypt zawierający opis wyników pakietu roboczego WP3. Badacze z Polski, Rosji, Ukrainy,

Holandii, Hiszpanii, Słowacji, Portugalii, Czech i Australii przeprowadzili analizę wyników pakietu roboczego WP3 w kontekście następných etapów i pakietów roboczych projektu IRNet – międzynarodowej sieci badawczej.

Sł o w a k l u c z o w e: międzynarodowa sieć badawcza IRNet, ICT (TIK), e-learning, kompetencje

Eugenia Smyrnova-Trybulska, Ewa Ogrodzka-Mazur, Anna Szafrąńska-Gajdzica, Ewelina Doluk, Tatiana Noskova, Tatiana Pavlova, Olga Yakovleva, Natalia Morze, Piet Kommers, Paulo Pinto, Laura Alonso Diaz, Rocío Yuste Tosina, Prudencia Gutiérrez Esteban, Martin Capay, Martin Drlik, Josef Malach, Tomayess Issa, Theodora Issa, Maryna Romanyukha

### **Отчет о ходе реализации рп 3 «Анализ и оценка уровня икт, электронного обучения и межкультурного развития в каждой участвующей стране» в рамках проекта IRNet**

#### **А н н о т а ц и я**

В данной статье, подготовленной международной группой авторов – исследователей из разных научных областей, связанных с ИКТ, электронным обучением, педагогикой и другими смежными дисциплинами, основное внимание уделяется целям и некоторым результатам международного проекта IRNet. В частности, в этой статье описываются инструменты исследования, методы и некоторые процедуры в Рабочем Пакете 3 (РП3) «Анализ и оценки уровня ИКТ, электронного обучения и межкультурного развития в каждой из стран-участниц»: цели, задачи, ожидаемые результаты, выполнение научно-исследовательских поездок. Кроме того, что в этой статье представлены наиболее важные события, такие как (видео) конференции, семинары, электронный круглый стол, среди которых конференции ICTE2014, DLCC2014, «Новые образовательные стратегии в современном информационном пространстве», «Высокотехнологичная информационная образовательная среда», на которых были представлены некоторые наиболее важные результаты исследований проекта. Список публикаций включает 32 статьи и рукописи с результатами РП 3. Исследователи из Польши, России, Украины, Нидерландов, Испании, Словакии, Португалии, Чехии и Австралии, проанализировали результаты РП3 в контексте последующих этапов и пакетов работы проекта IRNet – Международной научно-исследовательской сети.

**К л ю ч е в ы е с л о в а:** международная исследовательская сеть IRNet, ИКТ, электронное обучение, компетенции

Eugenia Smyrnova-Trybulska, Ewa Ogrodzka-Mazur, Anna Szafrńska-Gajdzica, Ewelina Doluk, Tatiana Noskova, Tatiana Pavlova, Olga Yakovleva, Natalia Morze, Piet Kommers, Paulo Pinto, Laura Alonso Díaz, Rocío Yuste Tosina, Prudencia Gutiérrez Esteban, Martin Capay, Martin Drlik, Josef Malach, Tomayess Issa, Theodora Issa, Maryna Romanyukha

**Informe de la aplicación del wp3 “Análisis y evaluación del nivel de TIC, e-learning y desarrollo intercultural en cada país participante” en el marco del proyecto de IRNet**

R e s u m e n

Este artículo, llevado a cabo por un equipo internacional de autores, investigadores de diferentes áreas científicas, vinculados con ICT, e-learning, pedagogía, y otras disciplinas relacionadas, se centra en los objetivos y algunos resultados del proyecto internacional IRNet. En particular, este artículo describe las herramientas de búsqueda, métodos y algunos procedimientos del WP3 “Análisis y Evaluación del nivel TIC, E-Learning y desarrollo intercultural de cada país participante”: Objetivos, tareas, metas y cumplimientos de viajes de investigación. Exceptuando que en el artículo presentado, las actividades más importantes tales como (video)conferencias, seminarios, talleres, mesas redondas de debate, entre las cuales ICTE2014, DLCC2014, “nuevas estrategias educativas en el espacio moderno de la información” y “High-tech del contexto de la información educativa”, fueron presentados más resultados del proyecto de investigación. La lista de publicaciones incluyen 32 documentos y un manuscrito con resultados WP3. Investigadores de Polonia, Rusia, Ucrania, Países Bajos, España, Eslovaquia, Portugal, República Checa y Australia, analizaron resultados de WP3 en el contexto de siguientes etapas y los paquetes de Work del proyecto de IRNet, la Red de Investigación Internacional.

**P a l a b r a s c l a v e:** red de investigación internacional IRNet, TIC, E-learning, competencias



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7. *IT tools – Good practice of effective use in education*. Monograph. Ed. E. Smyrnova-Trybulska. Katowice–Cieszyn: Studio Noa for University of Silesia, 2015, 408p. ISBN 978-83-60071-82-3.

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2. *Zastosowanie systemów CMS w tworzeniu przestrzeni informacyjno-edukacyjnej w Internecie*. Podręcznik akademicki. 2012. Ed. E. Smyrnova-Trybulska, S. Stach. Authors: E. Smyrnova-Trybulska, S. Stach, B. Fuklin, D. Staniek. Katowice: Studio Noa for University of Silesia, 194p. ISBN: 978-83-60071-55-7 (<http://www.wydawnictwo.us.edu.pl/node/3731>).

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