"Integrating E-Learning and Open Educational Resources into Classroom" – iOERc

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Research report on iOERc High Schools analysys

"Integrating E-Learning and Open Educational Resources into Classroom" *– iOERc*

E-learning and OER (Open Educational Resources) usage in project partners
High Schools analysys

Erasmus + Programme,
Key Action 2 - Cooperation for Innovation and the Exchange of Good Practices Strategic Partnerships for school education

MARCH 2016

"Integrating E-Learning and Open Educational Resources into Classroom" *– iOERc*

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1. Introduction

The aim of the project is to increase the human capacity in high schools that will work on the integration of ICT in teaching through the application of technologies for e-learning and through creation of digital content for education in the form of online OERs. This project will help teachers make comparison between the technologies and methodologies they are currently using and the latest trends worldwide.

The project performs researches in the field of informational resources in several schools. In particular, the research conducts the analysis and development of opportunities for effective use of modern technologies that enhance visualization, interactivity, control and management of the accumulation of knowledge in training in widely available, easy and low-cost technical environment. Partners and participants of the team are prominent professors and teachers in teaching different courses, which creates organizational and technical conditions for a real experiment in checking the appropriate relational or virtual models in the learning process in order to increase its effectiveness. The study is done with the prospect for broad application of the obtained results in other schools and in various other courses, related to the use of ICT.

In the last decade great efforts have been made to integrate ICT in the educational process. But it has not been carried out with the desired dynamics. There are a lot of reasons for it among which the following are considered as most important ones: lack of digital learning content, insufficient training of teachers and lack of desire and motivation to follow and use the latest technologies and methodologies for e-learning. An indirect factor for reasons of inadequate integration of ICT in teaching is the rapid development of technology. Technology is developing faster than the average teachers can follow.

The application of computer technology in conjunction with other media such as sound and video equipment, projection systems and more creates the possibility of organizing joint architectures and their automatic control in dialog mode. Such constructed training systems provided with interactive applications are used in various fields of science, education, art, business and others. They increase the efficiency of communication and selection of the necessary information. The results depend not only on the quality of technical support, but also the flexibility, adaptability and convenience of interface offered in combination with optimal structure of accessible and attractive offers interactive information.

The development of new hardware tools and the increasing technological and methodological possibilities of computer training systems are an important prerequisite for improving the quality and efficiency of education. This leads to a gradual overlap of the term "computer technology" with the term "information technology". These terms mean the process of organizing, processing, presentation and use of information by electronic means [1]. Therefore, technologies for raining could be defined as a set of electronic tools and methods for their operation, used for the realization of training activities. The composition of electronic resources includes hardware, software and IT components, route of administration, which is indicated by methodical provision of technology in education.

Modern methodologies provide basic system of principles and methods for organizing and carrying out theoretical and practical activities, as well as learning about this system. By the means of the methodology a description is performed about a set of methods used to study the basic characteristics and parameters of science, using a systematic way of acquiring knowledge. It is based on observation, measurement, assumptions, experiments and verification [2].

The usage of ICT and providing of free access to information is a fundamental requirement for the formation of a society based on knowledge. In the current world the Internet is a source of knowledge by which we have access to various information presented in different formats

Since 2002 UNESCO actively supports the initiative for distribution in Internet of open educational resources (OER). Their usage enables significant expansion of access to education and training with high quality. The design, development and and usage of OER are being broaden in many countries, by opening the access to different educational and scientific materials.

2. Overview of the latest ICT trends worldwide

Modern technologies for e-learning are the base to teach young people a new style of education, developing their skills and skills training, lifelong. ICT provide huge opportunities for education at all levels and in all sectors. There is a wide range of studies made in the sixties up to nowadays for the role of computer technology in teaching and learning and the use of computers in various forms in training systems, which are widely distributed throughout the world. ICT could be introduced in the educational sector at all levels in the system. These technologies can be used as tools to support the management and administration of the system, or may be introduced in the course of study, or specifically as objects for training. The modern focus is placed on the educational use of technology in education, on how to use them best as tools for effective teaching, which could lead to more effective learning opportunities. The main methods of use of ICT in teaching and learning include:

- support method - technology is used to increased accuracy and performance of the work. Such tools are word processing packages, utilities for design and design programs for amateur printing;
- research and control method - the trainee may examine, explore, experiment and build solutions. Software packages include adventure games and other simulations, databases, expert systems, statistical analysis packages;
- management method - here the information is presented to the student with the appropriate level and pace, allowing feedback on the progress in training. This can be applied in the technical sciences, mathematical sciences, etc., where it is possible to have more objective criteria;
- resources method - technology is used to access information and other resources, either online with the capabilities of the Internet or offline using CDs and other software;
- relevant method - technology is used for communication between students [3].

The use of ICT in the learning process can be seen as a tool for teaching and learning, by which teachers teach and students learn [4]. This can be done in different forms: exercise review of material studied, simulations, modeling, seminars, tutoring systems, educational networks, hypermedia programs, knowledge control systems and other. Currently, ICT only replace the existing activities of teaching and learning. This use of replacement is expressed in one of three phases, which govern the spread of new technologies in society in general, and hence in education [5].

The three phases of the spread of technology are:

- replace - at this stage technology automates existing teaching practices;
- transition - the methods of teaching change, i.e. technology is being used for activities for which it was not specifically designed and these questioned their previous practice;
- Transformation - the introduction of completely new teaching methods.

In order to provide educational process, technology should support visualization and analysis tools, the basis for solving the problems, opportunities for feedback, comments and criticisms, connection between trainer and learner, real content for training and learning opportunities to the teacher.[6].

Today there are many different technologies that can be used for e-learning. We can distinguish six main types of technology in teaching [7]:

- ***Computer-Based Training, Computer-Based Tutorials, Computer-Based Teaching*** – the most widely used type of training in educational organizations in the recent years. This kind of learning represents computer exercises on different courses, usually distributed via CD-ROM or other media. Computer based training may be used as a guide for teaching a course, also for the teaching in classrooms. Students, who are studying on a computer, have the ability to absorb the learning material at their own pace. Online materials accompany most of the computer-

based courses. In recent years this type of course includes many multimedia components. About the price of this technology could be said that the most expensive component in the development of these courses is not hardware or software, but the development of the course [8]. The level at which the course was developed directly affects its efficiency. So it should be paid particular attention to the design of the course. Designers should use the advantages of the media, and include in the course static information (text, graphics and images), supplemented with dynamic (sound, videos and animation). One of the major advantages that give graphic interface is the ability to visually depict complex structures. In computer-based courses it is important to take into account the interaction that takes place between the learner and the learning material. To achieve effective training course designers should stimulate students to perform some action, i.e. the student should become part of the training system. This most often is done by the system "right answer" - "wrong answer". The required hardware for this kind of technology is the availability of computers with enough RAM and CPU speed, microphones, headphones and a suitable monitor, and software - multimedia software and Action recorder software.

- ***Computer-Aided Instruction, Computer-Aided Learning, Computer-Based Learning, Computer-Based Teaching, Computer-Aided Teaching*** - like computer-based training, but it is usually used as a complement to traditional ways of learning. This method is often used for guidance and assistance given lectures and to hold that the relevant exercises. There are two types of computer-assisted training, depending on the software you use - if there has been a particular program for a particular purpose, or when we have a common software, where the students perform exercises given by the teacher. The design of the courses of computer-aided training is very similar to the design of the computer-based training. The main difference is that in computer-based training course material must include all the information, because the student cannot get explanations from the teacher. In computer-aided training teachers can explain to the students during the lessons in class or via the Internet. The information in this course is organized in such a way as to be easily accessible, for example using hierarchical or hypertext (via hot words) structure of documents. In computer-aided training an important role occupies the interaction between the learner and the learning material. There must be an often and useful feedback that can be realized as the system "right answer" - "wrong answer". Computer-aided training courses should be directed to a particular topic, usually because they represent an additional to the basic material. The ideal course makes students practicing on material that has been previously taught. Hardware and software requirements in this kind technology are the same as in computer-based training.

- ***Web-Based Training*** - training in which WWW is used as a virtual environment for the presentation of educational materials and / or implementing the educational process. In other words WWW is used to conduct the training session remotely, for discussions on topics of educational content, communication between students and teachers and among students, to conduct exercises, passing the tests, for joint development projects, to access additional learning resources and more. The Web-based training can exist in two different forms – to support regular training (as in computer-assisted learning) or completely replace a course taught in the classroom. This type of training is often used only for information. This can happen at any time and any place in the world where there is Internet, so Web-based learning enjoys wide popularity in educational circles. Web-based courses are called often cyber courses or virtual courses. In such courses the student plays the central role and is given the opportunity to study at his own pace. Generally, Web-based courses widely use means of Hypermedia. It exists the opportunity for communication between students and teachers and among students. This can be done in different ways - for example by e-mail, discussion groups, computer conference or chat. Hardware requirements are a good network connection (high-speed modems), high capacity

servers, computers with enough RAM and CPU speed, microphones, headphones, etc., and the software is Web-editors, browsers and programs supporting networking.

- *Teleconferencing* – synchronous method for distance learning, in which all participants in the course are related to each other (or to the teacher) during the conference. Teleconference comprises three types of conferencing technologies: audio, data and video. Audio conference is done through media such as microphones, speakers and audio software. Videoconferencing uses cameras suitable multimedia monitors and software to communicate face to face. Videoconferencing can be performed on two levels: large-scale and desktop video conferencing. Teleconference supports three types of interaction between participants: unidirectional (dissemination of information through sound, picture and text by the teacher to distant learners), two-way (communication between the teacher and individual student) and multidirectional (allows interaction between students and teacher). Two-way teleconference is very successful, because teacher, in addition to providing information is receiving instant feedback from every student. The hardware requirements are different for the two types teleconference: a large scale requires a good Internet connection, camera, large screens and audio hardware and desktop conference - good connection to the Internet, cameras and microphones. For large-scale conference software is needed to maintain the connection, audio and other systems, and for the desktop - multimedia software and teleconference.

As each technology is typically used for a specific purpose, it is better to analyze their advantages and disadvantages. For example, some technologies provide almost no interaction between students and the teacher or between students, others do not provide additional information on the subject, while others give the learner a lot of additional knowledge extra the obligatory material. Some of the technologies provide more flexibility through asynchronous learning; allowing students to learn at their own pace, while synchronous training have better opportunities for interaction. The choice of technology for e-learning depends on the specific nature and purpose of the course, from consumers targeted by the financial capabilities of the organization and the existing infrastructure (table. 3.1) [7].

As result can be concluded that the choice of technology for e-learning depends on the specific needs of the organization and its financial resources. The analysis of the current state of ICT in education shows that the ambition of all of them is to increase the flexibility, quality and efficiency in traditional environments as part of a combined model, not as a replacement of traditional methods and forms. Information technology is widely applied in teaching and training, serving students, staff development and management of educational institutions.

Development of the technologies for e-learning have a key influence on the education system, because the learning process is a combination of subjects, means, methods and forms of teaching knowledge and its improvement in line with new technological capabilities is vital.

Table 2.1 Advantages and disadvantages of the e-learning technologies

Teaching technology	Advantages	Disadvantages
Computer-based training	Time independence of the learner; Work on the modules; Immediate feedback; Fast response to the learner; Increases the control over learning; Flexible schedule; Low operating costs;	Lack of interaction with the student; Lack of teacher; No control over the learning environment; It requires access to a computer; Platform dependency; Implementation costs; Expensive processing; No control over the results;
Computer-assisted learning	Improves actual training; Flexible schedule; Work on the modules; Immediate feedback; Different ways of learning; Increases control over learning; Flexibility for teaching; Individual attention to learners; Lower operating costs; Standardization of course;	Limited interaction with the learner; It requires access to a computer; Platform dependency; Development costs; Requires material in electronic form;
Web-based training	Not depending on geography; Time independence; Ease of use; Increases interaction with the teacher; Increases interaction with other learners; Increases control over learning; Cheap means of communication; Actuality of the the courses; Everything is in electronic form; Platform independence; Links to additional resources; Use of existing infrastructure; Centralized checking of results;	Slow connection speed; Viruses; It requires access to a computer; Costs for network access; Security; Increase in total costs; "Lost in the Network"; Confidence in e communication; Required material in electronic form; Required knowledge of HTML or any other WEB programming language; Copyright; Authenticity while testing; It requires a fast connection; Lack of standards; Infrastructure maintenance; High general costs;

Teleconferencing	Communication face to face; Interaction between students; Interaction between student and teacher; Independence of geography; Comprehensive explanation of the problems; Easy processing;	What is needed is a good connection; Audio restrictions; Video restrictions; Implementation costs; Security;

Some of the main hardware tools for achieving quality and efficient e-learning are the modern multimedia learning environments. Application of computer technology in conjunction with other media such as audio and video equipment creates conditions for the organization of mixed architectures and their automatic control in dialog mode. Quality of technical support depends on their proposed interface that should be flexible, adaptable, attractive and with optimal structure. In the spirit of the latest technologies, developing very rapidly may be reviewed the Top 10 Global Trends in ICT and Education [9]:

- *Mobile Learning* – new advances in hardware and software are making mobile "smart phones" indispensible tools. Just as cell phones have leapfrogged fixed line technology in the telecommunications industry, it is likely that mobile devices with internet access and computing capabilities will soon overtake personal computers as the information appliance of choice in the classroom.

- *Cloud computing* – applications are increasingly moving off of the stand alone desk top computer and increasingly onto server farms accessible through the Internet. The implications of this trend for education systems are huge; they will make cheaper information appliances available, which do not require the processing power or size of the PC. The challenge will be providing the ubiquitous connectivity to access information sitting in the "cloud".

- *One-to-One computing* – the trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology. Whether the hardware involved is one laptop per child (OLPC), or – increasingly -- a net computer, smart phone, or the re-emergence of the tablet, classrooms should prepare for the universal availability of personal learning devices.

- *Ubiquitous learning* – with the emergence of increasingly robust connectivity infrastructure and cheaper computers, school systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere". This trend requires a rethinking of the traditional 40-minute lesson. In addition to hardware and Internet access, it requires the availability of virtual mentors or teachers, and/or opportunities for peer to peer and self-paced, deeper learning.

- *Gaming* – a survey by the Pew Internet and American Life Project per the Horizon Report found that massively multiplayer and other online game experience is extremely common among young people and that games offer an opportunity for increased social interaction and civic engagement among youth [10]. The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.

- *Personalized learning*. Education systems are increasingly investigating the use of technology to better understand a student's knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles. This focus transforms a

classroom from one that teaches to the middle to one that adjusts content and pedagogy based on individual student needs – both strong and weak.

- ***Redefinition of learning spaces*** – the ordered classroom of 30 desks in rows of 5 may quickly become a relic of the industrial age as schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning. Concepts such as greater use of light, colors, circular tables, individual spaces for students and teachers, and smaller open learning spaces for project-based learning are increasingly emphasized.

- ***Teacher-generated open content*** – OECD school systems are increasingly empowering teachers and networks of teachers to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their own purposes, so that their students receive a tailored copy that exactly suits the style and pace of the course. These resources in many cases complement the official textbook and may, in the years to come, supplant the textbook as the primary learning source for students. Such activities often challenge traditional notions of intellectual property and copyright.

- ***Smart portfolio assessment*** – the collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches. In addition, assessment is increasingly moving toward frequent formative assessments, which lend itself to real-time data and less on high-pressure exams as the mark of excellence. Tools are increasingly available to students to gather their work together in a kind of online portfolio; whenever they add a tweet, blog post, or photo to any online service, it will appear in their personal portfolio, which can be both peer and teacher assessed.

- ***Teacher managers/mentors*** – the role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal class time and outside of the designated 40 minute instruction period. This shift is easier said than done and ultimately the success or failure of technology projects in the classroom hinge on the human factor and the willingness of a teacher to step into unchartered territory.

The introduction and usage of Open Educational Resources, (OER) in the educational process is of considerable importance for the modern development of education of high quality. According to the definition adopted by UNESCO, Open Educational Resources, (OER) are educational and scientific resources that exist for open access or created under licenses that allow their free usage and modification by third parties [11]. The main characteristics of OER are:

- Methodical, educational or scientific field of the material;
- Maintain a variety of formats and media presentations of the material;
- Publication of license conditions for open scientific and educational materials in the public domain;
- Providing free access, usage, processing and redistribution of the material from other users;
- Minimum limitations when working with OER;
- Built-in free (open) licensing rights to intellectual property to established international conventions.

The characterized in such way OER are all kinds of public and free to access educational and scientific materials, which are set in accordance with "open licenses", that allow their free use by all users – coping, editing (changing) and creation on this base of new materials. There are now created and published in Internet thousands collections, containing free (open) access

to millions educational resources – lecture notes, electronic books, learning and methodical tools, learning modules, audio and video materials, tests, computer programs etc. materials, which might be used for providing and access to knowledge. OER is a kind of educational content which enables the Internet user to get acquainted with educational courses and other educational materials from leading schools or teachers to receive quality education.

The so defined task shows the necessity of active and actual usage of the content. The solution to this global problem is impossible without the development and promotion of the use of open educational resources.

These trends are expected to continue and to challenge many of the delivery models fundamental to formal education as it is practiced in most countries. It will be interesting for us, for the goal of the project, to get feedback from the teachers for the information resources which they used in their practices.

3. Analysis for the current utilization of the ICT in the educational process in the partner organizations

The main goal of this research is to analyze the current condition of the ICT in the educational process in the partner organizations. The main technologies and methodologies would be identified, as well as their advantages and disadvantages in the learning process in different courses from the providers of this education – the teachers' point of view.

The feedback from the teachers is an important indicator for the definition of the quality of education. Within the project **"Integrating E-Learning and Open Educational Resources into Classroom" – iOERc**, information has been gathered and processed. The gathered information concerns the application and usage of different means and tools for e-learning. In the process of gaining this information a inquiry has been developed and used for the purposes of the project.

The main objective of this inquiry is to examine the experience of teachers on Content-Based Resources, Delivery of Learning Content, E-learning Technologies and Specifications, Dialogue and Collaborative Learning and Evaluation Activity.

The analysis of the received responses and the interpretation of the received results could propose strategies and approaches for measuring the level of understanding and application of the information technologies associated with facilitating the absorption of the material by the students and the effectiveness of systems used for e-learning. The result may make evaluative conclusions about the severity of the individual elements in the learning process that we match to the criteria for technology and teaching methodology used by the teacher. In case of approximately match between the positions of the surveyed teachers can be argued that information technologies used for training are acceptable, because they help the improvement of the quality of education and obtaining sufficient levels of knowledge and skills of students.

3.1. Technology of the inquiry

The construction of the text inquiry has been based upon the standard "6 - models" belonging to TSS (Testing Service System), proposed by the company TestCraft [12]. This standard was chosen because it is aimed at a wide range of users – students, teachers and employees. By model TSS could be explored the main components in the educational process [13]:
   • teaching methods of disciplines;
   • interaction between teachers, students and sources of information;
   • practical application of the technology used;
   • methods and technologies to verify the knowledge and skills.
The principle is based on six core activities (Fig. 3.1):
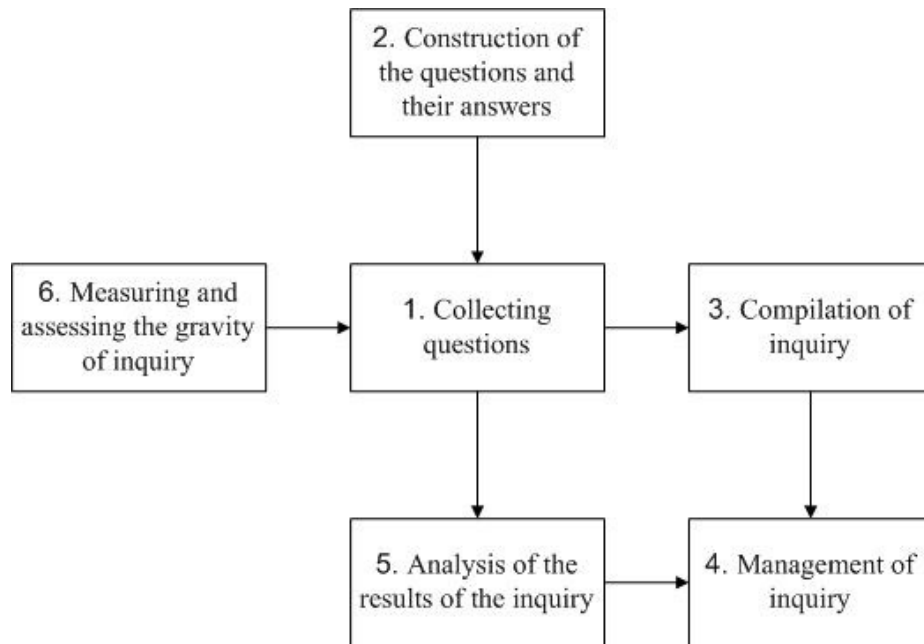
Fig. 3.1 The standard "6 - models" of TSS

- Collecting questions;
- Construction of the questions and their answers – the collection and design the questions for the questionnaire is an important process where the aim is to select appropriate targets for questions, so that the answers to which will allow for accurate diagnosis and treatment;
- Compilation of inquiry – it is a process which must choose a suitable form of the method of obtaining the answers – it can be multiple choice, true-false, fill in the blank and others. According TSS most appropriate method for processing and calculation of data is multiple choice;
- Management of inquiry – it is necessary to choose a suitable environment in which to allow an opportunity for feedback;
- Analysis of the results of the inquiry – it is necessary to be able to apply appropriate statistical methods, based on the distribution of points according to obtained answers, standard deviation, percentages, arithmetic data, charts and graphs;
- Measuring and assessing the gravity of inquiry – measurements and assess the severity of inquiry is a statistical procedure in which the results of the inquiry used to evaluate the components (various issues) on a common scale based on the Item Response Theory – ITR, due to which it can draw conclusions about the quality, relevance and effectiveness of the implementation of inquiry.

The transfer of results to Excel provides an excellent opportunity for automatic visualization and graphical data processing.

3.2. Structure of the inquiry

Following the basic principles for creating inquiry at the TSS, such a study is made up of the experience of teachers according the described and applied strategy (Fig. 3.2). It consists of five main parts:

- **Content-based resources**

   Nowadays, each course author has a numerous collection of learning resources, which represent some specific area of knowledge. It is a major challenge to organize author's resources in well-structured and well-defined course content, which achieves the learning outcomes. Learning object is the smallest entity that can be used and reused for learning content. It usually represents digital and web-based modular resource like image, video or audio file, text, etc.

- **Delivery of Learning Content**

   The rapid growth of the Web-based education market poses a number of challenges for software developers and educational content providers. That area covers integrated software platforms for delivery of course content and different learning activities. The main goal is that the teacher and the students have access to the course materials and the course environment.

- **E-learning Technologies and Specifications**

   The E-learning standards are expressive tool for knowledge mastering, technology and good practices. The standards are created with the goal for easy adopting of one application to another using similar interface.

- **Dialogue & Collaborative**

   We define different communication alternatives in order to include learning activities in student dialogue and collaboration:

   - ✓ E-mail - internal or external mail;
   - ✓ Chat, virtual chat rooms;
   - ✓ Discussion Board - branching discussions connected with different courses and other topics;
   - ✓ News - personalized news that teachers can publish and students can read;
   - ✓ Shared/Personal Space - each user is given a limited personal space in the form of virtual disk. The shared space could be provided, where students can share their materials, while working on a group project.
   - ✓ Videoconferencing/ online meetings
   - ✓ Online Teamwork - work on shared documents that all the students within the team can use in real-time.

- **Learning and Assessment Activity**

   There are different learning activities using ICT, which apply strategies for organizing, comparing, synthesizing and analyzing information for students. Assessment data and evaluation procedures can be recorded and analyzed more efficiently, allowing teachers to see where particular students or areas of learning need more support or attention.

Page 1

KA2 - Cooperation for Innovation and the Exchange of Good Practices Strategic Partnerships for school education
Project title: "**Integrating E-Learning and Open Educational Resources into Classroom" – iOERc**

Analysis of the experiences for utilization of the ICT in the educational process

Project Participant:

Name	Country	Date

1. Content-based resources

Please, fill the following table:

		Use (yes/no)
Methodology	Multimedia — Graphics	
	Tables	
	Image	
	Audio	
	Animation	
	Video clips	
	Course documents	
	Presentation slides	
	Glossary	
	Others (please describe)	

		Describe the technology
Technology	Hardware — Scanners	
	Computer linked to data projector	
	Interactive whiteboards	
	Video cameras	
	Mobile phones	
	Others (please describe)	
	Software — Paint and drawing software	
	Clip art	
	Recording and editing sounds	
	Simple multimedia authoring	
	Graphing programs	
	Flat file	
	Databases	
	Open repositories	
	Others (please describe)	

List the subjects which use these methods and technologies:

Page 2

2. Delivery of Learning Content

Please, fill the following table:

	Use (yes/no)	Describe the Software
E-learning platform		
Blog		
Repository		
Others (please describe)		
List the subjects which use these methods and technologies:		

3. E-learning Technologies and Specifications

Please, fill the following table:

	Use (yes/no)	Describe the Platform(-s)
LMS (Learning Management System)		
LCMS (Learning Content Management System)		
SCORM (Sharable Content Object Reference Model)		
IMS (Instructional Management System)		
AICC (Aviation Industry Computer-based training (CBT) Committee)		
xAPI (Experience Application Programming Interface)		
QTI (Question and Test Interoperability specification)		
LTI (Learning Tools Interoperability)		
Others (please describe)		
List the subjects which use these methods and technologies:		

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4. Dialogue & Collaborative

Please, fill the following table:

			Use (yes/no)	Describe the Software
Asynchronous	E-mail	internal		
		external		
	Discussion Board			
	News			
	Shared/Personal Space			
	Other (please describe)			
Synchronous	Chat			
	Online meeting			
	Online Teamwork			
	Videoconferencing			
	Other (please describe)			
List the subjects which use these methods and technologies:				

5. Learning and Assessment Activity

Please, fill the following table:

			Use (yes/no). If "yes", list the used methodology/technology
Methodology	Learning Activity	Games	
		Simulation	
		Virtual tour	
		Wiki	
		Others (please describe)	
	Evaluation and Assessment Activities	Assignments	
		Test/Quiz	
		Problem-solving project	
		Assessment	
		Others (please describe)	
Technology	Hardware	Digital microscope	
		Control interface with associated switches, sensors and others.	
		Colour printers	
		Robots and toys	
		Others (please describe)	
	Software	Voting systems	
		Software for move and match words and pictures	
		Simulations	
		Personal portfolio tools	
		Enterprise learning-management systems (LMS)	
		Open source LMS	
		Semantic Web-based systems	
		Others (please describe)	
List the subjects which use these methods and technologies:			

Fig. 3.2 Questions of the inquiry

3.3. Analysis of the results of the inquiry

Four schools belong to the current project. Those schools also belong to three countries in Europe that are- 2ELS – Sofia, Bulgaria, SOU Dobri Daskalov - Kavadarci, Macedonia, CNG – Finspang, Sweden, ZCS, Skopje, Macedonia. We received 46 filled up inquiries from those schools.

3.3.1. Content-based resources

The gathered data from the inquiries in its part for content-based resources is presented in Table 3.1. The data is separated in different columns for each country. From table 3.1 could be seen that most of the schools use content based resources.

Table 3.1 The data from the inquiries for the content based resources

			Bulgaria (yes)	**Macedonia (yes)**	**Sweden (yes)**
Methodology	Multimedia	Graphics	9	11	8
		Tables	9	11	7
		Image	9	11	11
		Audio	9	11	9
		Animation	8	11	9
		Video clips	9	11	12
	Course documents		9	11	11
	Presentation slides		9	11	11
	Glossary		9	5	4
	Others (*please describe*)				
			Describe the technology		
Technology	**Hardware**	Scanners	8	10	8
		Computer linked to data projector	9	11	9
		Interactive whiteboards	9	0	12
		Video cameras	3	2	11
		Mobile phones	2	0	8

		Others (*please describe*)	0	0	
	Software	Paint and drawing software	4	4	8
		Clip art	5	8	5
		Recording and editing sounds	5	6	4
		Simple multimedia authoring	2	5	4
		Graphing programs	4	4	7
		Flat file	0	0	4
		Databases	0	4	4
		Open repositories	4	4	4
		Others (*please describe*)	0	10	8

Figure 3.3 shows the percentages of the used content-based resources for hardware and figure 3.4 shows the percentages for software used by the schools.
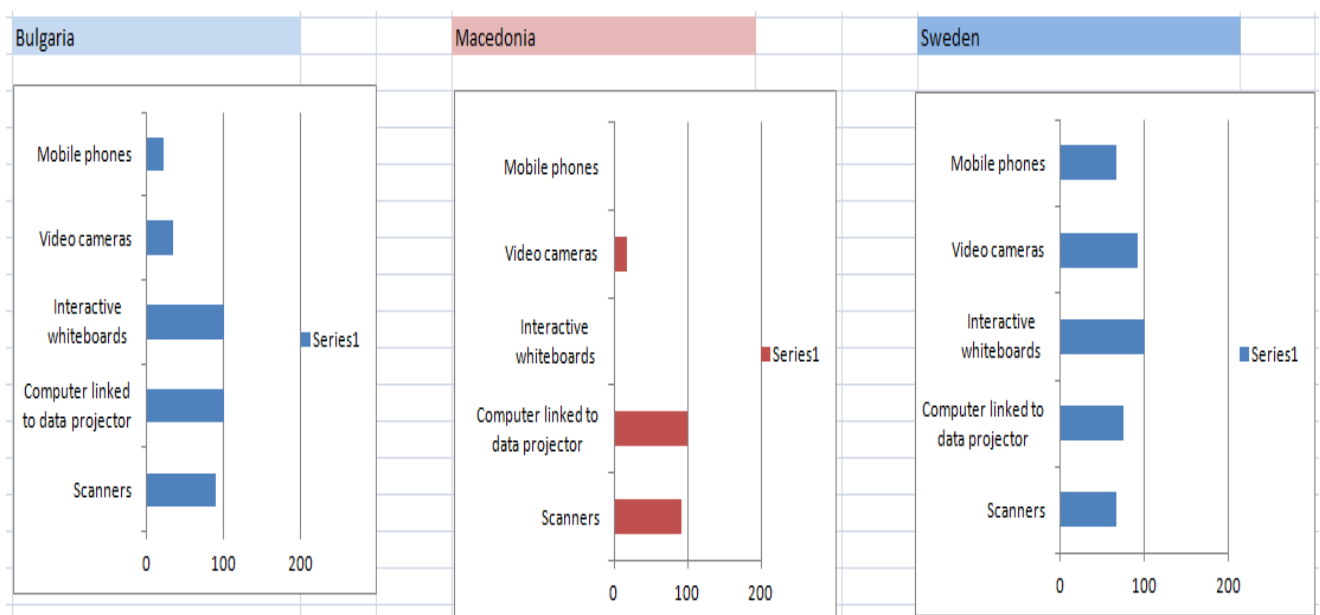

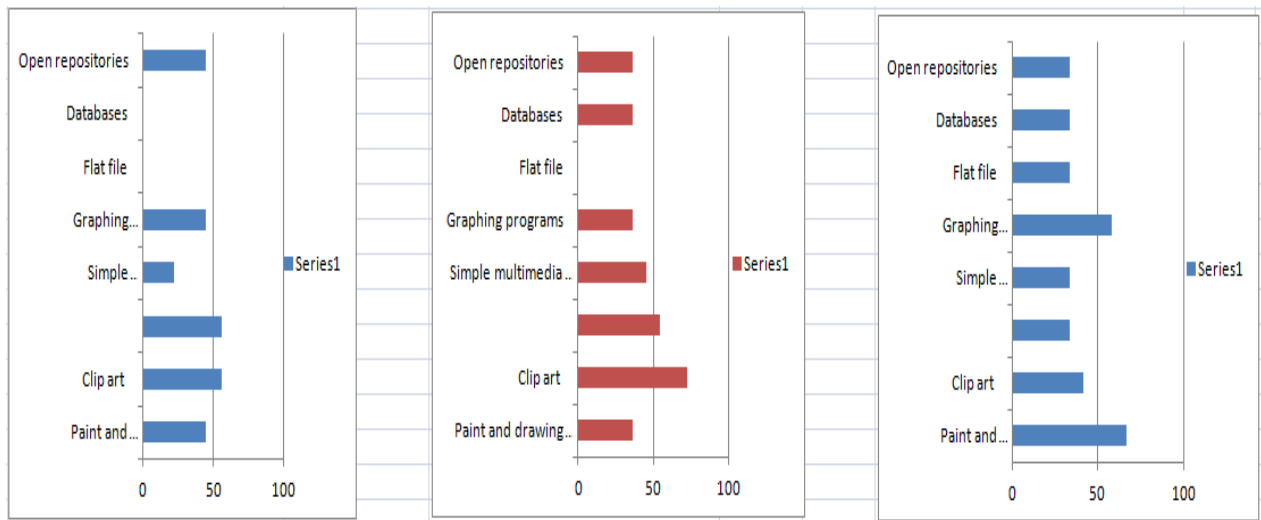*Fig. 3.3 Percentages of positive answers by countries (hardware)*

Fig. 3.4 Percentages of positive answers by countries (software)

The figures 3.3. and figure 3.4 allow us to make the following analysis:

- The usage of the white boards is a technology widely used except in Macedonia – no smart White Boards at all.
- In Bulgaria and Sweden almost every classroom is equipped with a smart White Board.
- Again for Macedonia and Bulgaria 100% of the computers are linked to data projector, no flat files are used.
- In Sweden most common is the infrastructure with network printers with integrated scanners and laptops which are widely used.
- In Sweden the full Adobe license is acquired and all the packages of the platform are being used.
- In all countries the scanners are widely used.

3.3.2. Delivery of Learning Content

One of the main aims of the project is to optimize and integrate the best practices of education. Teachers use special software systems to deliver online training, automate record-keeping and for student registration. The current software technologies enhance and support classroom teaching and offer many benefits as course content delivery, training event management, assessing and resulting, reporting.

Students with a Web browser and Internet connection may actively participate in this e-learning community using the recent technologies and Web application advancement that support open, social, personal, flexible, learning analytics and mobile.

The following table summarizes the collected answers from all participants:

Answered = **46**

*Table 3.2 Summarized delivery of learning content data from participants' surveys*

E-learning platform		Blog		Repository		Others	Subject List	School
Y/N	Software	Y/N	Software	Y/N	Software			
N		N		N			Mathematics	
N		N		N				
N		N		N				
Y	Google Drive	N		N			English Language and Literature	
Y	Google Drive	N		N			English Language and Literature	2ELS Sofia Bulgaria
N		N		N				
N		N		N			Geography	
N		N		N				
N		N		N			Biology	
N		N		N			Mathematics	
Y		N		N			Economic Subjects in the Second Education	
Y	Moodle	N		N		Anjuta and CodeBlocks, Open Office, Gimp, Kompozer, YouTube, CMS Joomla – official school website	Informatics, Information Technologies and Programing Languages	SOU Dobri Daskalov Kavadarci Republic of Macedonia

Table 3.2 Summarized delivery of learning content data from participants' surveys

Y	Moodle	N		N		Anjuta and CodeBlocks, Open Office, Gimp, Kompozer, YouTube, CMS Joomla – official school website	Informatics, Information Technologies and Programing Languages	
Y	Moodle	N		N		Anjuta , Open Office, Gimp, Kompozer	Informatics, Information Technologies and Programing Languages	
Y	Moodle	N		N			History	
Y	Moodle	N		N			Latin	
N		N		N			Sport and sport activities	
N		N		N			Macedonian language and literature	
Y	Moodle	N		N			Economic subjects	
Y	Moodle	N		Y	Dropbox		History	
N		N		N			German Language	
Y	Moodle	Y	www.wordpress.com	N			Macedonian Language, History, Geography, Business, Informatics, Programming Languages	ZCS Skopje Republic of Macedonia
N		N		N			Language	
N		N		N			Language	

N		N		N		History	
N		N		N		Geography	
N		N		N		Chemistry	
N		N		N		Philosophy	
N		Y		N		English, Management, German, etc.	
N		Y		N		Foreign Languages, Economy, Computer Studies, etc.	
N		N		N		Economy, History, Foreign Languages, etc.	
N		Y		N		Foreign Languages	
N		N		N		Foreign Languages, Economy, etc.	
Y	Vklass.se	Y	Integrated in Vklass	Y	Integrated in Vklass.se	Religious Studies, Civic Studies	
Y	Learnware	N		N			
Y	Vklass	N		N		History, Religion, Health Course	
Y	Vklass	N		N		Mathematics and Physics	
Y	P&L Learnware	N		Y	Vklass, P&L Learnware	All electrical courses	
Y	Vklass	N		N		Mathematics and Physics	
Y	Vklass	N		Y	Cloud services		CNG Finspang Sweden

Y	Vklass	N		N			Swedish, History, Religious Education
Y	Vklass	Y		Y			All practical and theoretical subjects
N		N		N			Course in special athletic and health
Y	Learnware	N		N			
Y	Vklass	N		Y		Cloud services	
Y	Vklass, Prezi	Y	Blogspot	N			We use it in the classroom as well out in the workshop. This goes for all the classes.

Teachers use different e-learning software for delivery of learning content – Goggle Drive (in Bulgaria), Moodle (in Republic of Macedonia) and Vklass in the cloud, Learnware and Prezi (in Sweden). Figure 3.5 shows the used e-learning tools:
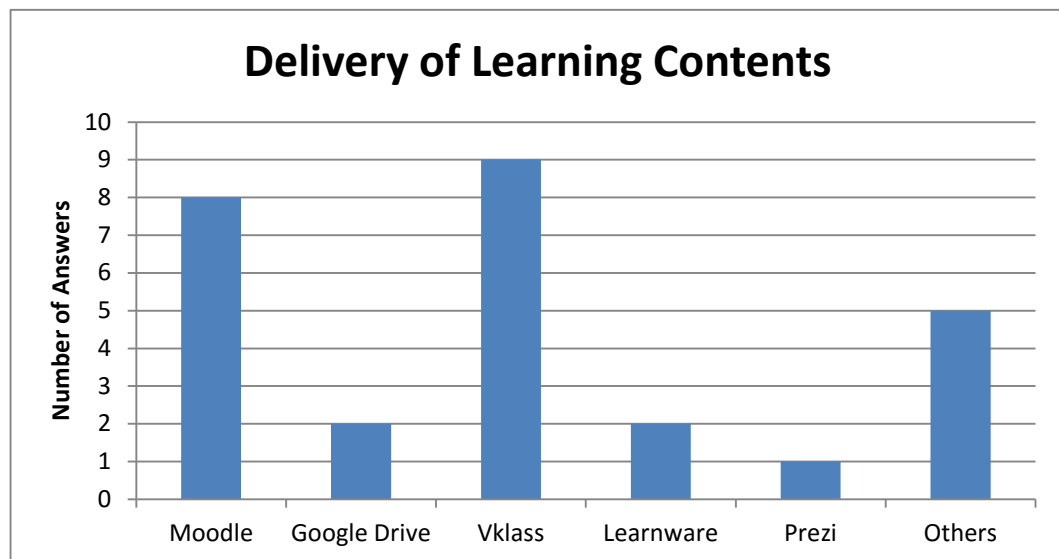
Fig. 3.5 Used e-learning tools

Blogs and repositories are not commonly used – teachers from Bulgaria do not use blogs and repositories; four participants from Republic of Macedonia use WordPress as a blog; but teachers from Sweden use the integrated blog and repository in Vklass (Table 3.3), which performs communication with teachers and friends via guestbook posts and messages, viewing the calendar, reading the latest school news, lunch menu and events. Other software (Anjuta and CodeBlocks, Open Office, Gimp, Kompozer, YouTube, CMS Joomla) is used in Kavadarci, Republic of Macedonia.

Table 3.3 Summarized number of 'Yes' responses by schools

Number of 'Yes' Responses	E-learning platform	Blog	Repository	Others
2ELS Sofia Bulgaria	2	0	0	0
SOU Dobri Daskalov Kavadarci Republic of Macedonia	8	0	1	3
ZCS Skopje Republic of Macedonia	1	4	0	0
CNG Finspang Sweden	12	3	12	2
used by	23	7	13	5

Figure 3.6 shows the chart diagram representing the 'Yes' responses by schools. Figure 3.7 summarizes the data derived from the surveys. The e-learning platforms are commonly used for delivery of learning content.
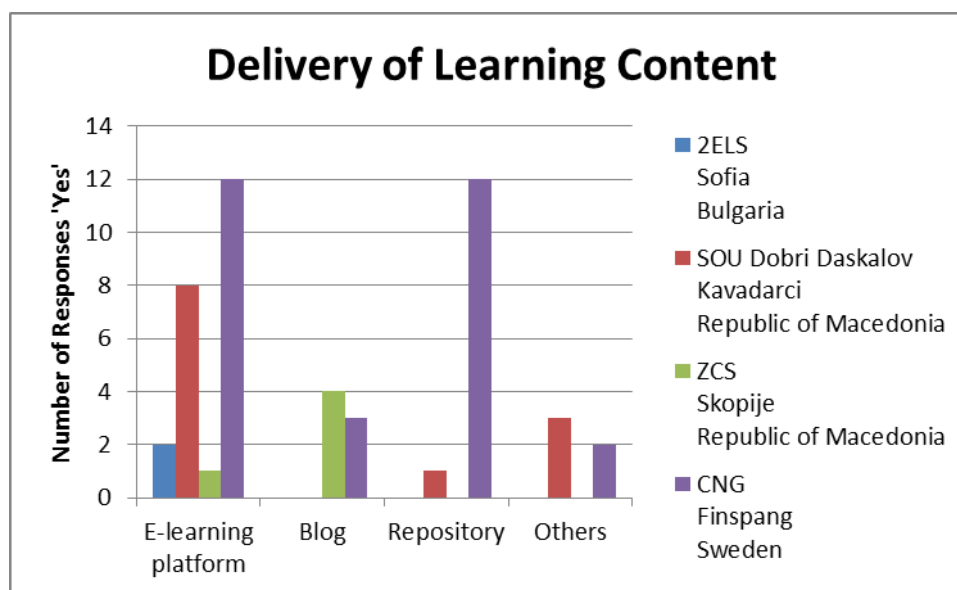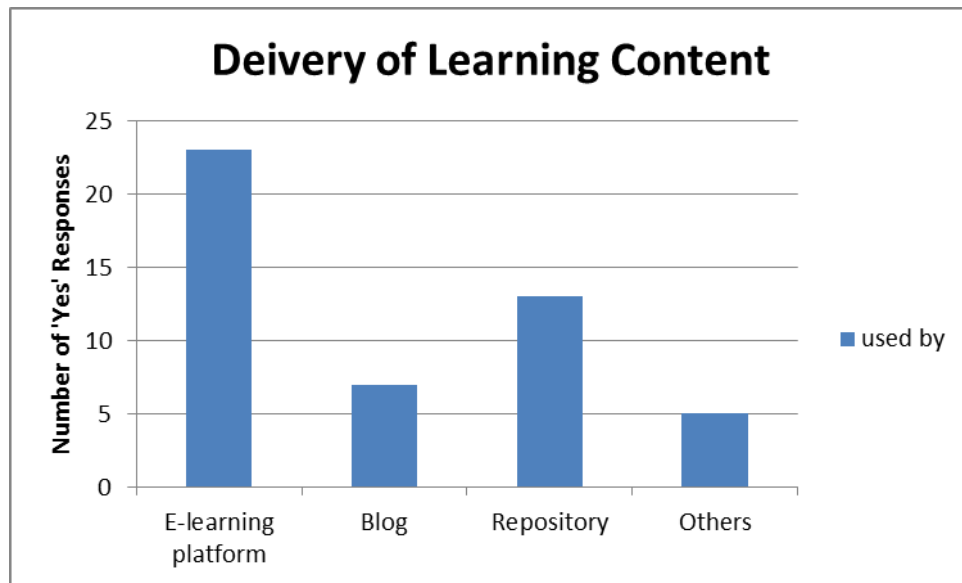

Fig. 3.6 Number of 'Yes' responses by schools

Fig. 3.7 Used of different tools for delivery of learning content

Table 3.4 [14] shows a statistics for the top e-learning platforms for teachers and coaching used by teachers, authors, coaches, self-help gurus, etc. The key criteria were the quickest, with minimum effort and maximum engagement for a base of student's platform.

Table 3.4 The top e-learning platforms for teachers and coaching

eLearning Software	Our Ranking	Rating	Ease of Use	Ease of Content Creation	Audience Engagement	Cost/Pricing
siminars	1	★★★★★	EASY	5	5	FREE/ $40/mo
udemy	2	★★★★☆	MEDIUM	4.5	4.5	30% OF SALES
articulate	3	★★★★☆	MEDIUM	4	4	$599
U UDACITY	4	★★★★☆	MEDIUM	3.5	3.5	FREE
SKILLSHARE	5	★★★☆☆	HARD	3	3	15% OF SALES

Table 3.5 [15] shows a statistic for the top e-learning platforms for academia used for universities, academia, and teachers. The key criteria were complete functionality, maximum student engagement in academic context.

Table 3.5 The top e-learning platforms for academia

eLearning Platform	Our Ranking	Rating	Ease of Use	Ease of Content Creation	Student Engagement	Cost/Pricing
moodle	1	★★★★★	HARD	4.5	5	FREE
Bb Blackboard	2	★★★★☆	MEDIUM	4	4.5	CUSTOM/PRICEY
KeneXa an IBM Company	3	★★★★☆	MEDIUM	3.5	4	CUSTOM/PRICEY
digitalCHALK	4	★★★★☆	MEDIUM	3	3.5	$399-$1095
efront	5	★★★☆☆	HARD	2.5	3	MONTHLY $85-1200

The following analysis is made derived from the gathered information:
- E-learning platforms enable content delivery, communication, collaboration, administration, tracking learner progress and reporting.
- ICT tools provide options for discussion forums, file sharing, management of assignments, lesson plans, syllabus, chat, etc.
- Content can be shared and reused by teachers.
- Feedback to learners can be provided.
- Need of plug-ins that has to be installed on student computers.
- Need of download any software required to make the content contained within the learning system work properly.
- Teachers can post messages and instructions to all students.
- Provide course content in a variety of media – including text and multimedia.
- Provide a course for use with wikis, blogs, podcasts, social bookmarking etc.
- Monitor and manage communication between learners.
- Complexity in terms of design and development. Need to build native applications.
- Multiple platforms.
- Social networking tools.

3.3.3. E-learning Technologies and Specifications

The E-learning Technologies and Specifications are expressive tool for knowledge mastering, technology and good practices.

The gathered data from the four school participants in the section "E-learning Technologies and Specifications" is summarized in Table 3.6 and Table 3.7. In the first table the results are generalized to show that from 46 gathered surveys only few "yes" answers are given. Most of the answers are "no" or no answer is given (n/a).

Table 3.6 Results data from participants' surveys.

	Use (yes/no)	Describe the Platform(-s)
LMS (Learning Management System)	26 no 15 yes 5 n/a.	Moodle,Vklass, P&L Learware is an electrical e learning platform with facts and exams
LCMS (Learning Content Management System)	40 no 1yes 5 n/a.	
SCORM (Sharable Content Object Reference Model)	37 no 4yes 5 n/a.	Vklass is a platform with inlogg for students to pull out and drop exams
IMS (Instructional Management System)	41 no 0yes 5 n/a.	
AICC (Aviation Industry Computer-based training (CBT) Committee)	39 no 0yes 7 n/a.	
xAPI (Experience Application Programming Interface)	39 no 0yes 7 n/a.	
QTI (Question and Test Interoperability specification)	36 no 6 yes 4 n/a.	Learnware
LTI (Learning Tools Interoperability)	38 no 3yes 5 n/a.	
List the subjects which use these methods and technologies:	Electromagnetics, Electronic, Mathematics and Physics, all electrical courses, Swedish, History, religious education, Economic subjects in the second education, Informatics, Technology and Programming languages, History, Latin, Economic subjects	

Table 3.7 shows the results of survey that are for each school participant in the project.

Table 3.7 Results according schools participant

E-learning Technologies and Specifications	2ELS	SOU Dobri Daskalov	CNG	ZCS
LMS (Learning Management System)	0	8	5	2
LCMS (Learning Content Management System)	0	0	0	1
SCORM (Sharable Content Object Reference Model)	0	0	4	0
IMS (Instructional Management System)	0	0	0	0
AICC (Aviation Industry Computer-based training (CBT) Committee)	0	0	0	0
xAPI (Experience Application Programming Interface)	0	0	0	0
QTI (Question and Test Interoperability specification)	0	0	3	2
LTI (Learning Tools Interoperability)	0	0	2	0

The analysis of the survey shows that 26 of them don't use E-learning Technologies and specifications. Most of the teachers use LMS (Learning Management System) as E-learning technology (figure 3.8). The platform that teachers use as LMS are Moodle, Vklass and Learnwear.

They use E-learning technologies in a various disciplines like English, German, Italian, Computer Studies, Elektronik, Mathematics, Physics, Swedish, History, Religious, .etc.
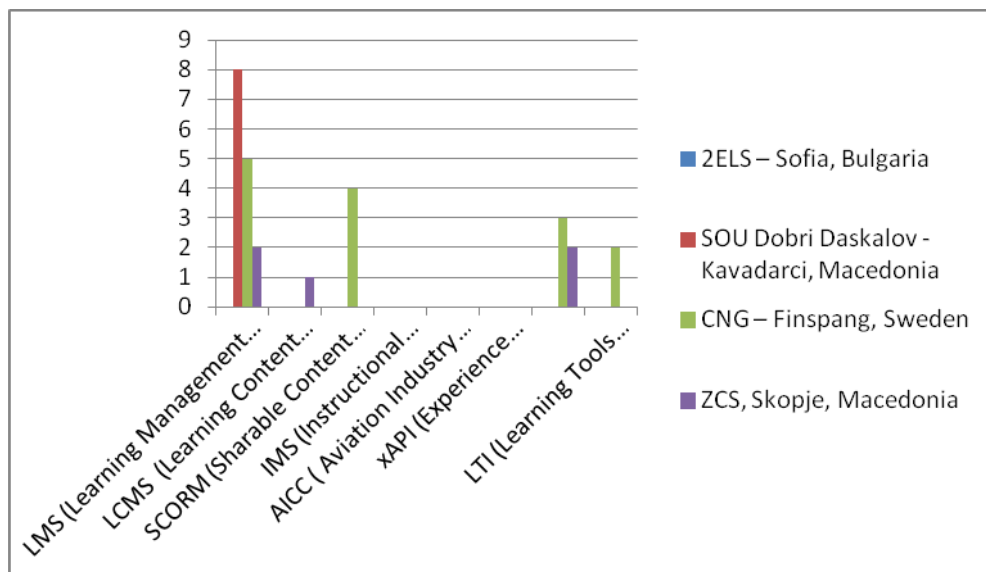

Fig. 3.8 Statistic of usage of E-learning technologies and specification in the four schools are described.
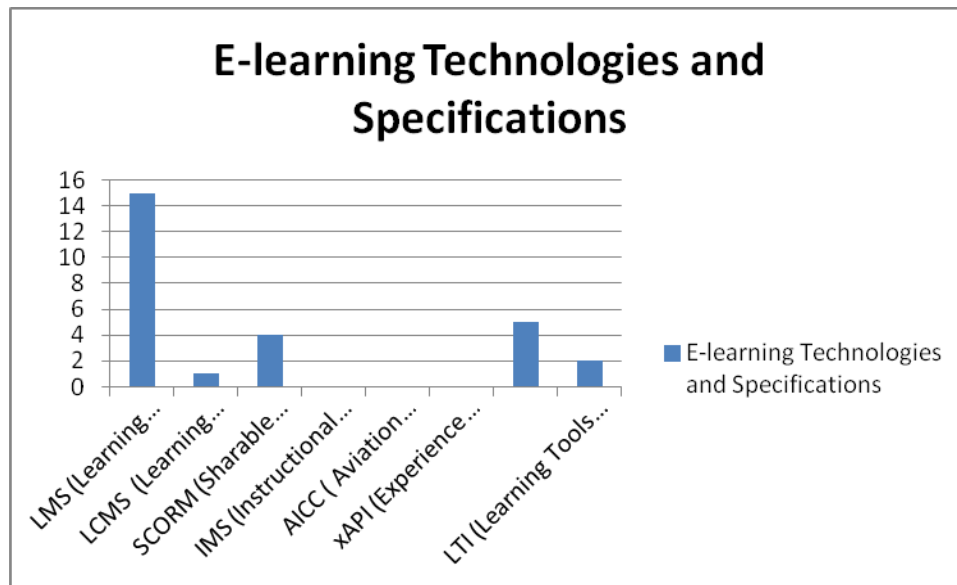
Fig. 3.9 Total number of teachers that use E-learning Technologies and Specifications

After the developed analysis over table 3.6 and table 3.7 the following conclusions might be made:

- Half of the schools and less than half of the teachers declare that they don't use the E-learning Technologies and Specifications for creation of learning content;
- The teachers are not motivated to create such content, they do not have time and so on;
- Some of the teachers that declared that they use some of the E-learning Technologies and Specifications use the e-learning systems for sharing documents, interaction with the students, Forum and so on;
- Just few teachers use the e-learning environment for Assessment, Quiz, and Grades and in this way they apply some of the E-learning Technologies and Specifications, listed in the inquiry;
- Content prepared according the specifications for one system cannot be transferred easily, if at all, to another;
- In this way the developed learning content could be no reused;
- The use of E-learning Technologies and Specifications for creation of learning content ensures the sharing of the e-learning courses with tracking learners' results with the LMS, SCORM, etc.
- The recorded results that follow the sharing of the learning content might be used for individual approach towards students and not only for grades.

3.3.4. Dialogue & Collaborative

One of the main learning activities is related with different communication alternatives in order to ensure students dialogue and collaboration. There are two categories of communication between students and teacher in each learning process. The first one is synchronous communication when a learning environment features real-time communication as chat, virtual chat rooms, videoconferencing, online meetings and online teamwork. Online teamwork and meeting are new forms which support to work on shared documents that all the students within the team can use in real-time.

The second communication is asynchronous where both the learner and instructor are separated by time and place. In that case, the participants in the learning process can use the communication tools like: e-mail - internal or external mail; discussion board, news and shared/personal space.

Table 3.8 shows data collected from four schools - participants of project which have submitted responses for usage of different communication tools. The total numbers of teachers, who have provided data on their courses, are 46. Seven of teachers have answered that they don't use ICT for dialogue and collaborative between them and students and the subjects are Philosophy, History, Geography and Chemistry.

Table 3.8 Results data from participants' surveys

Dialogue & Collaborative			2ELS – Sofia, Bulgaria	SOU Dobri Daskalov - Kavadarci, Macedonia	CNG – Finspang, Sweden	ZCS, Skopje, Macedonia
Asynchronous	E-mail	internal	2	2	6	0
		external	6	11	6	9
	Discussion Board		0	6	5	5
	News		0	8	5	6
	Shared/Personal Space		2	6	5	5
Synchronou	Chat		2	7	3	3
	Online meeting		2	2	2	2
	Online Teamwork		0	6	4	4
	Videoconferencing		2	0	3	3

Figure 3.10 shows graphical statistic of usage of different tools for dialogue and collaborative in the four schools are described.
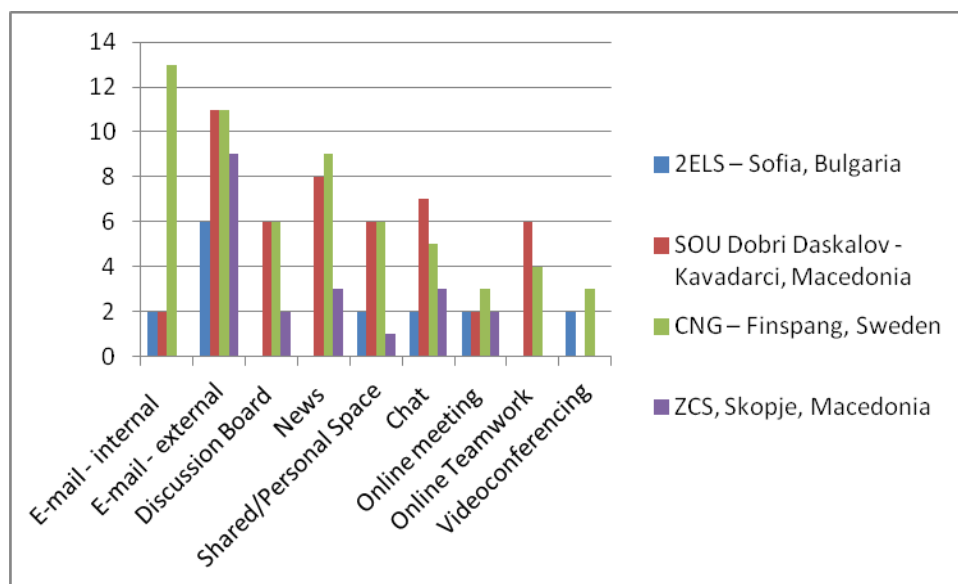

Fig. 3.10 Statistic of usage of tools for dialogue and collaborative in the four schools are described.

Figure 3.11 shows the summarized data derived from surveys. With this result, we can discover that email is usually used method of communication in learning process. The email is used in almost all subjects in each school. The teachers daily use online postal service to send and receive new, information and materials. Follows chat and news as the most used communication tools. For share news are used Moodle and Facebook and for chat Skype, Viber and Moodle. The social network Facebook is used for educational purpose for chatting with members of a particular group for sharing materials.
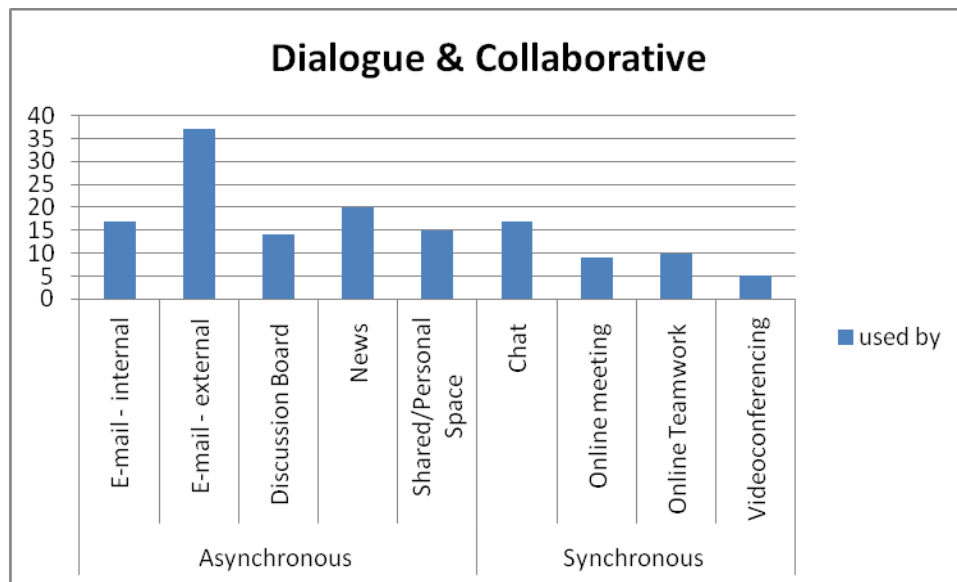

Fig. 3.11 Used of different tools for dialogue and collaborative between students and teacher

We realized that the widest variety of used ICT is for online teamwork and meeting: Skype, Vklass, Google.com/doc and Dropbox. Both, teachers and students, are using web-based Google service which enables users to create and edit web-based documents, spreadsheets and presentations. In order to store documents online and access online the participants work with Google Drive, Moodle and Vklass, where the users have personal and shared space to store information.

Videoconferencing is area that has the least overlap with ICT tools. Only eight of the participants use it and the tools are FaceTime and Skype. FaceTime is a video telephony product which supports a set of related protocols for voice over IP (VoIP) developed by Apple Inc. It is available on supported mobile devices that run on iOS and Macintosh computers that run Mac OS [16].

We can address the analysis for dialogue and collaborative activities in learning process:

- Through the use of e-mail or videoconferencing, teachers and pupils are able to undertake collaborative projects.
- Shared/Personal Spaces facilitate sharing of e-learning resources between participants in learning process.
- Shared/Personal Space helps some learning resources to be assessed more easily.
- ICT tools can provide online teamwork and meeting which encourage pupils to explore, solve problems, discuss and consider.
- ICT tools for dialogue and collaborative facilitate to enter and store information in a variety of forms, e.g. saving work, storing information.
- Access to fast internet connections.

- Differences with the interoperability over the Web.
- ICT tools for dialogue and collaborative help learners be creative.
- Use different tools for dialogue and collaborative to motivate pupils and to achieve positive attitudes to learning;
- Provide students with good opportunities to take responsibility for their own learning.
- Identify aspects of coursework where students' individual needs can be met more effectively through the appropriate use of ICT.
- Personal privacy - how much information may be able to collect about people and with whom and how that information might be shared.
- The trust in learning resources used from students and teachers.

3.3.5. Learning and Evaluation Activity

There are different learning activities using ICT which apply strategies for organizing, comparing, synthesizing and analyzing information for students. Assessment data and evaluation procedures can be recorded and analyzed more efficiently, allowing teachers to see where particular students or areas of learning need more support or attention.

The statistical data are collected from four schools - participants of project which have submitted responses for usage of different learning and evaluation activities. The total numbers of teachers, who have provided data on their courses, is 46. They use learning and evaluation activities in a various courses like History, Religion, Athletic and Health, Mathematics, Physics, Mathematics, Informatics, Information Technology, Biology, Management, Economy, etc. All data are shown in Table 3.9.

Table 3.9 Results data from participants' surveys.

			CNG – Finspang, Sweden	2ELS – Sofia, Bulgaria	SOU Dobri Daskalov - Kavadarci, Macedonia	ZCS, Skopje, Macedonia
Methodology	**Learning Activity**	Games	6	6	4	6
		Simulation	10	4	2	1
		Virtual tour	2	1	1	2
		Wiki	3	4	8	8
		Others				
	Evaluation Activity	Assignments	9	6	8	3
		Test/Quiz	9	10	8	8
		Problem-solving project	9	5	1	1
		Assessment	4	6	6	2
		Others				

Technology	**Hardware**	Digital microscope	1			3
		Control interface with associated switches, sensors and others.	7			5
		Color printers	10	2	2	3
		Robots and toy	8			
		Others				
	Software	Voting systems	5			
		Software for move and match words and pictures	6			1
		Simulations	9		1	
		Personal portfolio tools	6			
		Enterprise learning-management systems (LMS)	4		7	1
		Open source LMS	1			
		Semantic Web-based systems	2			
		Others				
List the subjects which use these methods and technologies:			History, Religion, Health Course, Mathematics Physics, Special	Mathematics Informatics, Information Technology Biology, Geography, English Language	Informatics Informatics Technology and Programing Languages, Economic, History, Latin, Sport	Informatics Architecture English, History, German, Italian, Management Economy, History,

		Athletic and Health	and Literature, History, Chemistry.	and Sport Activities, Macedonian Language and Literature, Economic, German.	Foreign Languages, Management Economy, Business, Computer Studies.

Figure 3.12 shows the chart diagram representing the usage of different learning and evaluation activities by the schools. Figure 3.13 presents using of hardware and software tools in the process of learning and evaluation. Figure 3.14 presents the summarized data obtained from the surveys.
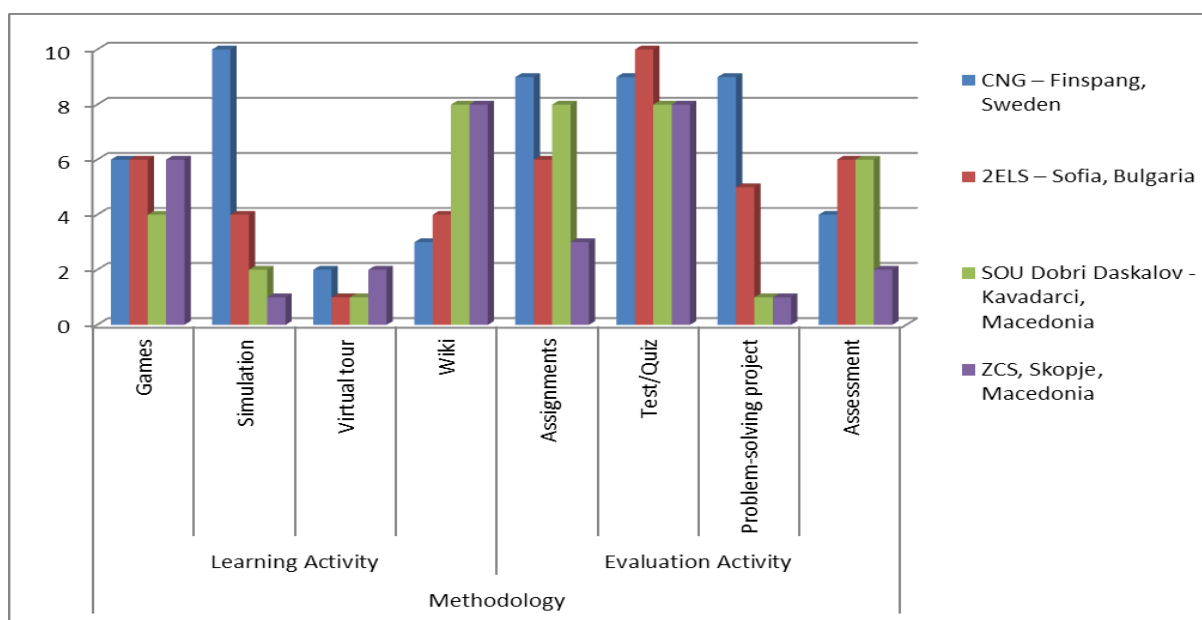

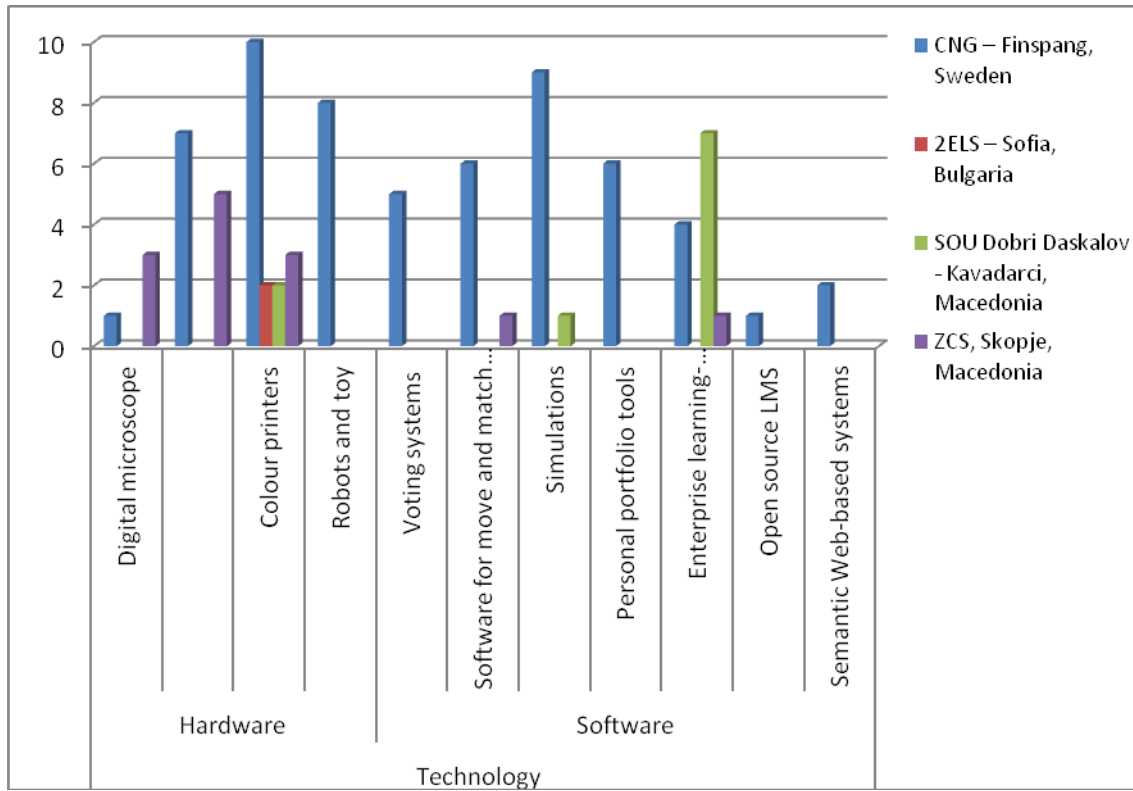*Fig. 3.12 Used of different methodologies for learning and evaluation*

Fig.3.13 Used of different technologies in the process of learning and evaluation
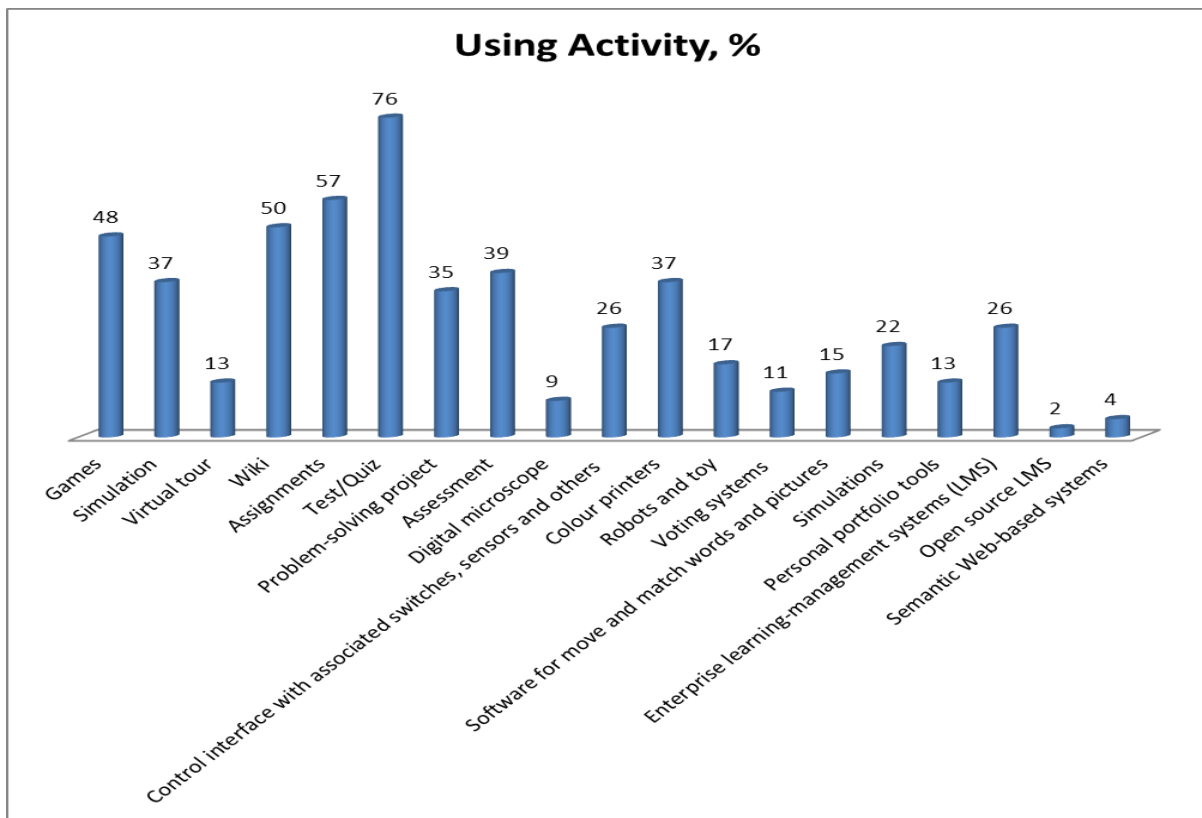

Fig. 3.14 Used of learning and evaluation activities

We can draw the following conclusions on the basis of gathered information:

- The results show that the most used evaluation activity is Test/Quiz – 76% of teachers use Eplatform Vklass or Moodle.
- Approximately half of the teachers were actually using games as a way of training and assessment. They use problem solving games, suitable online games such SuperTeacherTools available at https://www. superteachertools.us.
- 37% of teachers use life processes, virtual guide, virtual exercises for smartboard, accounting software, and youtube during the learning process.
- Much popular learning activity is wiki. Wikipedia and wiki module in the online learning platform Moodle are used.
- The second learning activity using ICT is assignment – 57% of teachers are assigning data files, slides, tasks, and group work assignments based on a project by Moodle platform, Office system, and Eplatform Vklass.
- Most used hardware is the color printer, followed by control interface with associated switches, sensors and others, and robots and toys.
- Enterprise learning-management systems (LMS) such V-klass and Moodle for load up files, document and other work on the web for the student to find are used by 26% of teachers.

4. Identification of the best practices in each school participant in the project

During the first workshop in Sofia the schools, that are participants in this project, showed their works and the current status of the usage of ICT in the educational process. The best practices in each school participant in the project are grouped by the inquiry questions groups.

4.1. Best practices in Content-based Resources in each school participant in the project

The best practices are in Sweden because of their usage of the Vklass – LMS system. Their hardware support seems to be the best.

Sweden school stated that they have acquired school license for all Adobe software which includes Premier Pro, Photoshop, audition and effects.

4.2. Best practices Delivery of Learning Content in each school participant in the project

The best practice in using E-learning Technologies and Specifications belongs to CNG (Sweden) because they have shown presentations for the usage of the Vklass and the lessons and tests that they have designed.

4.3. Best practices in E-learning Technologies and Specifications in each school participant in the project

The gathered inquiries and the presentations, prepared from the school participants in the project, show that an understanding of Technologies and Specifications in this area exists but not in all schools is widely used. The most educators and Web-based education systems are not used to reuse standards-based distance learning applications.

The best practice in using E-learning Technologies and Specifications belongs to CNG (Sweden) because they have shown the usage of ISO – INTRO and the theoretical presentation of the curricula. The students are supposed to prepare themselves. In the program there are available tests for creating a feedback to the teacher and for forming the grades of the students. The practice that should achieve congratulations is the usage of the learning platform Vklass for direct connection with the students for educational purposes. The Vklass platform is being used in many disciplines.

The school in Kavadarci uses the Moodle system and also has the best practice in the field.

4.4. Best practices in Dialogue & Collaborative in each school participant in the project

The best practices in dialogue and collaborative activities in learning process we can point Skolfederation [17]. It provides infrastructure for collaboration between the school and online service providers and facilitates access to digital resources, protects user privacy and provides a secure service for members. Collaboration helps increasing the understanding of the federation and facilitates the work of its members through the exchange of experiences, opportunities to see the service and use of demo schools, as well as highlighting various good

examples. The goal is to create common guidelines, and practices on how they should be applied, as well as spreading knowledge and awareness of how to use them [18].

The SIS project set up a number of impact goals [18]:

- The use of digital learning resources increases in school.
- An increased use of digital resources should provide the students with opportunities to improve their performance.
- Both municipal schools and independent schools use compiled guidelines for ordering digital resources.
- Service providers use the guidelines when producing digital learning resources and services.
- New suppliers are established and the market is expanding, both within and outside Sweden.

The other best practice comes from SOU Dobri Daskalov - Kavadarci, Macedonia which provides online teamwork based on Dropbox. The teacher and students can create a centralized database where they can upload and download their projects and files. When the teacher wants to assign a task to his/her students, he/ she can simply upload the task in Dropbox and students can easily give updates or submit their reports. This advantage makes communication and organization between students and teachers exponentially effective. Furthermore, course projects can be more interesting because student teams can tackle more complex tasks together than they could manage individually.

The best practice from chat is coming from ZCS, Skopje, Macedonia which uses the social networks (facebook.com). The main goal is for educational purpose chatting with members of a particular group for sharing materials. The teachers and students can use all available learning and communication multimedia tools Facebook offers: videos, presentations, images, pictures, discussion groups, chats, private messaging, sharing, liking and so on. Using those practices teachers can utilize Facebook for enhancing communication and for engaging students in a manner that might not be possible in traditional classroom settings.

The 2ELS – Sofia, Bulgaria best practice as shared and personal space is using Google Drive. It gives a great way to interaction and the teachers can create group projects that are uploaded directly onto the Google Drive. For example, Google Docs can transform any assignment into an interactive and collaborative eLearning experience. Using Google Docs, the learners can leave real time feedback, communicate with others in the group, and share their insights and opinions via the document or file.

4.5. Best practices in Learning and Evaluation Activity in each school participant in the project

Data analysis have led to the conclusion that best practice in using the ICTs for activities related to learning and evaluation hold CNG (Sweden).

Enterprise learning-management systems (LMS) Vklass for loading up files, document and other work on the web for the students to find is used. Vklass is also used as personal portfolio tool, for data files, slides, group work assignments based on a project and for test/quiz organization. Open source LMS Prezi is also used. The students can find my prezi and work with it. Smartboardsoftware as voting system and for move and match words and pictures, as well ABB Rob studio, pascosystem in the physic lab, robots are used. The simulations are performed through Robotstudio, Programming PLC Logosoft, Simatic and Easyveep, Festo Fliudsim, Computer based programing for machinery.

SOU Dobri Daskalov - Kavadarci, Macedonia best practice is using enterprise learning-management systems (LMS) Moodle as online platform for assignment, test/quiz, assessment and wiki. Learning through simulation is performed by accounting software and youtube.

Learning through games is carried via problem solving games and online games. Popular learning activity is Wikipedia.

ZCS, Skopje, Macedonia carry out mostly test/quiz, assignments and assessment using enterprise learning-management systems (LMS) Moodle. They use suitable online game SuperTeacherTools available at https://www. superteachertools.us. Popular learning activity is Wikipedia.

Best practices of 2ELS – Sofia, Bulgaria in using the ICTs for activities related to learning and evaluation are playing game, life processes simulation, virtual guide, test/quiz, problem solving project, assignment and assessment.

5. Conclusion

In this report might be summerised that the goals set for the team of the project have been achieved. A short overview of used methods and technologies of electronic learning (e-education) worldwide has been made and the possibilities for their application in the educational process have been stated. It has been examined the applicability of the different methods and technologies for E-learning. The appropriate tools for study and analysis have been chosen and used for analysis of the partner schools technologies and methodologies. The educational process in different subjects in the schools implies multiplication of the application of ICT technologies. For the goals of the analysis the current existing environments for creating, storing and transfer of multimedia information have been used. Well known pedagogical methods, technologies and information methods necessary for computerization of education in local and global network are analyzed.

After the inquiries have been made for the definition of the quality and effectiveness of the used technologies and methodologies it might be stated that the offered tools for education in the schools exist in a big variety and specifically different for each school partner.

The described technologies and methodologies and the best practices in each school participant in their nature are open. Because of the increase of the quality and the effectiveness is necessary that they should be constantly developed and elaborated.

Internet is becoming one of the main sources of information and knowledge for today's students. Open educational resources created in the first place with the support of universities provide users the ability to use high-quality educational materials. With the use of OER the educational system undergoes a qualitative change as a result of changes in the way the actual content and teaching methods, and tools, environments and ways of disseminating knowledge. All this leads to transformation of the educational model which allows movement from studying ICT to learning by using ICT. The presence of a huge number of open educational resources with free access motivates trainers to create and use training courses with high quality and students may compare and evaluate the available teaching materials. Recommendations for a greater use of ICT tools and OER in teaching can be placed as the next task.

6. Literature

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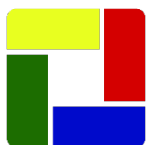
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