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New perspectives on communication and co-operation in e-learning

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KATALOGIZACE V KNIZE - NÁRODNÍ KNIHOVNA ČR

Burgerová, Jana
New perspectives on communication and co-operation in e-learning / Jana Burgerová, Martina Maněnová, Martina Adamkovičová. -- Vyd. 1. -- Praha : Extrasystem Praha, 2013. -- (Didaktika, pedagogika ; sv. 12)
ISBN 978-80-87570-16-6 (brož.)

371.3:004 * 371.3:004 * 004.9:37.018.43

- computer-aided learning
- e-learning
- learning management systems
- e-learning
- collective monographs

- počítačem podporovaná výuka
- systémy pro řízení výuky
- kolektivní monografie

370 - Education [22]
37 - Výchova a vzdělávání [22]

ISBN 978-80-87570-16-6

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1 INTRODUCTION

The impact of information and communication technologies, most notably the internet, on contemporary society including educational system can be marked as phenomenal.

The implementation of new technologies into learning is a subject of expert discussion with different conclusions. On the one hand, there is full support of ICT integration into education; on the other hand, there are voices that approach the issues of massive ICT implementation into learning with care or even with scepticism.

It can be argued that the potential use of latest online technologies can be compared to the use of television, radio or printed media, which is considered to be a common aspect of our everyday life, and it is purely individual whether they become "a good servant" or "a bad master." In the context of the young generation, also called "multitasking" or Y generation, it is provoking to scrutinize their understanding of new technologies in learning; in this case it is particularly blended learning as a method not only for mediating information, but mainly for bringing new possibilities in communication and cooperation via the Learning Management System.

E-learning courses as the initial support for distance learning are becoming highly spread tools for teaching of full-time students. The demands for e-learning courses are rising due to the tendencies which limit the number of lessons of direct contact teaching and its gradual individualisation not only in combined but also in internal forms of study. Therefore it is essential to provide new solutions which are grounded in scientific findings of pedagogy and psychology, or as Klement argues, consistent enforcement of knowledge into education via e-learning is an inevitable condition for a meaningful development of education, and technical possibilities are necessary to be perceived as a means for their promotion (Klement, 2011).

The present publication focuses on the issue of education supported by e-learning. In the case of university-level education this method of realization becomes increasingly significant. The majority of universities in Slovakia and the Czech Republic use e-learning to educate students in pre-gradual preparation or lifelong education programmes.

- The publication consists of seven chapters. The content of individual chapters is outlined below:
- The first chapter is an introduction and addresses the issues of education via technologies.

- The following chapter is dedicated to e-learning as virtual educational environment, its history and use in various study forms.
- The third chapter provides the perspective of e-learning course creation concepts, course evaluation issues, and debated topic of e-learning education quality.
- The fourth chapter maps contemporary trends in the development of the Learning Management System.
- Next chapter provides comparative analyses of selected LMS systems.
- The sixth chapter introduces less frequently used LMS system tools dealing with communication and cooperation.
- The final chapter presents the results of the research carried out at the Faculty of Pedagogy, University of Presov in Presov, Slovakia, and the Faculty of Education, University of Hradec Králové, Czech Republic. The research was focused on the use of specific LMS tools in Moodle from the perspective of students of teaching for junior primary schools.

The concept of the publication aims to contribute to the issues of electronic learning and provide new understanding of e-learning accentuating its communication and cooperation possibilities.

2 EDUCATION IN THE 21TH CENTURY

Nowadays we can undoubtedly state that technologies are changing the world along with our everyday life, they are making the world closer, influencing our knowing, converging countries, demolishing boundaries, removing handicaps and transmitting a lot of information. This publication deals with problems of matching new trends with the traditional education. It's true that classical education managed by teachers lives on and it is sure that will live on many centuries and it is going to be irretrievable in the future as well. However the education by means of teaches has its limitations as well. Some examples only-the classical education is taking place at classrooms in predetermined time and it is characterized by the direct contact between the teacher and pupils, it is controlled by valid curriculum regardless to particular knowledge of students. In addition to, the education is directly mediated by the teacher and sometimes it does not contain students' particularities (even it is not possible in most cases).

Education by means of information and communication technologies (ICT) is an alternative which naturalized itself at universities. Education by means of the Internet (e-learning) is predominantly intended for adults with the aim of improving their actual education or their lifelong learning. Needs of lifelong learning has never been so strong as today. Many of our ancestors had lived all their productive age without necessity to learn further. Our informational society is characterized by large expansions of information and on the contrary requires permanent education of different forms.

Not even an institutionalized education with complexed problems cannot stay on principles of a stony institution. Changing processes are usually time consuming, demanding and often painful as well. There is an effectiveness at the end, i.e. most of knowledge in shortest time as possible along with lowest effort with most modern technologies, etc. In addition to, there is a requirement in reference to overcoming distances which is connected with using common information and communication media for education and lifelong learning. As mentioned above, the most part of lifelong learning consists in adults' education, i.e. the community studying mainly during occupation, has clear motivations and responsibility as regards the study and ability to learn. According to Hartl (1999), adults study best it the study has immediately meaning for them. They need to know why to learn. This fact is known to educational institutions including universities. If they want to improve changed needs of students, there is education face to face not enough. There are preferred advanced self-study forms (distance education, distance learning). There is is so called remote learning,

i.e. both a student and a tutor are separated permanently of predominately and they used a common environment bringing study contents along with their communication and following evaluations. In terms of ICT there is an education with the electronic support, i.e. e-learning as the advanced study form with supporting computer technologies. Both learning contents and learning itself representing new knowledge and findings are elaborated in multimedia forms as so called courses which represents integrating texts, videos, sounds and other multimedia elements. It could be said that e-learning is a multimedia study form, i.e. the education is made in electronic course forms. As mentioned above, e-learning connected to the distance study way (the distance education represents a scheduled remote education using a wide technology scale allowing the communication) represents one of the most interesting ways of learning in terms of saving time and human resources.

2.1 SELECTED PROBLEMS OF EDUCATION BY MEANS OF TECHNOLOGIES

As mentioned above, our life is overwhelmed with information being transferred by media. There are not only computer media, but also classical ones as well (newspaper, television, radio, etc.) which are broadcasting information in an uncontrollable form and in a wide spectrum. It is difficult and I guess unthinkable to elaborate that information in terms of education, at which there is a target to transform acquired information to knowledge. The impact of enormous information amount is crucial especially for young people. Tasks of more informed people, i.e. teachers especially at elementary schools, consists in learning select and elaborate information and saving it within reasonably effective bounds. Tasks of teacher are also changing due technology influences. The teacher becomes a consultant often with lower skills as a pupil (there is a paradox situation), however with bigger experience in reference to orientation in information. A teacher at the elementary school is supposed to lead its pupils to reasonable and responsible utilization of ICT with the target to make the education creative, effective, active and motivative. The connectivity of subjects at the elementary school is very important along with their mutual cooperation even by means of one teacher. The pupil is oft in a position which means that he/she must be able to obtain and consequently to elaborate information. The teacher shall control the pupil's work in such a way that selected information are going to act as educational material (additional or alternative). That means especially information obtained from the Internet, where the pupil faces an enormous information amount in large distributed volumes (Burgerová, 2003).

The multimedia has obtained a lot of admirers, however only distributing multimedia in the Interned has opened a new phase of a so called multimedia Internet. The Internet has become an integral part of our life. During very short time the Interned obtained a lot of admirers and users (both daily and occasional ones). The permanent growth of users is connected with needs of a permanent "enlightenment" in fields of information technologies. The Internet with www possibilities can make miracles. It obtains support even of users with lukewarm approach to computers. The world-wide-web really connects worlds, it is changing undemocratic governments, opening boundaries, brings the space of communication dimensions of the Interned in terms of both off-line and on-line communications. The computer communication "strength" is proved by its popularity at the youngest population. It can be observed that even pupils without positive relations to computers implement their communication activities in terms of the Internet. Pupils are attracted to be a part of the community where everyone is communicated with each other ant the information availability creates feeling the parity. A nationality does not play any role, because the Internet is a democratic environment without limitations and boundaries. The Internet provides teachers with lots of benefits in reference to teaching. Multimedia presentations, videos, animations and simulations provide a value added which in our opinion cannot be even expressed in numbers in terms of information and effects. The database of learning sources, inspiration pages and softwares provide a portfolio usable by both teachers and pupils. Understanding bases are created at elementary schools and we return to Komensky, who was a founder of multimedia in some ways (the first picture encyclopedia, combinations of several senses, connecting of all senses for the purpose of understanding), in order to point at importance of computer technologies and their applications in the learning process.

Schools as educational institutions are facing new facts in terms of by us mentioned problems during last ten years. Beginning the ICT implementation was mainly represented technical equipments of schools with computers, later thanks to the government's supports of the Internet, e.g. in Slovakia thanks to the Infovek project the schools have been provided with Internet connections and we dare to say that the schools are opened for the world. On the other hand it is necessary to remember that the phenomenon called Internet has changed our households as well. The similar at our schools development occurred also in our households, sometimes even on a higher technological level. The new coming population has changed, children from their low age are coming in touch with technologies (TV, DVD, cameras, computers, smart phones, tablets, etc.), there is growing the so called *digital*

population, the so called multi-tasking population - the children can concentrate their attention on more things or activities at the same time. They are creating their tasks under some programs on the computer and at the same time they are searching necessary information resources in the Internet, at the same time they are communicating and discussing through social networks, listening to the loud music and they do not have any problems with ringing mobile phones. They are maintaining their concentration much easier as the older population. On the other hand, this population read classical paper books and magazines much lesser than the older population (excluding a mandatory school literature). Besides "mandatory" textbooks at the school they do not even use them as a source of important information. They obtain information in open Internet encyclopedias (e.g. the Wikipédia), there is however a problem to what extends they elaborate that. The communication represents an extremely strong phenomenon. Social networks (Facebook, YouTube, ICQ, Skype or Twitter) represent local sharing information, often not written bud visual, a text is not very attractive for them, it bothers them, it is better for them to express experiences by means of pictures. There is occurred a team cooperation paradoxically. The paradoxicalness consists in the fact that work with the computer is supposed to be individual one, however only in the primary scope. Sharing information, private consulting, discussions are typical for this opened world. The young people want to communicate and create in teams. As mentioned above, schools after their temporary problems and shortages are provided with most advanced technologies nowadays, there are also interactive tools (e.g. very popular interactive blackboards). Because of that it is necessary to accent the fact that teachers or future teachers of elementary schools are to be provided with necessary knowledge and skills. Successful teaching of the incoming population depends on the above mentioned equipment with a target consisting in opening possibilities offering by the information society. In terms of particularity, we observe following educational trends as the most important:

- interactive teaching methods;
- on-line lectures or on-line teaching;
- social networks and the communication in them;
- video games with educational features, etc.

It is known from experience that there are always missing methodical materials for used technologies in particular subjects at schools and even teachers are not prepared to their utilization neither in users'field nor for generating materials to be located in the Internet. Even despite changing this situation, the teacher's position stays complicated, because he/she

muss know how to select the materials and mainly how to organize approach to information and work with it. The technologies and especially services conveyed by means of the Internet are connected with risks which shall be mentioned by the teacher or minimized by planned activities. The teacher should use effective teaching forms, e.g. solutions of projects, problems and creative classes. It all is necessary to prevent purposeless "surfing" which brings nothing new for teaching. The mentioned trends of education by means of technologies and the Internet we have compared to Bílek (1999), who divided using the Internet into four basic levels:

- User approach - managing an attendance of particular services;
- generating databases - creating information resources being available by means of the Internet;
- generating "meta-information" - creating information resources of the "information about information" type, i.e. so called secondary information resources;
- the Internet and learning („Learning Space“) - creating information structures based on hypertext documents with progressive using cognitive learning theories, information-psychological models of learning subjects, etc.

In addition to, using the Internet can be divided according to approaches to education connected with higher effectiveness ((Burgerová, 2003):

- **Information - initiation approach** - it mainly offers materials for pupils - lectures with additional incentives for pupils (questions, discussions, discussion panels, tests, etc.);
- **information - popularizing approach** - it contains only lecture syllabus with references to the Internet;
- **remote and virtual labs** - virtual labs are working places with access to remote workers - experts with own instruments and measuring systems. In most of the cases there is accessing preliminary scanned data (environmental satellites, seismographs, powerful spectral instruments, etc.) for remote users;
- **information-communication approach** - presentations of lectures focused on a presentation of particular literature, e-mail communications between teachers and pupils, surveys of submitted homework, projects, lab exercises, evaluations, etc.

It can be explicitly said that users' skills are not enough in reference to both teachers and pupils. We observe so called "didactic" skills as crucial ones, i.e. to know how to use the tools and technologies of the Internet for understanding, demonstrating and training.

2.2 EDUCATION IN THE VIRTUAL ENVIRONMENT

„I think educators would have a better idea who would benefit from teaching in virtual world, and who would not" James Wagner (2010).

The virtual reality (or the virtual environment as well) is a technology allowing to work with a simulated environment. Technologies of the virtual reality are creating an illusion of the real world (e.g. at combat training, pilots, medicine) and/or an illusion of a fiction world of computer games. There is generating of an visual experience displayed in the computer screen by means of special devices e§g. in forms of an audio-visual helmet or clothes scanning movements and simulating touch. In order to create an absolute illusion of the real world so there are necessary very sophisticated and financial demanding devices, however there are also supposed very high data flows in terms of a computer network, which can be achieved in optical circles only. There is very difficult to create the "true seeming" virtual reality by means of technical devices nowadays. However it is supposed that during the time those technical problems will be managed and the virtual reality is going to become an integral part of the computer equipment.

Because of the above mentioned reasons there are arriving in the educational field so far only certain seeming of possibilities of using potentials of such technologies. There are especially so called "simulated virtual worlds" so far used mainly in the game industry, which promises a huge potential even in fields of electronic learning (Klement, 2002), e.g. through already now existing educational virtual simulations of diverse activities or effects. A pathfinder in fields of the mass utilization of the virtual reality is the Second Life system (http://secondlife.com/), which probably represents the most advanced and successful simulation of the virtual world nowadays. The scope of activities of people in this environment is nearly unlimited mainly because of contents are created by users themselves. All the project is throughout based on their creativity. Creators themselves take especially care about trouble free runs of the system, server functions, but also about its technical support, characters, subjects, buildings and the whole worlds are generating because of common striving all participants.

The center of our interests consists in pedagogy students focused on the pre-school and elementary education. It is necessary to stress that just in younger school ages there are created basic elements of understanding. We believe that these virtual reality elements applied in teaching by means of electronic materials structured according to a virtual

teaching environment represent the means enhancing understanding and demonstrating the real reality. Further we are going to describe shortly main fields of using the virtual reality in the educational environment:

- **Utilization of interactive teaching elements in forms of simulation real phenomena or processes** - educational simulations can support the educational effectiveness because they are effective in fields of particular training and development of psycho-motor skills of students. They are suitable to that because of their hyper-medial features.
- **Utilization of the virtual reality in form of an educational environment** - it is a hopeful field of computer technologies which after managing some technical problems can offer nearly unlimited options of education being really independent on both the space and the time. Nowadays there is already possible to use some options being integrated in the electronic education, e.g. in forms of substitution of virtual classes by virtual simulations (e.g. the Second Life project). Development of technologies connected with electronic "teaching" environments brings new elements as m-learning, e-twinning or blended learning.

V in connection with another development of e-learning there is a question in which direction will go its further development. I seems that the electronic systems of nowadays making the effective controlled educational process possible already reach their limits because they are able to assimilate all the important aspects of the effective education in terms of implementation of multimedia elements into educational materials, tools of knowledge evaluation (on-line tests) or the presence of social education aspects in forms of implemented communication tools (e-mail, on-line chat, video-conferences, etc.). According to Rohlíková (2009) the e-learning of nowadays cannot be based on reading texts and testing only, if it shall be observed effective. A student needs to do something actively, to discuss and envisage his/her opinions with opinions of others, to create and to obtain real experience. Just the constructive approach to e-learning represents one of the important arguments supporting another development of e-learning towards to a cooperative environment which is just presented by the virtual reality.

Mainly missing contacts to other people, i.e. insufficient feeling social interactions in the actual LMS (Learning Management System) represent an important argument for introducing the virtual reality in terms of e-learning. As mentioned above, following items are important in the traditional e-learning system:

a) Sufficient social interaction;

b) clearly specified visual boundaries among groups;
c) possibilities for members to monitor their mutual behavior;
d) the necessity of orientation in the environment of the huge amount of information.

Some studies having been performed ad foreign elementary schools indicate that pupils are feeling better motivated if they can come in touch with the virtual reality and they are in this way able to obtain new information. Recently there has been growing the interest of users for the virtual communication approach to the real world. Because of that fact, nowadays there are booming **social networks** making possible immediately sharing information (Facebook, Twitter etc.), **communicators making video-transfers possible** (Skype, ICQ, etc.), portals offering information in **multimedia** forms (television pages), portals offering sharing information in video-forms (YouTube, Google videos, etc.) and last but not least **multi-users of the virtual environment** (Active World, Second Life, etc.). The virtual reality as mentioned above represents everything not existing in the reality, however which is being some ways simulated by electronic media. According to Vitovský (2004) it is defined as an apparent reality indistinguishable from the real one. The simulated interactive environment in a simply example e.g. three-dimensional model of the surrounding environmental scene simulating even physical features of structures created in a computer. View of the scene is changing in the real time and rendering according to the observer's movements and activities. In order to obtain the most ideal realistic perception of the observer, there shall be used special input and output devices mostly projection helmets or stereoscopic glasses and wire gloves. There is also a cybernetic suit which makes possible to perceive the simulated environment by all five senses. The simulated environment can be controlled by means of a keyboard and displayed in a screen. The computer environment strives to resemble the reality by means of a user's interface in such a way as our senses scan it (Brdička, 1995). Actual applications are able do integrate the user into the environment by means of all senses, i.e. not only by sight, ears or touch, but also by smells and tastes (Vrtiška, 2009). A three-dimensional spatial stereoscopic vision is intended for simulating sight stimuli. Nowadays there are several grades of the virtual reality which are by Brdička (1995) described as follows:

- **Passive applications** - they work similar as classical movies. WE can see and hear this environment, however we cannot influence it at any way. There is stereoscopic (3D) movies as an example.
- **Active applications** - we can see and hear this environment, we can even move in it and explore in at all its sides, however we cannot influence it at any way. We are not

able to move objects or to handle them. An example could be simulations in flight simulators.

- **Interactive applications** - this environment possesses all features of the active applications, in addition to this environment can be modified as well. We can take in hand virtual objects, move them, work with virtual tools etc. An example could be a virtual training operation which can be performed by a physician repeatedly on a model ob a certain organ.

Nowadays the virtual reality is used as a simulator of real situations, e.g. driving a car, operating aircraft, spacecraft, training emergencies, crashes, medical operations, etc. In the architectural engineering there are options of 3D-models, e.g. the CAD (Computer Aided Design). Another possibility is represented by virtual traveling (e.g. the GPS - Global Positioning System). We can meet a virtual man in actual computer games, speak to him, take him by the hand or look at him from all the sides. One of the expressive signals is also a higher share of using videos and virtual 3D environments which is known from most of actual computer games mainly from the environment of computer games representing the real world simulation in the Internet network. The 3D environments start to serve as a basic user's interface in some web browsers (e.g. 3B - http://3b.net/browser/demo.html) or in particular web applications - Kopecký (2009) stresses especially tools of the Web 2,0 in the field of new possibilities of using 3D - e.g. large projects of Google Maps and Google Earth, comprehensive interactive world maps making movements in the virtual environment possible, a simulation of an environment making possible to display 3D structures of buildings, grounds, but even moving in an environment of panoramic photos etc., which allows to "walk" in the electronic environment monitoring the actual real resemblance of the physical environment.

The 3D environment represents another grade of the Internet application development from the Web 1.0, which represented especially an information source accessible to an user who can find information in it (but he/she stays a passive user of the the Internet applications, though the Web 2.0 tools, which already made possible an active participation of users in terms of sharing information, to the „Web 3.0“, which is called as 3D by some authors (Kapp, Driscoll, 2010). That was all about the technical view of the virtual reality. In the following part there shall be described the virtual reality in terms of education or e-learning and a virtual teaching environment.

3 E-LEARNING - VIRTUAL LEARNING ENVIRONMENT

According to Marešová (2012), an education in the virtual environment means a type of teaching at which a teacher and a student are separated by the time and/or by the space (or by both of them) and the teacher provides the course content by means of a control application, multimedia resources, the Internet, video-conferences, etc. Transfer of this communication way into the 3D virtual world represents sill news in the educational field which however provides a lot of so far not used possibilities. I the past there was difficult to integrate authentic learning activities into classes, either because of financial demand and environment risks or because of impossibility of performing the given situation in the classroom. These boundaries are disappearing in virtual worlds. Here students can become astronomers, chemists or physicians without any impact on the real world. An important reason consists in the fact that in the information age students are spending their free time in the virtual environment, because of it the traditional learning methods can become little motivated. Using virtual worlds can give teachers an opportunity to obtain higher grade of connection of students and pupils because the student is not only in a position of a passive information recipient. The virtual world offer a lot of possibilities for creative cooperative work which would be limited in the real world, e.g. by limits of a classroom or by numbers of Participants being cooperated at a given moment. The virtual worlds can be adapted in such a way that they can implemented authentic learning strategies focused on the real world, its problems and solutions, using playing roles, activities focused on problems, case studies and participation in virtual communities (Kluge, Riley, 2008). Students are fully connected into these situations because they cannot be passive at playing roles or participations in a simulation.

The virtual worlds provide educational institutions with changes from teaching by a teacher to educations focused on a student. Such a model is more corresponding to constructive theories, where students use their experience in order to active understand problems, they understand the sense as if the problem has been submitted to them in an organized form (Kluge, Riley, 2008). In virtual words the students are more involved and stay in the constructive process based on their experience. The virtual worlds provide teachers with opportunities for implementation of teaching principles focused on a student and supporting active, constructive and on problem solution focused teaching.

The first utilization of virtual worlds in the educational field has been dated since the ninetieth years of the 20th century. In these environments the student can browse a content, handle objects, training skills and design his/her knowledge in a natural way. A positive step of the 3D environment consists in the fact that the student's navigation in the learning environment interior is more effective if the student feels "some room". If the navigation in terms of the study environment is difficult, it could be connected with less effective conceptual learning. The virtual world environment has been started and used mainly by universities, e.g. the MediaMOO environment at MediaLab (Masssachusetts Institute of Technology), Daedalus MOO at the Texas University in Austin, which has served as a contact space for students in which they worked together on tasks and other educational projects. In the Czech environment the virtual reality is uses mainly by students of the Mendel University of Agriculture and Forestry in Brno, who work at the Virtual reality lab. The working place can be interconnected with similar institutions in the world which allows mutual communication and cooperation of teams from other universities. At the Faculty of Mechanical Engineering in Prague there was implemented transfer between a virtual reality device CAVE (situated in the laboratory of the Inter-Media Institute at the Faculty of Electrical Engineering) and an open lecture-room at the real time. This kind of transfer can be able to interpret feeling movements in the virtual world even for remote users. The CAVE looks as a cube of about 2.5 m edge, an user is situated in the cube with stereoscopic glasses on eyes and encased from nearly all sides by stereoscopic look at the virtual world with feeling he/she is situated in it. A multiple user mode (there can be more persons in the cube) represents an important difference to systems using only projection into glasses or a data helmet for displaying the virtual world.

Firstly only diverse simulations of real environments were used for the educational process (e.g. flight simulators, etc.) or computer games which transformed real situations into the virtual environment. On principle there was only a technical improvement of the existing educational environment (in forms of text or multimedia materials), however from sociological point of view it was relationship of kinds of "a separated individual versus a technological interface". The e-learning format as **monotonous lonely teaching himself/herself in front of a screen** represents an obsolete process nowadays and according to experience of many teachers it can be useful only in combination with other methods mostly in forms of blended learning, i.e. in combination with attendance courses. Despite that there are tools implemented in the nowadays LMS intended for the asynchronous or synchronous communi-

cation, there are sill units missing supporting also social aspects, i.e. those which can integrate non-verbal incentives into this communication (e.g. gestures, physiognomy, face to face interactions, etc.). Some studies state that an essential factor affecting a grade of using e-learning is mainly sense of missing social interactions, which seems to be a crucial factor in the on-line education being missed by students at most (Holubcová et. al., 2010).

3.1 MULTI-USER VIRTUAL ENVIRONMENT

According to above mentioned and due our experience there is evident that the popularity of 3D virtual worlds increased enormously during recent years. According to prognoses of Gartner Research (Gartner, 2007) it should be more than 80 % active users of the Internet representing a part of some of the virtual worlds to 2011. Some authors have stated that these virtual worlds are re-defining the Internet (Kluge, Riley, 2008) as a large digital environment combining all nowadays technologies at the same time - so called three-dimensional Internet. WE can really observe signals in terms of higher proportions of using videos and virtual 3D environments being known by most of today's users from the computer game environment which represents simulations of the real world today. Just knowledge about the virtual world of games obtained by the young population or children of younger school age (by means of computer games) makes for as possible to learn the today's population world along with the education by means of virtual classes. Warburton (2009) has classified these virtual worlds as follows (table 1).

According to the above mentioned we can state that one of the options for the system and conceptual application of ICT means creating **virtual learning environment** (VLE). The virtual learning environment represents a target of progresses in reference to the computer visualization and animation. In general it can be defined as follows (Britain, Liber, 1999): There is an electronic environment by means of it a teachers' team directly participate in teaching in forms of diverse ways and controlling the education process.

Nowadays ICT provides a lot of attractive possibilities for creating new kinds of educational and learning projects. At solving of problems defined by us (i.e. supporting learning by the virtual learning environment) we are supporting by the fact that applications of new technologies is inevitable for creating educational environments. Learning in the virtual learning environment is targeted organized and controlled. Mostly there are possibilities interpreted by the Internet, however another electronic computer support belongs to them as well. The

most demanded element of education connected with technologies is an interactivity with its determined role in the multimedia field. The interactivity is defined as a basic feature of the multimedia didactic software which allows active participations of pupils and students in the learning process. The real activity at work with a learning software consists not only in a me-chanical mouse "click" to project some document, its stop or selecting a right answer from offered options. The didactic software requires connections of all intellective and cognitive abilities of pupils and students in the learning process. A self-activity of a pupil is going to support the most effective method of the learning process, i.e. the active learning or learning by activities.

Table 1 Typology of virtual worlds Source (Warburton, 2009)

	Flexible talking	**Social world**	**Simulation**	**Working room**
Kinds of VR	Games (MMORPG, Massive-Mutiplayer Online Role-Paying Game)	3D social networks, 3D chat-rooms, generators of virtual worlds	Simulation of the real space	Implementation 3D
Examples	World of Warcraft	Second Life	NetworkGoogle Earth	Project Wonderland
	Never Winter Nights	Mataplace	Distributed Observer	Olive
	Ardcalloh	Habbo Hotel		
	Rivery project	vSide		
Person Entering the World	He/she plays a role.	He/she is an extension of himself/herself.	He/she is himself/herself.	He/she is himself/herself.
Design of the World	The world is existing in form of fictive talking which represents preliminary defined design games.	The world contains elements preliminary defined by designers which can be fictive (e.g. simulated environments from last centuries), however there are elements of the real world entering the space (social inter-activities, etc.).	The world is a very close replica of the real world based on the same rules as in the real world.	The world represents a virtual working room for cooperation and working tools in this environment are adapted to it.

There is evident from the above mentioned that the actual trend of learning consists in supporting the e-learning for the purpose of more intensive learning and to make monotonous routine activities more attractive. This activity has diverse forms. One of them consists in creaing a partly e-learning course being focused on supporting one of presence learning forms. In this case there is again the virtual learning environment (seemingly real learning) as supporting the cognitive process.

The virtual learning environment can has diverse forms, e.g. web pages available through the Internet along with important elements of the system as an authorization and authentication of the virtual learning process participants, etc. For access to the virtual learning environment in the form of an e-learning course, both a teacher and students will receive an access password, however the students are going to have lower access level at s the teacher. It is given by the organization of virtual teaching environment tools, where the teacher can ad lectures, texts, homework and students have access to form, discussion panels, e-mails or students' contributions only. The teacher creates electronic learning materials by means of diverse multimedia, web presentations and information. Information didactically evaluated by the teacher presents a quite new form of the content presentation as a source document.

Contributions of the virtual teaching environment can be proved on many levels, especially by creating conditions for independent controlled work of students with elements of individual approaches. The individual approach can be implemented in terms of forms and pace. Most benefits for the students consist in the fact that they have ready working materials available which has come through certain "selecting" quality and amount, i.e. its managing will secure meeting required criteria.

The active approach creating the virtual teaching environment does not require any programmer skills from the teacher. His/her teaching mastery shall be demonstrated by effective integration of knowledge in reference to the existing learning material. In that respect, there is the most important requirement, namely that the existing integration should be implemented systemically and conceptually in terms of learning strategy and pedagogical-psychological and didactic rules.

An innovative approach to the virtual teaching environment means to use computers and programs for more effective cognitive processes which induces synergy effects during learning processes due their multimedia features. It means that the virtual teaching environment

represents a set of visual, audio or animated elements which evokes an effect of better, quicker understanding substances of phenomena, mutual connections and utilizing acquired knowledge. In addition to mentioned multimedia features it is possible to design the virtual teaching environment with "hypertexts", i.e. generating hyper-documents. The hypertext represents non-linear (non-sequential) configuration of a text in which its particular parts are interconnected with each other by means of hypertext links representing mostly by cross-references (Dostál, 2009). It is an environment making possible to structure learning materials into units of diverse preferences and in that way to create materials for learning with different rate of details of interpreted information.

An application of the virtual learning environment cannot be without an administration system. One of the possibilities of implementation of the virtual learning environment can be already mentioned integrated learning systems - Learning Management System - LMS. In these environments there is possible to implement a real teaching with most of its attributes. It is a combination of "content delivery" and an administration system of information about the students. The course delivery system administers contents, cooperates with tools for creating contents and supports the learning implementation. The administration system of information about the students administers the student's profile, scheduling teaching and the student's registration. The Course Management Systems - CMS can be used for combination of several learning delivery methods. The Course Management Systems generate complete a whole course by virtue of templates. The Internet network itself make possible throughput of information direct to a desktop of a user. In such a way it is possible to take part in obtaining and using information for development of own knowledge, skills and own education.

A popular virtual learning environment for more effective cognitive processes is the LMS Moodle (Learning Management System Modular object-oriented dynamic learning environment) being characterized as follows:

- It is a modular dynamical learning environment focused on objects;
- it represents user-friendly interface which can be operated easily and intuitively;
- it is an open source system, i.e. a free software intended for creating web courses;
- there is a professional team working on its development and producing new, more advantageous versions;
- it is suitable for supporting presentation study forms with diverse course formats for daily and distance students according to diverse study organizations in reference to topic plans and kinds of consultations;

- in its nowadays form it is the same or even better as professional systems which are often very financially demanding.

3.2 METHOD OF E-LEARNING IN THE INTERNATIONAL CONTEXT OF HIGHER EDUCATIONS

The e-learning adaptation by means of the university education system represents a result of the natural process of creating didactic aids and accessing lectures and professional literature by academic teachers. The on-line education strategy has been developed from securing access for students to syllabus and bibliography services through providing with infrastructure for communication between the teacher and the student up to utilizing web-resources for reinforcing and completing common learning practices. According to the study of Chris Curran (2004), a survey performed at more than 100 tertiary institutions in the USA (1998) has proved that two thirds of the schools participated in the so called project of "a virtual university" or these were partners of informational and technological supporting the distance education. Later it has been proved in terms of an extended survey that 55 % of participated institutions offered college-level credited programs for distance study, and 30 % of responsible institutions presented an option of distance study for complete education. It means that already before more than ten years there was rapid increasing synergy of both distance and on-line educational forms. Targets of that process represented especially the extended access to education, reinforcing the learning process quality and saving (or even reducing) the price for the tertiary education. The strategy of the extended access to education consists in possibilities of providing diverse grades of university education, of securing programs, increasing numbers of recorded students and extendnig the access to lifelong learning.

The e-learning in the Czech Republic has been systematically introduced in universities since 2001 due establishing the National Network of Distance Education (1995-1999) and four of regional centers of distance education. There are used both commercial and non-commercial (open-source) systems (Czech LMS systems, foreign LMS systems, Microsoft Class Server - Microsoft Learning Gateway, Sakai project, Moodle, etc.). According to Kopecký's survey (Kopecký 2006a), which was performed in 2006 it was proved that the University of South Bohemia used the application of eAmos (eAMOS, 2006). Nowadays there is available the WVC ONE application there which securing learning materials in audio-visual forms and open-source LMS Moodle by means of the web-casting system. English language courses in terms of the University of South Bohemia are interpreting by the Faculty of Education by means of the

eAmos system. Since 2001 the VŠE in Prague, the University of Pardubice and the J. E. Purkinje Universityin Usti nad Labem had used the eDoceo system, nowadays the VŠE used the foreign open-source system of MIT - Open Courseware (2013), Massachusetts Institute of Technology. The language center of the University of Pardubice and the J. E. Purkinje University use a learning support in LMS Moodle. The University of West Bohemia in Pilsen is securing by means of the Institute for lifelong learning an author system of ProAuthor being intended especially for authors of on-line courses controlled by means of the LMS and multimedia off-line textbooks. The financial advantageous Open-source systems use other school working places as the Faculty of Arts and the Faculty of Education of the Masaryk University in Brno, the Faculty of Mathematics and Physics of the Charles University in Prague, the Silesian University in Opava, Brno University of Technology, etc. Supporting e-learning in terms of the Masaryk University in Brno is secured by the Information system of the Masaryk University in pages of the so called Elportal, which has been created on base of web tools in the service center of the Masaryk University or there are free tools with preliminary prepared templates (Questomat, Animated text, GEM, Extraktor, Multiquest, Transmitter, Counter, Dril, e.t.c.). Students of the Faculty of Informatics and Management of the University of Hradec Králové are able to study subjects with supporting e-learning in terms of the project of the Inter-University Study (IUS) and study at European universities by means of the EVENE project whose results are represented by implementation of "virtual mobilities" of the students. For saving learning texts, giving homework and checking knowledge the University of Hradec Králové uses a platform (virtual learning environment) of Blackboard as a part of virtual learning environment Oliva. The University of Ostrava is securing on-line courses for students and the platform of Virtual Universiy of the Third Age (2013), which are operating on the Moodle basis.

Nowadays conditions of the distance educational network in the e-learning field in the Czech Republic is specified as ineffective and unsatisfactory because of a lot of diverse kinds of LMS despite thee availability of applications as e.g. the Moodle. The most advanced universities in the e-learning field are the University of Ostrava, the University of Hradec Králové and the the Silesian University in Opava which mutually implemented the project of Universities' cooperation at creating standardized multimedia aids (2004). In 2005 the creator team was supplemented by workers of the Charles University, ČVUT and West Bohemia University.

A specific version of e-learning without the evaluation and testing students is represented by a system of free available lectures in forms of video-records in the Internet The Academy of

Arts Architecture and Design in Prague has selected this approach and since March 2009 there have been situated in terms of the Czech Television web broadcasting diverse lectures of art history and theory. This model of making knowledge available stresses the popularization function of the field and pedagogic activities of the school. There is a similar and more elaborated system of "open courses" at the Yale University: Open Yale courses (2013), which provides without registration term courses of diverse subjects, which are close determined except for so called introductions of problems (e.g. Principles of Physics). The project author is Diana E. E. Kleiner (an Art Historian) and the first courses were available in autumn 2006. Advantages of this on-line educational system (in opposite to the Academy of Arts Architecture and Design in Prague) are active materials of lecture video-records. Each of the courses is divided into 26 lessons and contains a syllabus of the subject, a question-form because of feedback, a reference to literature lists and a direct link to the Internet bookshop. Each of the lessons contains a lecture record in the HTML format, an audio-record (in the MP3 format) and a video-record of two qualities (the MOV format). Evident disadvantages of this educational model are represented by the interactivity missing.

From this point of view the "Harvard" open courses represent an improved model. The Harvard University offers in its web pages free courses being available thanks to the Harvard Extension School's Open Learning Initiative (2013). There are non credited learning courses open for public without registration. Particular videos of the courses are available in separate web pages of the subject containing a detailed description of the subject, a video-presentation, a syllabus of the subject, learning materials, comments of students, discussions and general messages. Compared with the Yale model there is a slightly extended version of the on-line learning.

The strategic plan of the University of Bologna focused on the e-learning development was approved in 2007 and its specific targets are adaptations of quality standards of e-learning courses, integration of e-learning into the information system of the university, supporting projects on the regional, national and international level, cooperation with the Guidance Office for supporting both Italian and foreign students of the Erasmus program. In March 2008 the Academic Senate approved the Methodological and Technological Manual of e-learning, which contained pedagogic directives and basic technical standards. Nowadays the technological e-learning background at the University of Bologna is based on open-source LMS systems being used for checking main study subjects of individual institutes. The study author (Comba, 2008) is emphasizing that maintenance of three diverse platforms (Moodle,

Atutor, AlmaChannel) is financially demanding and because of it the university workplace of the E-Learning Center considers an uniform platform and the budget focused on costs on the course authors.

The University of Brussels Université Libre de Bruxelles (ULB) supports e-learning through its LMS WebCT system, so called L'Université Virtuelle (2013), the virtual university. Since 1998 it has supported the classical learning process along with the open and distance education. It is based on the WebCT software which makes possible for a teacher to insert comments to exercise subjects, diverse resources, practical information (calendar of activities, important messages) into the on-line structure and at the same time provides tools for communication and cooperation between students and teachers (e-mails, panels, etc.).

The University of Tokyo had offered the OpenCourseWare of the University of Tokyo (UT OCW) free web application with a calendar of activities, a syllabus of subjects, comments to learning and texts. Nowadays the University of Tokyo utilizes the LMS system of CFIVE (Common Factory for Inspiration and Value in Education). The project of this Japanese system was created in 2003, in the next year it was implemented in the teaching process and updated in 2011.

Another university in Tokyo, the Gakugei university utilizes the WebClass application. It is the LMS system requiring platforms for file servers of PHP/MySQL and technologies of Java Script/AJAX. It allows the registration in a course, creating the course content, the basic communication between a teacher and a student and evaluations. The possible utilization of the platform consists distance studies and „blended learning“ (the combined method supported by presentation worshops).

One of the most wide-spread platforms in fields of the on-line university education, especially in the USA and Great Britain, is a virtual teaching environment (VLE) of Blackboard (it is utilized e.g. at: Princeton University, University of Westminster, University of Leicester, University of North Dakota, Northwester university and many other). Benefits of the Blackboard system consist in its comprehensiveness and quick adaptation to development of communication technologies. The latest step represents the system implementation into mobile devices - the Blackboard Mobile design (e.g. students of the University of Leicester have had access to e-learning through mobile phones and iPads since October 2012). The Blackboard teaching environment at the University of Princeton contains a panel of general information and current messages, access to on-line courses, access to the university library and the univer-

sity editorship (Labyrinth Books) and references to diverse student and university organizations. The interactive teaching environment of Blackboard (model of the University of Leicester) is based on students'access to course materials and at the same time inserting and evaluating elaborated homework. The students registers himself/herself into the environment by means of the entry name and the with university provided password. A home page of the student contains a list of attended courses, messages/notices, an assistant, information support of the student, information from the university library. The menu of particular courses consists of syllabuses, documents and multimedia files supporting lectures and materials in reference to workshops. The student has his/her access to homework assignments, evaluations of his/her homework and examples of tests. Communication tools are a part of the environment. The student can see all members of the study group and the tutor. He/she can select compatible tools of communication (Blog, Discussion Board, Wiki, E-mail).

The University of Oxford) has elaborated a comprehensive system of the e-learning education. A lot of coordinated departments are participating in supporting the virtual education. There are examples of two of them: Learning Technologies Group (LTG) and Technology Assisted Lifelong Learning (TALL). The LTG provides a set of on-line tools for academical workers, which can be used for teaching: The WebLearn virtual teaching environment (developed at Oxford), which is supporting the traditional learning. The university employees can easily obtain on-line materials, lecture notes, essays, question-forms for feedback etc. along with using communication tools for on-line discussions, sharing documents, examination and evaluation. There is supported group/project on-line work, possibilities of planing consultations with the tutor and a lot of learning sources. The virtual learning environment also contains the new Web 2.0 tool intended for Wiki, a pod-cast and blogs Students and academic workers can use the WebLearn for all kinds of media (i.e. on-line videos, pictures, datasets). The LTG staff offers consultancy and assistance to university members at utilizing those tools and even at productions of digital media or softwares. There is laid stress on evaluations of users and other planing technologies of the virtual teaching environment. There is also a large training program available for development of IT skills of academic workers.

The division of lifelong learning (TALL) offers its team of web application developers for teaching adults and short lifelong learning courses performed on-line and by distance study. These courses are very popular and updated regularly. The TALL provides a comprehensive support of participating students (Highton, 2009).

AS mentioned above, the Slovak Republic is close similar to the Czech Republic in reference to its educational system. The e-learning introduction with successful results is observed at the Silesian University in Opava, the University of Ostrava, the ČVUT, the University of Pilsen, of Hradec Králové, Of České Budějovice, the Masaryk University in Brno, etc. The e-learning is utilized especially in combination of distance and present studies at them. It can be said according to available documents that the main reason consists in a guarantee of a development of the good educational system with requirement on e-learning suitable for diverse pedagogic approaches and specific needs of existing study programs. Some more examples:

- The Technical University in Prague utilizes the LMS Class Server. Particular school and particular classes are created in this system. Because of that each of the faculties has created its own school and each of lectures and exercises represent an own class.
- The Czech University of Life Sciences in Prague decided that the most suitable system is the LMS Moodle which has been consequently implemented.
- The Palacký University in Olomouc has a working place (the Center of distance education) being used by the whole university and coordinating introductions and developments of e-learning accredited study programs with supporting e-learning as a matter of fact.
- The University of Pilsen and especially its Faculty of Education are very active at the e-learning applications in the distance method.
- The University of Hradec Králové has already been proved at e-learning applications historically. It belongs to the first universities which have created the new educational strategy based on a suitable combination of electronic learning materials and the classical approach to the education. The introduction of the WebCT professional virtual stud environment has been evaluated very highly (Milková, Poulová, 2001). The WebCT system was substituted with the Blackboard system which has been used by the Faculty of Informatics and Management till today. Other faculties utilize the Moodle system.

It can be state in generalthet the public universities in the Czech Republic utilize the LMS Moodle system for supporting the e-learning education (Magdin, Burianová, 2010), especially with combination of the present and distance method. There is evident from surveys about e-learning applications that e-learning in Slovakia still does not represent a "common" method. According to Furindová (2011) there may be following reasons:

a) A fossilization, unwillingness to change educational customs in reference to both students and teachers;
b) insufficient knowledge about integrating e-learning into the educational process;

c) insufficient motivation of course authors and mostly missing technical support.

In reference to the above mentioned it is necessary to answer following questions:

1) What problems are connected with e-learning applications?
2) What are developments of competencies necessary for distribution of learning contents into the virtual teaching environment?

In terms of that expertize we monitored diverse references, e.g.: The successful school, Teachers' newspaper, The advanced school, Slovakia teacher, New educational systems, Active schools ant other mainly foreign references. In terms of selection the LMS Moodle presents itself as a suitable tool. Another starting point insists in a thesis that integrating e-learning in the university education requires a specific pedagogic development of teachers in this field along with deeper integration of information technologies in foregoing experience of students. In reference to those two requirements there are especially following questions:

- A level of the technical infrastructure;
- a level of the organization infrastructure;
- a value of educational benefits.

Solving this scope of problems cannot be based only on individual activities of individual persons, however it is necessary to solve these problems comprehensively a systematically. Because of that there will be necessary systematical supporting e-learning applications. Pressure of students on supporting e-applications may not be negligible.

Applications of e-learning as a support of presence educational methods are to be understand as a natural development with two possibilities:

a) The combination of materials by means of them more types of students with diverse learning style can be contacted (Burgerová, 2001);
b) educational economy;
c) flexibility in reference to innovations, advanced cognitive processes;
d) utilizing virtual learning environment as an interactive system for providing different learning activities,
e) utilizing the LMS environment as a dictionary of study materials,
f) elaborating studying topics into units with special offers of activities;
g) accesses to study materials in electronic form, i.e. increasing the availability level of the study materials (providing e-learning materials is securing possibilities of learning at the most suitable motivating time);

h) interconnection of learning with needs of practice, i.e. innovation and flexibility of learning contents and their availability to both potential and current students;
i) creative applications of multimedia, etc.

It is necessary to emphasize that new technologies applied at education are not carriers of success automatically. Their value shall be appreciated if students and teachers are able to use them for effective education. It is evident that initiatives focused on creating e-learning courses shall represent a process of building knowledge and not a process of transferring knowledge. In terms of of e-learning created learning activities led to a dialog with a new learning source which shall support the change of learning, to improve the learning process, i.e. interactions, cooperation, communication, etc.

As already mentioned, nowadays technologies induced that a new population is coming to practice having different educational customs and needs as the foregoing population. Oblinger (2005) has introduced survey results according to report of Pew Internet & American Life Project with following findings: The 4 of 5 nowadays college-level students started to use computers in age between 5. and 8. years, nevertheless 61 % use the Internet every day. In terms of the whole county there are nearly 90 % of college-level students on-line. Utilizing the Internet or a school's network in the higher education fields is nearly general. The classical education is becoming obsolete for pupils. This population is and will be willing and able to do another education in terms of its exercise in the labor market. In a lot of cases that education shall be performed by means of e-learning. It would be a mistake if nowadays universities do not prepare their students to that situation. It is well to take into account that the university market can be compared wit the labor market. It shall be transferred to places of better and superior conditions. If there are not any innovations, we could expect ebbs of students instead of their flows. If we consider e-learning as electronic supporting educations, we cannot forget selecting educational forms where e-learning has started and even today it represents a possible way, i.e. distance education.

3.3 FROM THE HISTORY, TYPES AND ELEMENTS OF E-LEARNING

If it may seem impossible, universities belong to the first of institutions which started to recognize benefits of new media and technologies. To the middle of nineteenth years, e-mail systems became a common communication way, namely in traditionally technological develo-

ped countries as Japan or the USA. Institutions and their workers along with students started to use the Internet and its service Web World Web (www or web) as an information, communication and entertainment source. Especially young students created discussions groups and on-line rooms for chat, where they could communicate about everything from fashion through politics up to finding for new friends at the real time. The development at universities went on with quick pace. Syllabuses, boor resources, lecture contents were removed from classical classrooms to multimedia sources and to local networks. Private companies launched finding options of commercial utilizing e-learning. There were created virtual universities in the web offering all their courses and obtaining certificates via the Internet.

The development of engineering, ICT and applications of pedagogic constructive theories make possible to create more effective fully electronic "learning environment" in terms of quality, namely in accordance with the theoretical vision of an *„information environment for learning and collecting knowledge"* having been formulated by Beyou in 1992. Later this vision has been conctretized and obtained its particular form of e-learning and LMS systems making its implementation possible. During particular development phases of e-learning, there had been big influence of the technological level of information ICT (firstly the off-line technology, then the on-line one) along with knowledge level about human learning (firstly programs, then hypertexts and compact multimedia).

3.4 KINDS AND COMPONENTS OF E-LEARNING

There will shortly be described three levels of e-learning corresponding to both technical and pedagogical maturity (Loventhall, 2009):

- **CBT** - Computer-Based Training - this level is considered an off-line education, where its contents are recorded on carriers, e.g. CD-ROM which makes not possible to develop the communication and control component of the whole learning.
- **WBT** - Web-Based Training - the on-line educational form, where its content is carried through a network. Sometimes is this component rejected because of its insufficient efficiency of learning control
- **LMS** - Learning Management System - nowadays it is the most advanced level; in addition to a computer and a server there is being installed a special software making creating, administrating and distributing learning contents along with the communication between tutors and students and control and evaluation of the educational process possible.

In the exiting division of the particular e-learning levels exists some terms very important for the educational process (learning with electronic supports). There are three basic components necessary not only for effective studies, but at the same time for creating a suitable LMS system. The first component is the educational content, the second the content distribution and the third one is controlling the process including communication and evaluation elements. These three components consist the educational system itself and have its non-substitutable position in it. The e-learning educational system (Fig.1) is complete only if it contains all these three components (Barešová, 2003).

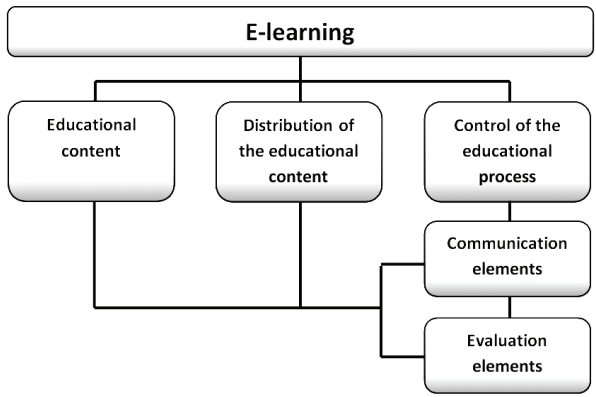

Fig.1 Basic components of e-learning

3.5 TRADITIONAL VERSUS DISTANCE EDUCATION AND PRIMARY EDUCATION

It is without doubt important to pay attention to applications of new educational methods for elementary schools, better said to educations of future teachers of elementary schools. As we are in that connection talking about the distance education, we observe it as an alternative or substitution of the traditional education, however it is important to say that to limited extend only. Undoubtedly the face to face education has brought enlightenment to students since long past times. Especially elementary schools are unconceivable without teachers having immediate contact with pupils. It is not necessary to stress that a teacher represents an example, a standard, sometimes also a mother, a friend but also an authority, i.e. a "good" and/or evil man who cannot be forgotten during all the life. On the other hand changes bringing by the information society along with technologies have impact especially

on the young population. As already mentioned above, children of pre-primary age have already met ICT by means of games, later by the Internet and tasks requiring by computers or their preparation in computes. As a child becomes adolescence or reaches adult age (college students, future teachers of elementary schools, of nursery schools, etc.) there come into effect limitations of classical educations due features of the digital population life. In reference to room, where learning take place, time and the pace being the same for everyone, and especially the shortness of dispensable time are the most difficult conditions. A lot of information we need to interpret, time of its understanding and exercising is sometimes very short and the traditions education is only superficial. In spite of excellent information resources we do not know how to transform them to our knowledge. We do not have time, it is necessary it deal with still planed things, go forward, etc.

In terms of lifelong learning which is nearly a duty at teacher's occupations, we are confronted with no enough time, with duties in our occupation, household, etc. The classical education supposes that all pupils in the classroom understand everything in the same way, are satisfied with teacher's explanation and all of them have the same subjective comfort for learning. We know that there is a different reality, because there are a lot of disturbing element. E-learning can eliminate these aspects. Students in e-learning can work in their own pace, go back to the subject, read the offered text many times and select versions of explanation However it can be connected with negative tendency as well.

Babinský (2001) states differences in reference to sufficient or insufficient students' motivation compared e-learning with classical studying methods. If a student want to obtain new knowledge, then he will mainly finish a well composed course. If the pupil's motivation is insufficient and he/she is not studying because of the inner conviction, there is a bigger probability of unsatisfied results compared with classical studying methods. Because of that it is suitable to start utilizing e-learning sooner in terms of adults' education then it is at pupils of elementary and secondary schools. The well-arranged comparison is contained in table 2.

3.6 LIFE-LONG LEARNING

Characteristic feature of the information society represent the emphasis on education, obtaining information and ability to its proper elaboration. The education doe snot finish by achieving certain age or school grade. It goes one the whole life - lifelong.

Educational institutions dealing with lifelong learning make the education available for a wide spectrum of persons. There are supporting individual abilities, positions on the labor market under dynamically changing social-economical conditions. In EU countries there is lifelong learning observed as education in advance productive, productive and post-productive age.

Table 2 Comparing traditional and distance learning Source (Babinský, 2001)

	Traditional study	*Distance study form*
Students	-on comparatively the same level of knowledge -at the same room -under control	-heterogeneous -„scattered“ -relatively uncontrolled
Records about Students	They cannot be neither complicated nor detailed	-they are very important because of material distribution, evaluation, motivation
Supporting Students	-automatically during learning -seldom individually	-needs of special supporting services for students with problems and minimization of "waste" -ways of overcoming distances between students and an educational institution -solution ways of control and time problems
Submission and Accreditation	-human factor- oral exams -relatively resistant to cheating	-distance submission increases the problem of evaluation -cheating represent possible problems
Media/Methods	-face to face learning represent the basic form -demanding on exercises -there are learning habits	-intermediary learning represent the basic form -demanding on resources -learning habits cannot be supposed in general
Courses/Subjects	-relatively easy and with explicit specified methods -low initial costs and high variable costs on a student	-with more complicated creating, manufacturing and distributing and with special functions -higher initial costs and lower variable costs
Organization and Administration	-non-demanding administration, most of the employees are teachers	-strong administration network securing supporting students - records about students, creating courses, distribution

3.6 KEY COMPETENCIES VS. LIFELONG LEARNING

There are the most important documents specifying the platform of lifelong learning. White Paper on Education and Training - Teaching and Learning - Towards the Learning Society (1995) is a document which emphasizes needs of knowledge and developing skills of individuals to participate in the economical life. E.g. the Slovak Republic before its joining EU introduced transnational documents pertaining lifelong learning - Lifelong learning for all, OECD (1996), Education and Training 2010 - EU-Commission Document from 2003. etc. Commission Staff Working Paper A Memorandum on Lifelong Learning (2000) is one of the most important documents integrating conclusions of focusing EU-policy and activities from the EU-Council meeting in Lisbon in 2000. The EU considers the educational field as the knowledge epoch influencing all areas of human living.

The important document of lifelong learning in Slovakia is the National Program of Upbringing and Education for next 15-20 years known also as Milénium (2002) comprising strategical methods got the educational field and integrating initial results in terms of reformed strategies. Changes induced by political, economical and social conditions are emphasized by the information explosion, developments of new technologies, computer networks and the Internet. Technologies evoke needs of education in the computer area or in areas which belongs to limited number of experts before. Needs of the information education evoke pressure also on educational institutes with the target of specifying and reaching competencies.

Document Key Competences for Lifelong Learning - A European Reference Framework (2006) represents a Document integrating key competencies. The basic definition in the Reference Framework is: *„...combination of knowledge, skills and attitudes adequate to the given context. Key competencies are those which needs all individuals foe their personal satisfaction and development, active citizenships, social integration and employment."* The reference framework had determined following key competencies:

1) Communication in mother language;
2) communication in foreign languages;
3) mathematics competencies and a basic competence in the science and engineering field;
4) digital competencies;
5) to learn how to learn;
6) social and civic competencies;
7) initiative and enterprise;
8) a culture consciousness and expression.

The given competencies are on the same level of importance and herewith there is a certain intersection among them. Critical thinking, creativity, initiative, solutions of problems, evaluation of risks, decision and definitely control of feeling playing roles in all eight key competencies (Kusenda, 2010). In terms of crucial competencies Turek (2010) expresses the following opinion: *„Key competencies are over a subject, they are not connected with a particular learning content, they can be mastered in any subjects. Their mastery is connected especially with the professional side of learning, with methods, organized forms and concepts of teaching. Any skill, ability and even key competencies can be mastered through activities only."*

3.7 DISTANCE EDUCATION AND E-LEARNING

„Distance Education DE is a multimedia form of a controlled study in which teachers and consultants are permanently or mainly separated from students. The multimedia mean utilization of all distance communication means presenting learning, i.e. press materials, magnetic records, computer programs on discs or DV carriers, phones, e-mails, radio and TV broadcasting, computer networks (the Internet and an Intranet). The main object of the process is an student, the main subject of the process is an educational institution - not a tutor" (Průcha, Míka, 2000, p.13).

The principle of the distance education is a self-study, study materials have "self-study" features, according to some resources instruction characteristics. There is mostly used a combination of the distance education method with the present ones, i.e. consultations, lectures, professional excursions. According to Průcha a Mika (2000), exams in particular subjects are performed after enough long time of the self-study in form of tests, exams are carried out individually and they are evaluated either automatically or in the present form.

The history of individualized learning has started in last past. At their beginning there were used mail services during the 19th century (the first correspondence courses of stenography - Moor, Kearsley, 2005, pp. 33-36). Since 1858 the University of London had started a distance education in form of an external educational program as the first university institution. In the USA there had been elaborated a conception of extended education in terms of the university institution cooperation. In 1892 there had been performed school correspondence courses at the Columbia University (Levinson, 2005). E.g. the University of Wisconsin-Madison started as the first to support also other methods of shipping learning contents (not mail services). In 1964-1968 the Carnegie foundation had financed the Wedemeyer's project AIM

(Articulated Instructional Media), which was using possibilities of communication technologies for transfer of not only the learning content itself, but also the mutual communication. According to Moore, the AIM was used mainly in Great Britain, where those ideas and methods had been used in foundation of the known Open University in 1969. In 1974 there followed mot only Germany by the Fern Universität in Hagen (Hülsheger, 2009), however series of similar institutions had risen all over the world. Those institutions very often used the name of Open University (both in English or a local language) and all those "open universities" were utilizing the distance education as a primary technology for shipping the learning content. Some of those institutions became so called "mega-universities" during the time.

The development of computers and the Internet make possible an easier and quicker distribution of the distance education, which was connected with creating "virtual universities" providing the whole educational process in the on-line form (Gold, Maitland, 1999). Since 1996 has started the Jones International University being called as the first accredited university working place offering the education fully in the on-line form not only in the USA, however over all the world.

In CZ and Slovakia the development of the distance education started as far as after 1989. The reason was that the so called "extramural studies" had long tradition in our countries. Because that form of studies could be performed in-career, it was very extended on secondary schools and universities (Palán, Langer, 2008). The distance education development is connected with activities of the "Czech association of the distance university education" (ČADUV), which was established in 1993 and since its start it has developed one of the methods of distance educations, namely e-learning as the "National center of the distance education", which was established in 1995. That status has stayed till today and it is characteristic not only in the Czech Republic, however abroad as well (Průcha et al., 2009).

As many times stated above, e-learning is being understand as multimedia supporting the educational process whereas students obtain study and information materials by means od a computer network. According to Burgerová (2006) the role is played with the self-study, self-instruction. In general there is the system utilizing electronic transferring and saving information for providing contents, solution of tasks, communication, administration and control of learning. Ligas (2004) states that e-learning does not substitute classical classes, however it enhances them to a higher level utilizing advantageous of new contents and distribution technologies in order to make the education possible.

For relationship between e-learning and the distance education we can stay that e-learning represent a distance education method. There is a process of both formal and informal education and training activities, processes, communities and events secured by means of electronic channels and media, e.g. the Internet, the Intranet, the Extranet, CD-ROMs, DVDs, TVs, phones, personal computers, etc. The electronic education comprises creation and distribution of e-learning courses, educational control and the following feedback from a tutor to a student and from the student to the tutor. The education takes place in integrated educational environments, so called LMS, which represents software suitable for learning, which simulates tradition school in a certain way. There are multimedia courses containing simulations and multimedia classes, i.e. integrations of texts, animations, graphics, audios, interactive cases informs of questions and tests and plays for the purpose of motivations and activations of the individual student.

E-learning is a didactic method. Some authors, e.g, Zlámalová and Hanušová (2001) consider it "a self-educational method", which however cannot be observed quite exact. There are activities which does not have self-educational features in e-learning, but they require an interaction between a teacher and a student.

In terms of time there are following activities in e-learning:

a) Synchronous or on-line learning (virtual classrooms, virtual labs, video-conferences, on-line workshops, on-line chats, etc.); learning run in real time along with the interaction between a teacher and students. The synchronous communication makes an immediate feedback possible. The synchronous education is characterized by a high interaction grade, however it is demanding on the teacher.
b) At the asynchronous or off-line education (DVD, e-texts, on-line courses, simulations, etc.), the interaction doe not run in real time. Students select their access time in reference to learning materials. Information is saving and archiving on some carriers.
c) An education combining both synchronous and asynchronous communication - a tutor e.g. by means of the synchronous communication will explain a selected theme and then students work and communicate by means of the asynchronous communication (e-mail, panels).

In this text our attention is paid to the on-line educational being considered as carrying in the virtual environment of e-learning. The on-line education and e-learning we consider synonyms (e-learning is a widely expression because it is based on on-line learning). In general, on-line learning consits of following components:

- student
- tutor
- learning materials, texts, references, web pages, videos, etc.
- technologies, LMS (software for simulations of a learning environment)
- educational institution

Kahn (2006) provides another division as eight dimensions of the e-learning end extended of some components (ethics, etc. Examples of these dimensions are contained in Fig.2.

Fig.2 Eight dimensions of an open, flexible and distributed e-learning environment
Source (Kahn, 2006)

In the wider context, e-learning are observed as TBL (Technology-Based Learning) or effective utilizing advanced technologies in learning. The TBL consists of the WBT (Web based training) and CBT (computer based training). We consider e-learning in its closer context, i.e. the synonym of the on-line educational term based on the WBT distribution and presentation. Because of finding a reason for on-line learning, focusing on e-learning and the virtual learning environment, we will state main strong sides of on-line learning:

- strong sides;
- activities of students;
- individual approach to students;
- own pace of studies;
- better access to resources;
- study during individual time according to nest wishes of students;

- better possibilities of testing, self-testing, immediate results;
- current information and many other benefits.

It is clear that on the other hand there are also weak sides:
- limited access to technologies;
- technical problems;
- shortages of abilities to study himself/herself;
- demanding course preparation and implementation of learning by a teacher;
- it is not suitable for some kinds of courses (subjects);
- personal contact missing.

Students select time, a room and they can determine the pace of study and educational contents to a certain extent. There is an individualization of the learning process in terms of time, places and contents; it is an open approach to the education. Students can also select rate of details given by an on-line hypertext. It is supposed the student's high motivation, because of that it is intended for lifelong learning. The learning materials are also different, because we are working with multimedia materials, interactions, simulations, animations, etc. This educational form possesses also economical and social aspects. There are not any stone buildings for the so called open universities, because there are preferred economical aspects of that institution.

Missing the personal contact with a teacher or among students are observed the biggest disadvantage of e-learning There are subjects at elementary school (and not only there) which requires training practical skills. For that the combination of traditional learning with e-learning is more suitable. Some surveys (Rohál', 2006) state that factors influencing levels of education are following:
- connections of students with the educational plan;
- cooperation of individualist being able to it, the students participate on costs their study which means an important factor foe their motivation;
- course quality.

Factors with negative impacts on the educational process are following:

- conservative participants who do not like accept something new;
- absence of a project leader, a tutor or a help-desk (assistance) or any other component of e-learning;
- insufficient comuter literacy.

It's true that classical education managed by teachers lives on and it is sure that will live on many centuries and it is going to be irretrievable in the future as well. However the education by means of teaches has its limitations as well. Some examples only: The classical education is taking place at classrooms in predetermined time and it is characterized by the direct contact between the teacher and pupils, it is controlled by valid curriculum regardless to particular knowledge of students. In addition to, the education is directly mediated by the teacher and sometimes it does not contain students' particularities (even it is not possible in most cases).

The e-learning process can to a certain extent eliminate non-respecting the student's individuality. Students in the e-learning process participate in a learning course by their pace; they select themselves ways how to get back to certain topics and select from more versions of explanations. In an ideal case, the student obtains the particular learning materials along with instructions in reference to an effective study process. If any problems occur, he/she can contact his/her tutor. In general, one of the most important problems of learning consists in the insufficient motivation. If a student wants to obtain new knowledge, then he will mainly finish a well composed course. If the motivation is insufficient and the student is not studying because of the inner conviction, there is a bigger probability of unsatisfied results compared with classical studying methods. Those aspects are partly eliminated by mentalities of adults students (however under our conditions a study is not motivated by obtaining knowledge, but obtaining a document about the finished study).

When the e-learning process is to be positive, it should correspond with the following ICT attributes:

1) interactivity, i.e. a property making possible a bilateral communication, allowing the user to intervene in the process and/or to react on obtained information;
2) multimedia mean integrating texts, pictures, sounds, animations, videos in a functional unit which is intended for transferring information, increasing students' interest, their motivation in reference to more comprehensible presentations of information;
3) hypertexts or hypermedia represent the similar presentation of information at the dynamic and associative features of human thinking are;
4) global work with information all over the world, scraping boundaries between countries and continents, selection options, comparison of competitors and enhancing quality because of it;

5) virtual phenomena allowing visit remote places for the purpose of solution serious problems and/or entertainment, to communicate and to give a new dimension to an human individuality;
6) mobility, distributions that makes a new distance education way possible without dependence on a place, i.e. distance learning, telelearning, teleteaching, on-line learning, on-line education, etc.

4 E-LEARNING AND REAL INSTRUCTION

E-learning teaching by means of information and communication technologies represents especially a supporting kind, i.e. it is an alternative. Both above already mentioned learning contents and learning itself representing new knowledge and findings are elaborated in multimedia forms as so called courses which represent integrating texts, videos, sounds and other multimedia elements. The educational model utilizing e-learning principles is intended for the controlled self-studies. A target of e-learning supporting the presence form of teaching is a possibility for students to proceed by their own pace, to determine their way of coming "back" to subjects and select themselves from more versions of explanations.

The following facts are to be respected at creating an e-learning course:

1) Demands on a student are essentially different from those **at the presence study**. The student must plan his/her time well in order to meet terms of examinations, tests, etc. There is not anything at e-learning which forces to study. Only a strong motivation can force to study. Motivation factors at the presence study are e.g. fellow-students. The student must be more active and responsible during e-learning. There are inevitable the ability ti study self, responsibility, ability to plan and organize own time, the computer literacy and availability of technologies. The student must not be alone with problems at e-learning. On-line courses make possible interactions not only between the student and the tutor, but among students themselves. A benefit of e-learning consists in the fact that students can save their anonymity if there are not any experimentally courses or ones combined with the presentation forms of study. The discriminating factors as age, appearance, clothes, race, gender plays mainly no roles. Instead of that the attention is focused on discussions and the participant's ability to communicate and cooperate. It is a paradox that introvert persons can find their role in this communication. The anonymity grade is observed a negative fact, i.e. missing contact to fellow-students ant a teacher. Revealing own person at the course, creating a friendly atmosphere, panels for independent communication can overcome feeling lonely. It is very important to do everything for student not to feel lonely. Loneliness can be overcome with technical on-line means, by sound transfers, etc. It is requisite to make possible for student to contribute with their ideas and opinions in reference to his/her study subjects. The students shall be aware that a tutor is not only one information source at e-learning. A student can learn a lot from his/her colleagues. There is an important possibility of comparing acquired knowledge with other students.

2) The role of the teacher has been changed at e-learning. A teacher having been successful at the presentation teaching may not be so successful at on-line lessons. The teacher is a consultant, trainer and assistant of the student, a discussion moderator and an examiner of knowledge. Following abilities are to be managed in this role:

- particular methods applicable in the e-learning course;
- replacement of insufficient physical presentation by the at the course created environment for communication (a written way of the communication must be in accordance with the tutor which represents the basic communication element at teaching);
- **willingness to changes, critical and self-critical thinking** (understanding, opening and flexibility of the tutor are inevitable);
- practical skills in reference to creating courses;
- supporting students during the whole teaching time.

3) Work with materials represents especially an independent activity or controlled independent activity. There is important for the students that essential documents must be prepared from which ere to be clear what are targets their work and according to which criteria it would be evaluated.

One of the first important activities is creating and using an e-learning course, because of that it is necessary to pay attention to creating study materials in the following sense:

1) **Contents** which does not mean a scheduling some chapters, on the contrary, the content is a crucial element for fulfilling the e-learning system with the study materials. Forms and means of implementation are different and not always imaginable for common teachers and students. Creating electronic materials is to be done from the pedagogical, technical and sociological point of view.

2) **Recipients of the electronic course**. In this sense we shall analyze whom the course is intended for, what there are profiles of students, simply said - what we want to teach the students. It is a very essential problem in reference to creating new contents or conceptions of teaching and learning.

3) **Elaborating contents** with a conceptually different interpretation than for the presentation form of teaching, i.e. for the electronically supported education. There must be observed at least most of attributes of electronic study materials. The mentioned attributes shall be described closely in chapter 7.

4) **Creating conditions** for updating contents of the study materials with using hyper-media and hypertexts, better graphical interfaces with options of simulations. It must paid attention to facts that the student shall have a sufficient amount of relevant information and pleasant environments to study including motivation and initiation aspects. There must be created so called pedagogical dimensions of e-learning according to Khan (2006), who comments following (Burgerová, Burger, 2009):

- **Analysis of electronic study material contents** - a content depend on targets of the whole courses or its components (one lesson or subject) including methods of e-course creating, controlling and acquired knowledge. It must be said in that sense that no every content is suitable for e-learning (training practical skills), however e-learning can support all contents.
- **Analysis of a target group which materials are intended for** - there is a special characteristic of students. The "real" e-learning represents providing students with education, often from diverse environments and with different habits and levels of education, with diverse communication and computer skills. The first-rate quality e-environment can be created with most comprehensive information as possible.
- **Analysis of targets which shall be attained by teaching,** i.e. most clearly and understandably defined targets. The disjunction of intents, targets and evaluation of learning results is ideal.
- **Analysis of media for supporting and interpreting studies** - there are problems connected with suitability of particular media (the Internet, digital media, traditional textbooks, etc.) depending on content analysis in order to control selection of media and presentation ways for different kinds of courses.
- **Design factors of e-learning courses** - A design of an e-learning course depends on kind of the course, i.e. required knowledge contained in the course content. We can also in real life meet both well and badly structured problems requiring diverse design methods.
- **Teaching strategy** - Possibilities of different strategies to make a learning process easier. This process can be facilitated by means of diverse activities based on digital technologies and the Internet. It is necessary to look for optimal strategies for the wide spectrum of students. From the wide spectrum of strategies one can use presentations, exhibits, examples and exercises, talking stories, plays, simulations, case studies, discussions, interactions, different model situations, cooperation, practical training, etc.
- **Learning organization** - The e-learning content shall contain organization and structures to assist the students (not on the contrary - to confuse students).

- **Combination strategy** - A need to utilize all available media to create a combined learning environment (mostly only one way of learning is not enough to provide students with sufficient selection).

It is possible to accept following strategic rules and step sequences for creating an e-learning support:

a) an e-learning support can be designed as a system and conception element of the presentation teaching form, i.e. an e-learning course will not disturb the cognitive process stability and it shall create a particular connection with crucial subjects of the presentation teaching form;
b) specification of the course content along with its suitable modification in accordance with implementation of the presentation teaching form;
c) observing self-study principles with clearly defined targets of all the course and its chapters, the text structure shall be divided into particular units (key words, exercises, check questions, case studies, entries) along with a clear and effective visualization (symbols and graphic marks, etc.;
d) providing with enough information about the course, its methods, learning system, participants evaluation along with information about a working team;
e) testing of students' competency level in terms of e-learning supporting the presentation teaching form. A student shall become information about testing factors of evaluating his /her results in terms of the presentation method - an automatic test.
f) supporting students (direct teaching, printed manuals, discussion groups, evaluating by a teacher, a contact with an educational institution);
g) utilizing the Internet in terms of LMS shall be adapted to demands on the controlled study (e.g. by means of hypertexts, electronic materials in the Internet, having evaluated them in reference to their suitability);
h) supporting the study content distribution due communication between students and teacher based on independent controlled work of the students.
i) At launching an e-learning course it is necessary to inform about following facts:

- a course title (it cannot be the same as a subject title);
- a subject title;
- a field of study which the course is intended for;
- a course author including his/her contact data;

j) particular focusing of the cognitive process with its partial targets because of the limited course content it is recommended that utmost three targets should be connected with a main target);
k) a student shall have an index of basic terms available, list of references, etc.
l) The course should be divided into lessons which are carriers of more information elements with the following functions:
- teaching students;
- to inform about developed competencies for professions;
- to inform about planed time scheduling which informs the students about speed of managing particular problems (quantitative power standard);

m) an information element represents an integral part of the system making possible self-ordering, self-checking and self-valuation;
n) a kind of the information element determines the partial target (it allows to create independent teaching units to apply in multiple chains of events), i.e. the information element content can be used in any other chains of events with another information element (principle of repeated using).
o) A teaching element can be created for information about following items:
- principles of proper approaches to solutions of given problems;
- examples of connecting theory and practice;
- methods of task solutions, i.e. to assist a student to identify a problem for solution, how to reach the target, however the number of targets is limited (recommended limitations for one lessons are at least five and utmost nine targets), demanding particular lessons cannot be reflection of assigned time.

4.1 DIDACTIC PROBLEMS IN THE PROCESS OF COURSE DESIGN

There has occurred new didactic chain of events at e-learning. The occurred relationships shall express certain regularity, individuality and subjectivity. These relationships shall express a strategy of organization and control of activities connected with independent work of students. In terms of that we are aware that success depends mainly on the ability to learn how to learn. There is a question if the educational model is solving the problem of learning how to learn enough. This problem is not observed as the problem of a student only. Our

approach is more comprehensive in the sense that the e-learning course is to be adjusted in such a way that the student shall not stay alone with the problem of learning how to learn. If a teacher does not understand that, it will be probable that the e-learning support will cause overworking.

Problems of learning how to learn fall into the theory field about teaching and learning styles. In the virtual educational environment, i.e. the e-learning course, there is not any mutual confrontation of these attributes of the education system, namely that at presentation study form the cognitive process of students is taking place under direct control of the teacher. The student at the e-learning course is alone without a contact with the teacher. It can be an unsuitable situation for the student. This negative effect is to be eliminated by means of the virtual reality or the interactivity simulating the teacher's assistance. From the above mentioned it is evident that the e-learning course is not only an information source, a set of organization instructions with control options, but also an instruction how to learn. The instruction how to learn can be identified in activities focused on analyzing mistakes in terms of their origin and their following removal (the student has a possibility to correct them). So an approach requires to judge chains of events between pedagogical-psychological effects and didactic-technological features of the virtual teaching. Because of it there is to be focused on activities observing following principles (Beisetzer, 2011):

- digitizing the study materials shall be suitable for demands on independent work of a student with a computer;
- there is necessary to determine strategic ways of effective independent work in a virtual teaching environment in order to emphasize self-control and self-valuation;
- elaborating a system of learning how to learn for the cognitive process by means of revealing key knowledge with options of their confrontation in cases of wrong decisions;
- to create possibilities for students by means of the virtual teaching environment in terms of participating in development of tracking competencies;
- users of the course shall be informed about its functions, targets and factors according to them the level of their competencies shall be evaluated (each of the targets represents an indicator for the particular information element connected with a given chapter of the course).

The indicators for determining above mentioned factors are represented by items below (Beisetzer, 2011):

a) didactic value, i.e. application of didactic aspects (course interactivity, students motivation, didactic methods, relation between required power to the evaluative criteria, effective feedback, etc.);
b) users' adaptability, i.e. managing technical aspects of the e-learning environment (ability to use the integrated teaching environment over the whole range);
c) theoretical study of problems and empirical research.

The last mentioned remark meets the thesis about recognition of the real e-learning course conditions, i.e. the ability to estimate the course in terms of (Beisetzer, 2011):
a) theoretical points of given problems;
b) suitability or unsuitability of solutions in the field of technical education;
c) opinions of students using e-learning (the research shall be performed by means of course graduates).

4.2 DESIGNING E-COURSES AND THEIR EVALUATION

We have already talked about course structures, their particular components and observing rules. Because of it there will be described the process and implementation of teaching processes below. Both of the sides (a student and a teacher) cooperate in courses utilizing communication tools or in courses representing "only" an individual study material. The teacher is always providing the student with the feedback in forms of e.g. comments to his/her work or evaluating activities.

Courses are based on:
- **Constructivism** - students utilizing their existing knowledge and skills and they active create further. If the students are entitled to create the courses, they will come to all phases of learning
- Based on **project teaching** with elements of cooperator, communication and work in groups. It is natural that the teaching has strong individual features and takes individual requirements of teachers in account.
- Principles of mutual learning and its social aspects, i.e. a cooperation among participants also in terms of changing roles (a student as an examiner, a consultant) with impacts on communication which any success can be achieved without.

A successful course must be well prepared and any the best course and well active and initiative teacher cannot be successful if the students are passive and without motivation. It is an art of the teacher to encourage the student.

Evaluation of students is an integral part of the course. It is possible to select more approaches - tests (test problems are described in other copies), testing in LMS systems hat its strong and weak sides, automatic evaluation of activities or elaborating a large database of questions providing both sides with a comfort impossible at traditional written valuations. This statement is not valid entirely in reference to submitting tasks ant their following evaluations. The courses offer also a comfort of preliminary evaluations and a final project which gives a systematic and comprehensive overview of each of students according to us. A counsel of a project in front of others creates a room for group work and the output improvement. The preliminary evaluation also provides a signal mainly in problematic cases and makes for weaker student possible to "catch up" their shortages it there is a sufficient time span. The final evaluation should be a comprehensive view of a student in reference to fulfilled tasks and also to his/her activities, communication, etc.

The feedback is observed a extraordinary effective tool not only for a student, but also for a course author in terms of updating which makes the course better.

4.3 STUDY MATERIALS IN E-LEARNING

In terms of above mentioned it is important to ask a question "How shall look study materials in e-learning like?" What shall be contents of those materials? How to elaborate a new content or a new conception of learning in an electronic form in order to meet all or at least most of attributes of electronic study materials or learning under support by an electronic environment. Let us remember some of the mentioned attributes (Fig.3).

We do not forget conditions for updating contents of the study materials with using hypermedia and hypertexts, better graphical interfaces with options of simulations.

Creating courses for distance education with e-supporting is a system of certain step sequence with observing following (also didactic) rules:

- creating firs-rate learning texts (also supporting crating course manuals);
- specifications and suitable modifications of a course content;

- observing self-study principles with clearly defined targets of all the course and its chapters, the text structure shall be divided into particular units (key words, exercises, check questions, case studies, entries) along with a clear and effective visualization (symbols and graphic marks, etc.;
- providing with enough information about the course, its methods, learning system, participants evaluation along with information about a working team;
- supporting students (direct teaching, printed manuals, discussion groups, evaluating by a teacher, a contact with an educational institution);
- professionalism and enthusiasm of all course authors.

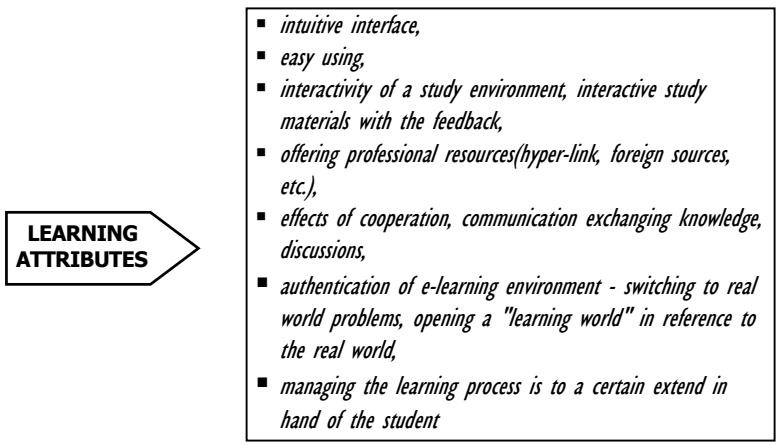

Fig.3 Learning Attributes
Source (Burgerová, Burger, 2009)

E-learning study materials or the whole e-learning course should meet a basic conditions - it should be purposeful for all parties interested. They must be accessible, well designed and helpful for students. Purposefulness for teachers represents ways of reaching targets for student who will appreciate available and supporting services provided by teachers and supporting workers.

4.4 TYPICAL CHARACTERISTICS OF STUDY MATERIALS IN E-LEARNING

The main area at e-learning are study materials, i.e. their features, form and content structure. It is or should be different as it is at traditional education. Their purposes and sense stay the same. There will be good to state basic features of these materials for e-learning, eventually their difference between classical study texts and electronic study materials.

Textbook - There was for long time an opinion of pedagogical experts that a textbook is an important however rare practical and common mean for educational processes and because of that there was not paid a lot of attention to it (I do not mean it in general). Pedagogical discussions were about criteria the textbook should meet. Experts on particular science fields estimated if a certain new textbook is proper and suitable for a certain school grade, but there was nearly not any matter-of-fact evaluation of the textbook. Changes occurred on sixtieth and seventieth years of the last century along with implementation of empirical researches in the field of textbooks in terms of knowledge of cognitive psychology, learning psychology, theory of information, systematical approaches, etc. The point of curriculum documents determines a content of a textbook i.e. integrating into didactic means supporting the education implementation. According to discussed problems, a virtual learning environment with multimedia contents integrates the text with visual and sound elements and it is divided into:

- explanatory part;
- practical part
- exploratory, testing part.

According to these aspects, the electronic environment can be identified with classical study materials, however there is the advantage of interactivity connecting with activities of pupils of elementary levels (but not only there) along with participating all senses and representation of effects, approaching the real world by means of simulations or by the virtual reality.

What features of classical textbooks are the most suitable? There are following:

- tradition availability, exactness;
- functionality even without technical facilities;
- compactness of textbook (even if it can be only seeming one).

There are comparisons in the following table.

Table 3 Comparing a classical textbook with the distance learning text (Shott, 1998)

Textbook	Distance learning text
Formulated targets are mostly helpful for writing textbooks but not for students	Targets specify requirements which should be achieved through the study
The text is uninterrupted until an author has finished explanation of a subject or an idea.	The written texts is divided into short sections according to its level and ability to learn it.
The textbook shall be so elaborated to serve as material to reading, as a manual, however not in such a way to inscript something in it.	There is supposed that students shall utilize provided free spaces within the text for writing their own notes in reference to the text.
There is nearly any help for readers to repeating the learned subject.	Students are led to repeating the learned subject
Questions along with responses (mainly very short ones) are mainly situated in the end of chapters.	The questions requiring immediately answers are composed within the text. A following comment (the feedback) of the author should be so detailed in order the student could find our if his/her conclusions (answers) were right.
There is supposed passive receiving information from the textbook by the reader.	Students are required to participate actively in learning especially by solutions of practical tasks and exercises intended for development of their knowledge and skills.
Textbooks are arranged in such a way to represent author's opinions (conclusions) in reference to the presented subject.	Supporting (study) materials shall be prepared in such a way to be suitable for students' needs.
The students are supposed to be interested in study of the given topic and motivated to it.	Supporting (study) materials try to evoke interests and needs to study the given topic.
Didactic learning	It is learning based on experience possessed or obtained by students.

Essential differences between classical and "e-textbooks" are following:

1) *Definition of targets (targets are often not specified in classical textbooks, in the electronic ones are determined by initial requirements of a course).*
2) *Amounts and structures of texts: The text in textbooks in not intermittent, it ends by explanation of the subject. In the e-textbook the text is divided into smaller sections being intermittent and repeated.*
3) *There is supposed a passive approach for study from classical textbooks, for the e-textbook an active approach is necessary.*

In terms of presenting information there is the following division:

- multimedia textbooks
- textbooks focused on a text.

Their structure is practically the same (Fig.4).

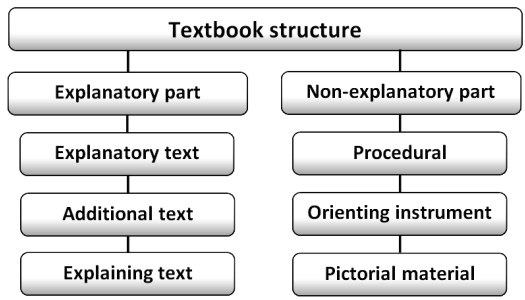

Fig.4 Textbook structure according
(Bednařík, 1981)

Creating and presenting study materials in the electronic form is also connected with regulations and rules. Refers to comparatively often mistakes of some authors in reference to creating electronic study texts. He has given as an example printed texts taken over without any modifications and changes for displaying in the computer screen. Observes as particularly important the transfer of the decision point from pure technical supporting learning to optimizing the reception during learning. There has started the time when there is crucial for learning not what, however how. Tóthová (2004) recommends the following rules for authors of electronic learning means:

a) *inserted learning materials (further "texts") shall be divided as most as possible;*
b) *there is necessary to observe agreed marks (icons);*
c) *there is suitable to situate references (hyper-links) in the text to materials at other points in this text or in other web-servers, references to a key word index;*
d) *the text must be expressed with clear formulations in simple sentences;*
e) *the text should not exceed one page (the text should be scrollable);*
f) *if the text exceeds one page, the next page should follow by click on an agreed mark;*
g) *a length of the comprehensive text should not exceed 3 pages;*
h) *there is suitable to enrich the text by means of pictures and graphics;*
i) *examples and close explanations are an inevitable part of the study material;*
j) *behind the every comprehensive part there should be situated check questions in the self-test form with options to return to the problems which have not been understood enough during the study.*

Tee mentioned rules are based on the fact that the reception of the printed text is implemented in another way as from the computer screen. Kopecký (2006b) states that an electronic distance text is existing on a specific kind of platforms (LMS environment). If such a text is utilized for a controlled self-study, is should encourage the student, convict him/her and make possible an interaction direct with the existing educational content. Nielsen (1995) had come to a conclusion that texts in the screen can be read by the recipient slower as in a paper (according to Nielsen on the average of 25 %). Because of that it is recommended to study electronic text authors not to use long comprehensive texts and instead of that to use shorter and substantial ones. This requirement corresponds with dividing the distance study text into smaller unit which should not be longer than 6-7 sentences. Some authors recommend an optimal length up to 10 sentences. According to Nielsen (1995), each of the sections should express only one comprehensive idea, i.e. analysis of one problem.

If it is not possible to avoid a longer text, this one should not exceed three following pages. In spite of the text shortness, such a text should not be impoverished of its **information compactness**. Nielsen (1995) states further that at the reception of a texts in the electronic form (and in the end in pressed one as well) a recipient scans it first of all in order to create a picture about discussed problems, i.e. there is not reading in details, but so called **informative** one. Because of that Nielsen (1995) proposes that the text should be vertically scrollable in the screen in order to be possible to read.

According to Nielsen (1998) an extraordinary attention should be paid to creating the typography of electronic texts. There are following main rules for creating study materials in the electronic form:

a) optimal letter size 12-14;
b) recommended types of letter Arial, Times New Roman, Helvetia, Geneva, Tahoma, Verdana, etc. (there should not be used more than two types of letters in order not to disturb the total appearance of the text);
c) texts written with capital letters, italics or fat should be limited only to titles or emphasis of key words because that so written texts decelerates its reading;
d) for color of the text background it is suitable to select medium color shades, not only white (too high color contrasts have negative affect to reading texts and can cause a "visual fatigue";
e) warm colors should be selected for letters;
f) is there is a underlined hypertext-link in the text, anything else in the text should not be underlined to eliminate doubts what the hypertext-link is;
g) there should not be any flashing effects in the texts, etc.

The study text represents an important study material in terms of the electronic education. The author's skills should be based on didactic rules but at the same time on principles for creating distance or electronic materials. Magdolenová (2006) states that a distance text should meet didactic attributes, i.e.:

- motivating one,
- understanding one,
- well-arranged one,
- concise one,
- with an easy understandable content,
- structured one.

There is necessary from the student's point of view that the text is suitable divided, consistent, relevant, interesting, understandable, interactive, supporting (Keogh, 1999). There must be stressed the unit's targets stressed, explained non-understandable or unclear elements, defined partly lessons as content and format units. It is important to remember that such a text is intended for the self-study and a main task of virtual learning environments of teaching and multimedia programs is providing with study materials, **which makes possible the easy study for students. If a text consists of long sections following without divisions, it is**

very difficult for students to study in short time periods (Keogh, 1999). If the text is divided into logical sections (units, chapters, sub-chapters, sections, sentences) it makes possible for students to understand problems better. Characteristics of the mentioned items:

a) **Unit** - it is a block of the study texts in terms of one subject being dispensed in parts to students. Targets of the unit are connected with chapters containing a definite and specific target for every chapter.
b) **Chapter** - it is a part of the unit solving mainly one topic and there is a time period determined to its study. Targets of the chapter are connected with chapters containing a definite and specific target for every chapter.
c) **Sub-chapter** - it represents a part of the chapter dealing one aspect of the topic of the given chapter. Dividing the chapter into particular sub-chapters depends on its content and scope.
d) **Section** - it represents a part of the chapter characterized with the content compactness.
e) **Sentence** - it shall be short and clear; it is not admissible to create long and very long texts demanding of understanding.

One of the above mentioned benefits of the computer communication is the feedback which must be correct designed in e-learning. Study materials should contain a lot of questions, problems, tasks, exercises, on-line homework along with a set of sample answers of solutions. Self-testing, preliminary testing and final tests offer an immediately feedback in reference to success or non-success of a student with illustrations of his/her mistakes. According to the mentioned facts we can state that there are different positions of both the student and the teacher (tutor) in reference to e-learning, on-line learning, a virtual learning environment or an electronically supported learning.

The student has to:

- be strong motivated,
- know how to arrange his/her time,
- schedule the study,
- be responsible,
- be able to study himself/herself,
- have positive relationship with ICT or be skilled to control it,
- have a certain grade of the computer literacy,
- have unlimited access to technology (he/she cannot be limited by technical problems),
- keep contacts with the educational participants (panels, discussions, etc.),

- cooperate in mutual projects,
- have suitable study conditions (psychological ones),
- approach to the study regularly (to learn short units),
- apply obtained knowledge in practical examples (combination of the presentation education), etc.

On the other hand is naturally changing also a position of the **teacher** who acts as a tutor - a consultant, an instructor, an advisor and a student's assistant who shall "follow the course of discussions, contribute with his/her professional knowledge and skills, to twist particular lines of conversation and learning elements into a unique purposeful unit and to maintain a friendly social atmosphere in the group" (Rohfeld, Hiemstra, 1995). He/she shall:

- manage and control discussions,
- prepare study materials,
- stimate knowledge,
- provide with the general support and assistance.

According to (Květoň, 2003), a successful tutor should dispose of:

- art of good communication (presented on-line every day during agreed time),
- frankness, enthusiasm, willingness to changes, critical and self-critical thinking,
- practical skills connected with theory,
- utilizing tools for immediately feedbacks especially during discussions or evaluating tests, homework,
- skills and knowledge of creating e-courses,
- function synthesis - pedagogical, social, organizational, control, technical ones.

There are a lot of things (!) which a tutor, a teacher should know, recognize, create. In addition to, activities connected with technologies are dynamic, changing permanently due development. But there is not another way. If we want a purposeful, innovative and effective education, it is a tax on its implementation.

4.5 QUALITY OF EDUCATION IN THE E-LEARNING CONTEXT

The **quality** represents an integrating element in terms of educations including e-learning. It goes for all even also selected aspects of the educational system. It is in force for both pre-elementary and elementary education, however also for development of competencies of graduated persons. The quality can be observed on two levels (Turek, 2009):

- a grade or rate of a goodness, a price, a value;
- something which is typical and makes difference between people and things;
- and/or as OECD-Study, Schools and Quality, 1989):
- a property, characteristic feature of something;
- rate of perfection, relative value of something (a normative term, necessary existing scale because of comparison).

In terms of philosophical understanding according to Hegel (in: Anthology of philosophical works, 1970): *„The quality is an essential determination of objects and effects; it is a complex of features, properties, peculiarities which describes the existing object or effect."*

It shall be said that estimation of quality depends on an estimator.
Quality characters may be:

- **Qualitative ones** - it is not possible to determine their numerical value, but they can be important in terms of satisfying (nice behavior, ability to communicate, etc.), **they are estimated by comparisons**;
- **Quantitative ones** - they are estimated by measurement (e.g. by means of didactic tests).

The term of quality is new at schools. Mainly we meet the effectiveness especially in connection with result evaluation, however the quality is connected with all processes in an educational institution. It is natural that the quality started to be standardized along with its definition. Deming is observed the most important representative of quality management and the founder of TQM (**Total Quality Management**), which is focused on:

- principle of permanent process improvement,
- focusing on the customer,
- nice atmosphere and pleasant environment,
- focusing on innovations, research and education of participants.

It can be seen that there are principles focused on the educational process based on the fact that seeking for quality is a permanent process. It is necessary for a successful introduction of quality to meet following demands:

- to propose **targets** we want to achieve,
- to propose **process how** to achieve them,
- to assign **responsibility** for achieving targets,
- to propose and secure **awards** for achieving targets.

Determining quality for an educational process is not unique. According to standards we can use Barnett's axioms (Roberts, 2001) suitable for evaluating quality of just college-level educations.

- **Epistemiological axiom** - preposition of a "bank" of objective knowledge which should be known and demonstrated by the students. The "bank" of objective knowledge consists of particular subjects in terms of estimated study programs. There is necessary to set factors and standards for evaluation in advance.
- **Problems of autonomy and freedom of the academic community** is based on a prepositions that objective knowledge are distributed in the free and autonomy environment better.
- **Problems of setting objective factors** for evaluation of subjects and programs or for external evaluation.

If we take into account the quality of education itself, it shall be based on quality standards in general. We consider the EFQM model of exceptionality as the most suitable. It is a work of the European Foundation for Quality Management (EFQM) and can be observed as a model of a successful company. At the same time it represents a tool for comparing with an ideal model. Even more suitable for organizations of the public sector and also for educational institutions is the CAF model (2006) based on EFQM principles.

An output of self-evaluation of an organization is a report which shall provide a complete and true picture of the organization. It is divided into nine factors, the first part of which is prepositional and another proof one. Its structure has been modified in such a way that "forces" the estimator to ask particular targeted formulated questions. What is declared in the prepositional part will be proved in the proof part. Particular factors are contained in Fig.5 representing the CAF model (Common Assessment Framework) and EFQM.

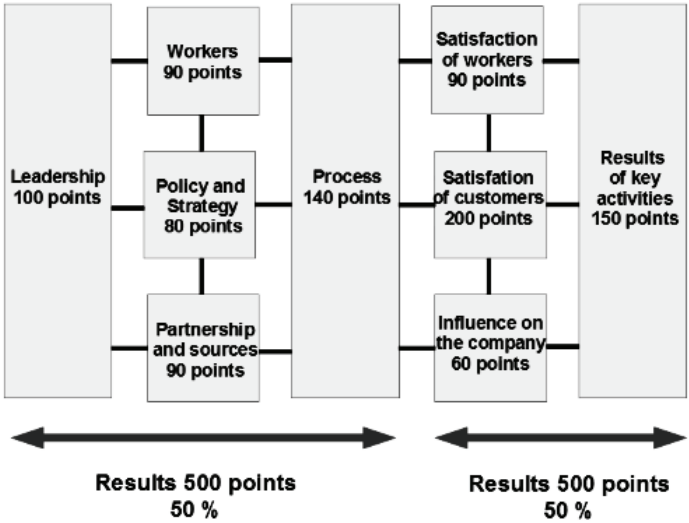

Fig.5 Structure of the CAF and EFQM

Even public institutions (municipal office and universities) have implemented the CAF model. A self-evaluating report represents the result of the CAF process and reflects the mostly supposed facts and the real conditions. Mapping the facts and especially proofs on the whole university level is not easy mainly in terms of impacts on the mentioned proof part. Following factors are analyzed in the self-evaluation process as well:

- processes (preferably education and research at universities);
- innovations and needs to generate suitable conditions for students;
- providing with a first-rate education;
- observing law regulations, existence of a law regulation database;
- rules for the evaluation and the feedback;
- securing and using transparent information systems;
- care of employees and their benefits;
- mapping supporting processes at the university, etc.

The proof part of the self-evaluation report reflects observing and securing the declared things. It shows reserves in reference to a customer/citizen, to students, to employees, to the company and to the "capacity" of the university itself. Thy are determined problematic

areas, which we observe very important in terms of corrective actions which shall be performed in terms of quality.

Nowadays there is impossible that a university or a faculty did not observe the quality area. We are forced by the competitive environment, evaluations of rating agencies, interests of public, public opinions, financing the faculty, etc. It is very pleasant to agree with Liessmann (2009), who impeach rating in PISE and in anywhere, but it is not realistic. We have to be competitive if we want it or not.

It is natural that focusing on enhancing the education quality at educational institutions is an inevitably condition for processes of the college-level study. Strategic documents of universities are focused on qualitative demands and set a framework for processes for enhancing quality. Universities determine e.g. following targets on the field of education and social supports of students:

- focusing on enhancing and evaluating the education quality;
- the educational activity of the university shall be performed in such a way that such a process represents a guarantee of saving the university status;
- crating first-rate conditions for study with stress on innovations;
- mapping needs of the labor market in terms of lifelong learning and in cooperation with the external environment to offer study programs for extending educations.

It is recommended following in fields of evaluating the activities' quality:

- enhancing activities' quality of the university in all areas (educations, research, business activities);
- generating a methodology for evaluating work capacity and quality of university employees in terms of education, science and research.

4.5.1 Quality in terms of Integrating Technologies in Education

Computer supported learning is a common requirement under nowadays trends of education. As mentioned above, the distance education platform in terms of e-learning represents one of the possibilities for enhancing educational processes, individual educational processes, its economy and especially wide access for diverse group of interested persons. In addition to, there are following tasks of e-learning in this sense:

- needs of enhancing quality of the educational process as a main tool for better exercise of graduated in the labor market;
- needs to make the college-level educational system accessible for wide groups of possible students;
- endeavor to introduce and present a sample model of permanent enhancing the college-level education quality.

In order to implement this process it is necessary to have competencies in reference to using the ICT means, to have knowledge about electronic education supports, to know learning alternatives in virtual learning environments. There are following ideal inputs for implementation of e-learning focused on quality parameters:

- software for innovative educational forms and performing measurement by the electronic form;
- professional workers creating contents of subjects;
- professional workers elaborating methodologies;
- professional consultants;
- professional services for adjusting environments and proposing a system of direct quality measurement;
- professional workshops focused on intentions of training.

The implementation of enhancing the e-learning quality is based on performing several interconnected activities:

1) building an infrastructure for introduction of the e-learning support of education as a tool of enhancing college-level education quality and a tool for obtaining data for a system of direct measurement of the college-level education quality;
2) creating pilot educational combined programs;
3) proposal of a direct measurement system for college-level education quality. This system could comprise following evaluation rates:

- Response: **How do students react on learning?** - question-form about the student's satisfaction with the learning content and its form, educational methods, a teacher, support from the teacher, on the part of the study group.
- Learning: **What the student has learned?** - measurement of a knowledge increment by means of electronic tests focused on educational targets at beginning and after finishing learning.

- Behavior: **How the students' behavior has changed?** - Changing of the student's behavior due innovative learning, watching the student's way of work, recording particular steps during fulfilling a given task, a question-form focused on evaluation problems at the given task solution.
- Results: **What was the effect of learning for the organization?** - students' exercise in practice measured by a practical examination form. There is necessary to monitor especially exactness of task elaborating and the time needed for that. Availability, speed of an application, measurement's accuracy and evaluating data, their archiving should be secured by a more comfortable and flexible electronic form.

4) Checking the direct measurement system for college-level education quality.

4.5.2 Quality in terms of E-Learning

Factors being necessary for enhancing quality by means of e-learning:

- **Study materials** - its selection, creation and adaption its content have an important impact on its quality. For creating digital materials it is necessary to have competencies (see other contributions). the Internet offers a lot of resources and inspirations. There is especially important to observe copyrights and to state quotations and resources correctly.
- **Structure/virtual environment** - the virtual environment represents one of the most dynamic and quick changing features of the e-learning education. Because of it a selecting the virtual environment is an important aspect in reference to possibilities of an educational institution.
- **Communication, cooperation and interactivity** - a conception of a virtual university and digital contents support communication, cooperation and interactivity in a new ways.
- **Students' evaluation** - methods of evaluation should support creativity, critical thinking and knowledge in the given field. On one hand, e-learning provides flexibility in time and place of evaluation students, but on the other hand it makes problems in reference to security and examination. Because of that there should be created and examined methods and regulations for securing availability of examination tools, identification and rightness of information.
- **Flexibility and adaptability** - there are following features of the design flexibility and adaptability: Locations (where to study), time (when to study), duration (length of the

study period), pace of the study, language(s) of teaching and contents, method adaptation for handicapped persons, size of a study group, individual and/or group study. Improving the flexibility in one area can deteriorate conditions in another area.

- **Support** (of students and employees) - a support of students and pedagogic workers has to contain more than technical problems. In terms of e-learning education the social support is observed as at least the same important at the technical one. In this sense the supporting teachers should be secured by experts and administrators.
- **Competencies and experience of employees** - competencies and experience of workers with e-learning are key factors of the success.
- **Vision** - it is important for e-learning to built strategies and provide all interested persons with a development vision.
- **Allocation of resources** - at e-learning resources are to be transferred from physical objects (lecture rooms, libraries, offices) to the technical infrastructure, departments of support and development of employees. It is evident that the development of interactive contents and on-line materials requires special demands rewarded by financial means.

Basic elements for functioning e-learning are following:

- technical infrastructure;
- organizational infrastructure;
- value infrastructure (including processes, a certain company culture, etc.).

In cases of **technical infrastructure** there are clearly defined conditions, targets and factors - needs of hardware and software equipment, selection of a suitable LMS product, needs of administration and rights of persons participating in the education on any level.

The last mentioned items belong even into **organizational infrastructure** based on purposeful e-learning organization in terms of competencies, law, administrators and interested students and teachers.

In terms of **value infrastructure** it is understanding needs of e-learning performance along with it connected changes, to respect their positive sides and to eliminate its negative sides as most as possible. Using changes and innovations, to develop an initial strength in order to overcome obsolete things, to obtain new skills, to reorganize time necessary for learning, to introduce a system of rewarding interested workers are also an integral part of the value infrastructure.

We can state according to analyses, observations and experience in reference to the e-learning education implementation that the highest reserves or reasons of lower success consists in the value infrastructure. The technical platform offers possibilities for everyone who want to implement e-learning in the open source environment with minimum financial costs and even very successfully. Even the organizational point of view connected with the e-learning implementation has been well managed. However, it is necessary to said that it depends on organizations ant their managers as initiators of the e-learning implementation. But only when we are talking about the organizational or technical infrastructure. Also we come back to the statement that the value area is the most problematic one. What are arguments for that?

- innovation and updating actual offers of education;
- opening educations for people who cannot attend present study;
- needs of removing obstacles of availability and distribution of study materials;
- utilization of flexibility of e-learning supports;
- using lecturers from other institutions or other countries of the world;
- canceling limitations of room capacities of universities in order to teach mote interested persons;
- increasing operational costs of universities;
- study organization being adapted even for lower number of participants.

Adding positive factors, e.g. following:

- making provision for students' individualities in reference to pace and demanding learning;
- removing barriers for handicapped students;
- lower costs on education and material distribution;
- simple updating documents;
- higher activity rate by means of multimedia elements, simulations, reality, etc.

It is also evident that a driving motor is represented by innovations and modernizing the education by means of ICT. There is evident according to question-form surveys at the Faculty of Education of the University of Prešov that the students prefer e-learning. It is not an obstacle even for students of lower computer literacy (especially distance students of older ages), but on the contrary it is a motivation. How are the biggest obstacles of success? It is absence of mentioned innovations, modernizing, changing routine processes connected with learning to manage the new software environment, to create electronic

materials (often without a technical support). E-learning under our conditions means extra work especially for teachers (tutors). Unfortunately it is work without financial rewards. A motivation can be creating a study material database in full extent providing teaching on a higher level with saving requirements on the education.

In order to be objective, we will state following negative arguments against e-learning:

- dependence on network availability and ICT functionality;
- incompatibility of courses, they cannot be used in diverse systems;
- missing direct contact with a tutor and a study team;
- impossibility of independent study and elaborating very lots information;
- health difficulties connected with using the computer.

"Non-implementation" of the e-learning educational support occurs while both content and practical side of education are unsuitable, some learning components, especially in reference to psycho-motor skills, cannot be mastered by means of e-learning, e.g. rhetoric, handicrafts-man skills, skills in work with instruments or machines, etc.

Educational quality depends evidently on tools used in terms of it. Innovative tools can be suitable for enhancing quality. Summary: Universities shall secure following:

- secondary or higher level of education;
- expertness, skills, knowledge;
- developing ethical principles, moral, ethics, critical thinking;
- equality of chance of education;
- to fulfill tasks in science and research (University Act No. 131/2002 Coll., Science and Technical Act No. 132/2002 Coll.).

We can only agree with Floreková (2002) in reference to the quality attribute definition. The education is to be understood in terms of quality determination as a service provided by an educational institution. Each service is in preference intended for anyone and has its clear target. The educational level - a quality which can be evaluated, there are preferred mostly subjective qualitative evaluation to objective quantifiable one. The university education is not mandatory, because of that can be observed a certain service form. According to Floreková (2002) a "service" shall be prepared, implemented and evaluated progressively in the CPS chain of relations (Customer - Process - Supplier), or IPO (Input - Process - Output). It is necessary to answer many questions, e.g.:

- Who are customers of university education and what are their requirements?

- How is the connectivity, content, form, organization and implementation of processes following satisfaction of customers?
- Who is the supplier of "added value due the educational product", how is its "quality"?
- Are there any required passages among interested components (stakeholders) or an invisible wall?

Is there a support of the educational STTEEP factors (social, economic, technical, technological, environmental, political)?

In terms of above mentioned relations it is natural that universities want to obtain financial resources on the education implementation with supporting innovative forms, but they are also focused on quality of provided educations. There are tools for design and evaluation of the direct quality measurement system and proposals for enhancing university education quality, i.e. the design and verification of environment of the educational quality system along with virtual classrooms and creating methodical and didactic conception for creating e-learning courses. We shall pay attention mainly to the quality along with focusing on the fact why we are changing traditional things, why we make innovations, why we are looking for ways of obtaining the most amount of clients and if our effort will bring any social and financial effects. It can be expected a qualitative shift in terms of provided services due these prepared activities.

The university is not only a place of enumerating factors, however there is a genius loci formulating the communication between a teacher and a student and the communication among all interested persons in general. Symbiosis of ethos (credibility, morality) and pathos (ability to engage, actuation) and logos (explain, prove, rectify) are very welcomed at the teacher and it can act on the student very effective. Let's try as much as possible to create premises of a university and the community in order the possessed privileges belong to them deservedly.

5 LEARNING MANAGEMENT SYSTEMS (LMS)

5.1 DEFINITION OF TERMS LMS AND COURSE

The LMS (Learning Management System) in in general a very comprehensive e-learning platform which, besides tools for the electronic education, contains other functions intended for control of users'activities not only at individual e-learning courses, but in terms of the whole system. These activities contain also such ones, which may not be directly connected with education (e.g. users'check-in the system, monitoring activities of users, creating users' blogs).

Similarly as changing meaning the term of "e-learning" (among main reasons of these changer there belongs the development of information and communication technologies in the educational field or out of it), there is also changing meaning the LMS-term along with increasing the technology possibilities, because it comprises several technologies together, which have developed heavily during recent time. In the LMS case the situation is more complicated, because this term is understood differently in diverse parts of the world. Often it is the LMS term interpreted in literature as a synonym of the VLE (Virtual Learning Environment). It is correct that in cases of advanced e-learning systems which are called LMS nowadays (e.g. Moodle, Blackboard) it is very difficult to determine an accurate boundary between the LMS and the VLE, because most of these tools contain already tools for fully-fledged operation of the VLE, eventually it is possible to integrate a suitable utility in that, namely by means of extending units. Because of that we will use such a definition of the LMS, at which we can observe the LMS and the VLE as synonyms.The advanced LMS contains especially following elements and functions:

Course syllabus:

- Additionally information about a course (prerequisites, contact data of teachers)
- Administration of teaching contents (creating teaching materials direct in the LMS)

Creating tests and interactive exercises:

- Tasks by means of that users will submit their works for evaluation (there are typically submitting files with seminar papers, however the systems provide with wider possibilities - e.g. an user can create his/her task direct in the LMS in an on-line text form).
- The administration of users'roles (e.g. option of assigning rights for teacher's assistants, students and external users).
- Tools for synchronous and asynchronous communication (discussion panels, chat, e-mail messages, video-conferences).

- Possibilities for entering another educational content (e.g. Power Point-presentations).
- Exposure of contents on external learning materials and entering these ones into a course (e.g. entering YouTube-videos direct in a page of the course).
- Tools intended for an on-line cooperation (e.g. WIKI, shared documents, shared blackboards).
- Tools intended for publishing user's contents (users' discussions, portfolios, etc.).
- Tools intended for monitoring the study process for students (e.g. a student can easy check up which learning materials he/she had got up already and what activities of the course fulfilled, eventually on what level.
- Tools intended for monitoring users' behavior (e.g. a teacher can follow what task of a test means problems for most of the students, how much time thy spent at particular activities and materials, etc.).
- Tools intended for conditional displaying parts of courses and control of the study process (e.g. by displaying another content even after mastering foregoing tests, revealing "bonus contents" in a case of fulfilling a voluntary task, etc.).

In the above mentioned text, we mentioned the term "course" several times. That may have a few meanings in e-learning: For the LMS, a course represents a place, which a teacher situates learning materials and activities for the students in. There are in general more courses in the LMS, which are generated by a system administrator or by the user having rights to establishing courses. The administrator or a person, having rights for particular teachers, can modify the content or adjustment of the particular course. Most frequently the course corresponds with one teaching subject, however there are other possibilities (e.g. if there is a subject for several semesters, it is possible to create one course with materials for several semesters). On the contrary there may be suitable sometimes to create two courses for one subject, e.g. one of them for students of the combined study form and another for students of the presentation one.

The students check into the course either themselves (e.g. by means of a password adjusted by a teacher who notices it to them by word of mouth or by e-mail) or they can be checked into the course by the teacher or by a system administrator. At the most of e-learning courses then one or more users act as a teacher and users as students.

5.1.1 TEAM OF IMPLEMENTATION AND USERS' ROLES AT LMS

Preparation and implementation of an e-learning course in the LMS is a very comprehensive activity requiring strong effort of a team of implementation which might be very large in many cases. Similarly as in cases of traditional teaching, there are several basic and whole series of supporting processes at e-learning (e.g. preparation of teaching and diverse administrative processes). These processes are connected with particular functions and activities which can be performed. A successful implementation of an e-learning project requires a lot of skills from members of the team of implementation which in any case cannot be required from one person. Shepherd (2003) has described a model of skills being necessary for securing first-rate e-learning. That model divides the skills into three basic categories:

- pedagogical skills;
- technical skills;
- creative skills.

This model assigns particular roles to three main areas of responsibility and suggests following key functions (the responsibility for implementation of a particular activity can have several experts in each of the areas):

- **E-learning manager:** He/she is responsible for e-learning strategies and control of individual projects.
- **Development worker:** He/she is responsible for designing e-learning programs and creating contents.
- **Tutor:** He/she is responsible for supporting students during their educational process.

Situations in practice look often differently (it is common that one worker performs several functions at the same time). However it is important that there are at least three above mentioned experts in a working team. We are going to introduce key Participants in e-learning in the LMS in the following text:

Author - The main task of an e-learning text author is creating a first-rate educational content which can be distributed to students. The author must be focused on both quality and form of the distance text. The author often plays a role of a tutor as well.

Tutor - Pedagogy literature (e.g. Petty, 2006 or Průcha et. al., 2003) has introduced a lot of meanings of this term. In the LMS the term of "tutor" determines a person surveying

activities of students, rectifying and controlling that. Herewith he/she checks and evaluates knowledge and skills of the students. A tutor is therefore a methodical interpreter of the distance study who communicates with the students and leads the presentation teaching. The tutor cannot be an author of the e-learning course, however in practice the author has often a tutor's role as well. The tutor's activity in the on-line form of the distance education requires not only pedagogical, but also technical skills. In every case he/she should be a communication able manager who can control the students' activities (Nocar, 2004).

There is a rule in force at the distance education performed by means of e-learning that there not any lectures at it (except for blended learning, see Section below). The tutor is not teaching directly, however he/she supports the students by diverse means. However tutors keep working tutorials which are intended for clarification problems arising during the text study, etc. A good tutor is trying not to answer the questions directly, however he/she leads the students to endeavor to answer their questions themselves. I.e. he/she dos not provide them with an immediate solution, however leads them to their own analysis and the following solution (Zlámalová, 2001).

Student - He/she is a participant in a distance study who is able to take full responsibility for his/her education. The distance education supported by e-learning is also called controlled study hours. A student must be willing to study oneself. The student during his/her study is mainly physically separated from the tutor, the communication is performed by means of particular communication tools. There shall be met following conditions for students to be able study in distance forms successfully (Vrba and Všetulová, 2001):

- he/she must be well motivated;
- responsible for his/her study;
- be able to organize his/her time;
- possess computer literacy.

The most strong motivation of the students is their personal self fulfillment. Because of that it is necessary for the study activities to create enough space for individual needs of the students, e.g. education adapted to needs of participants, space for expressing own opinions and exercising their personal experience.

Study Manager - A manager function is very important for the e-learning education implementation. The study manager is a person who controls and coordinates the whole study and is able to perform its final evaluation. He/she should therefore have abilities and skills

necessary for the control of the team of implementation and securing the e-learning course functions. The study manager shall perform following activities (Kopecký, 2006):

- He/she secures input and output analysis of educational needs.
- He/she controls and coordinates activities of particular tutors.
- He/she inspects observance a time framework of the course implementation.
- He/she decides changes of the course curriculum.
- He/she performs the course evaluation.

The manager is securing the logical, functional and especially effective development and implementation of the e-learning education. For that purpose it is necessary a very close cooperation of the manager with the tutors and authors of e-learning courses.

Most Frequent Users' Roles in the LMS

As already shortly mentioned above, there are several users 'roles on the LMS level. Whereas it is in force that one user can have several roles (typically e.g. an inceptor can be registered as a student in some courses and at the same time he/she can have a teacher's role in courses for his/her students). As examples we present some types of roles being standardly used in the LMS Moodle containing a very well elaborated system of users' rights and roles. In addition to that roles predefined in the system are insufficient, a system administrator can determine quite new roles. In the following text we are going to focus on the most common roles only, which a user can meet in this LMS.

Curse Creator - Course creators can establish new courses. It is suitable that this role is possessed by necessary minimum users only.

Teacher - Teachers can create, modify, change and delete learning materials and activities in terms of a course. Furthermore they can grade students and change some course setting including registration of students and assigning some other roles to users registered in the course.

Non-Editing Teacher - Non-editing teachers can learn in courses and grade student, however they cannot activities. It is suitable to assign this role to e.g. teacher's assistant or to a colleague who has access to course materials if you require that course contents cold not be changed (neither by mistake) at the same time.

Student - Students have usually lower rights at the course, however they can also share in the course content if the teacher allows it to them. There is a typical example that the

teacher establishes a discussion panel and the students can contribute in it. It is possible to create more similar activities in the course (e.g. wiki pages, workshops).

Visitor - Visitors have minimum rights. They usually cannot change anything in the course. It is suitable to assign this role e.g. to accredited board members. It is usually used only for access of external teachers and students they cannot require for check up. Because visitors do not check up into the LMS, they cannot pass either tests or submit tasks.

Manager - Managers have free access in courses and can modify their content and adjustment. Usually they do not create any activities in courses and are not registered in them (usually a system administrator assign the manager role, whereas this role is in force for several courses). Leading workers eventually workers performing control activities have this role.

Similar types of above mentioned roles and their titles are used also in other LMS and as a matter of fact this summary corresponds with needs of universities and similar bodies. Some roles can be assigned in general in terms of a system in particular categories or courses. In depends on possibilities of a given LMS and also on adjusting particular bodies used in the LMS by the users' role system.

Most advanced LMS make possible to display a system or a course from point of view of another role. A teacher can e.g. look at the course from roles of a student, a non-editing teacher and a visitor. It is very suitable in a case that the teacher adds a new material or activity into the course and wants to control whether the added content is available for students or how the given activity looks like from the student's point of view. It is also possible to control in such away how tests are displayed for students, whether they are visible or not.

5.2 ADVANTAGES AND DISADVANTAGES OF LMS

E-learning (as every other learning form) does not represent any ideal solution which could be used universally and its use would enhance quality of a teaching process in any cases automatically. However it is truth that advanced LMS had been developed for years and during that time a lot of information and pedagogical experts had contributed to increasing quality of these tools. The nowadays LMS of Moodle or Blackboard types offer besides advanced technological options also tools and functions for enhancing the e-learning quality

(of course under the preposition that authors of the courses use these tools in compliance with didactic rules and saving rules of users' amiability). The e-learning course elaborated according to these rules and using advanced LMS can strongly enhance the learning effectiveness, quality and attractiveness. As already mentioned, LMS ii its actual form represents a comprehensive tool with more benefits than disadvantages, if it is used correctly. In the following text we are going to introduce main advantages and disadvantages connected with using advanced LMS at learning.

5.2.1 BENEFITS

Unlimited Access to Information

Both teachers and students obtained with e-learning the nearly unlimited access to information in terms of time and place. The advanced LMS makes possible to study at any spot. There is not necessary for teachers and students to be situated on the same spot at the same time. However, the access to information is not quite unlimited (one must have necessary technical equipment and access to the Internet for study in e-learning courses), but practically there is an unlimited access. Actual LMS make even possible to access to an educational content not only from a computer connected to the Internet, but also from other devices as a mobile phone or a tablet. If the LMS supports the access fro these mobile devices, it will be displayed a modified version optimized for touch control eventually with a smaller display or resolution compared with them being available for users entering into the system from a desk computer or a notebook.

There is the access to learning materials around-the-clock. Because of that the study can be processed under own pace and it is not limited by school schedules. The students can study according to their own possibilities, time and conditions. Even in this case there are certain limitations - e.g. given tasks must be submitted in a term determined by the teacher.

Information Topicality

Options of immediately up-dating information represent a big benefit. A course can be kept always actual in compliance with the development of a given field. Compared with e.g. offline e-learning forms there is not necessary to immediately redistributed updated learning materials because the e-learning course has been stored in a central server and students have access to the updated content at any time. In cases of updating the educational content

is not necessary to immediately distributed new versions of learning materials and that is why updating does not represent increasing costs (under the condition that the time, which the author spent on its updating is not added into the costs). The advanced LMS contains advanced tool intended for creating contents so that the author can create the content directly in the system. Of course it is possible to prepare some materials (e.g. learning animations) in special tools and then to upload the result in the LMS. In a lot of cases it is enough to use tools of the system itself to create a first-rate e-learning course.

Better Memorizing Information

E-learning courses are designed in most of cases in such a way that they activate more senses of a student. This activation supports the more effective saving information into the memory because people perceive information by more senses at the same time. Researches focused on the sense perception (Melezinek, 1994) have proved that the most used sense for the perception is the sight. However during traditional learning in the school environment is conveyed most of information by the sound. I.e. hearing is connected with the perception at most.

Multimedia elements try to remove that shortfall - they affect mostly the human sight, however they connect hearing in the perception as well. The balanced perception with the sight majority is very important for memorizing the curriculum. Information in the e-learning courses are supplied in the interactive form and in small batches which makes quicker learning possible.

Interactivity

The interactivity represents an important feature of multimedia learning materials. An interactive learning material performs communication with a user in a some way. Its important feature consists in the fact that the mentioned communication is processed bi-directional - a user's action will evoke a response of the multimedia content and vice versa. A simulation represents a typical example of a multimedia element. At simulations the user can try on a real situation and suggest a certain kind of solution. The user will get results in a form of simulations of effects of his/her decisions (Vrba, Všetulová, 2003).

The most used interactive elements at the e-learning courses are diverse control tests providing the user with a feedback and intended for continuously evaluations of his/her knowledge (see below).

Advanced Possibilities of Verifications

E-learning courses should provide with verifying obtained knowledge on particular levels. There are diverse kinds of tests and open tasks intended for that purpose. Tests are usually evaluated by means of scores and success percentage. In many LMS we cam meet special kinds of tests being often called "auto-tests". Results of the auto-tests are left out the total evaluation. The user can usually start them unlimitedly (however if the course author wants to, he/she can set a limited start number along with other limitations of these tests). During tests or after their finishing there are displayed various feedbacks for the user (e.g. correct answers, comments to the answers and total response in reference to the course success).

Open tasks, e.g. seminar papers, are usually evaluated in words or by means of scores. The word way of evaluations is usually very effective at the distance education and enhances motivation of students, however it is connected with higher demands on teachers. A very good compromise between evaluations in words and by scores represents using so called categories. The teacher can determine various categories and a maximum score which can be reached at particular categories. Scores are then assigned in the particular categories. E.g. for a seminar paper the teacher can define following categories and a score range:

- Style (0-20 points)
- Grammar (0-20 points)
- Quality of inserted illustrations (0-30 points)
- Quotation of professional references (0-30 points)

The teachers assign evaluation points in particular categories, so that the student obtains much more better imagination about the total evaluation composition and the teacher can perform the evaluation rather quickly.

Communication and Cooperation

There are tools intended for facilitating communication available for students in order not to be separated from teachers and other fellow-students. The communication is performed by means of synchronous and asynchronous tools. Currently there are more used asynchronous tools whereas communication is performed by means of messages, e-mails and discussions in panels. Tools for synchronous communication start to be used progressively. Thy can be represented by chats, video-conferences and other tools intended for on-line cooperation in the real time (e.g. the shared white board). Tools for synchronous communication can serve

to mutual communication of students (e.g. at cooperation in projects) or to communication of students with teachers who can provide consultations by means of chats or video-conferences.

5.2.2 DISADVANTAGES AND LIMITATIONS POSSIBLE

Demanding Creating Courses and Big Initial Time Investments

Creating an e-learning course content is a very demanding activity in terms of financial, time and methodical sides. Authors must be well trained to create a first-quality distance text. It is not in force in any case that the distance text intended for the e-learning course is only a transformed text from a printed form.

An independent chapter is represented by creating tests and fulfillment of a task bank which can be supposed very demanding and less intuitive by authors mainly at the beginning. Having overcome this barrier, the benefits are prevailing and the invested both time and effort will return very quickly.

In general it is in force for LMS that creating first-rate multimedia teaching materials represents a task for a team of experts. A problem consists in the fact that under limited conditions of our educational system the teacher have to do most of work himself/herself, in addition to that he/she does not have necessary technical equipment available. However even in such the case a first-rate e-learning course may be created, which can be improved progressively by its author and which will save his/her work and time in the end.

Dependence on Technical Provision

For complete utilizing the e-learning courses possibilities by students, it must be secured access to a computer (eventually to a tablet or a mobile phone) with particular hardware and software equipment and a connection to the Internet. Dependence on the Internet connection has been removed by means of of data synchronization in some systems. The student has study texts and study environment without network supports in his/her computer. Only tasks and discussion contributions are sent in the network application. The Internet connection technologies are improved and available for most number of users, so that we suppose complete eliminating this disadvantage during some time.

Insufficient Standardization

Another disadvantage of current LMS consists in insufficient standardization of the e-learning systems and their educational contents. The standardization of the e-learning systems plays the important role in transfer of educational contents between particular LMS eventually their different versions. It is not always in force that in a case of changeover to a newest version of LMS the e-learning courses and other data can be transferred without problems. Sometimes the course utility can be partly limited and even data get lost. The situation is mostly even worse in a case of a migration of courses among diverse LMS. Because of that there are various services of companies which are focused on data transfers among particular LMS.

Recently the SCORM (SharableContentObject Reference Model) starts to push itself which represents a recommended model for sharing educational contents. In spite of the fact that supporting the SCORM standard represents one of key features at selecting a suitable e-learning system, its support is very bad in some systems. Some systems do not support it at all, eventually only by a limited set of this format's features. The SCORM standard has several versions and in addition to it is always developing, so that even if some LMS declares its full support, it is necessary to focus on the particular version.

The standardization of educational contents plays an important role as well. There are a lot of rules and regulations for their creation. These rules are connected with the structure of distance texts, requirements on their contents, etc. It is necessary to take into account what target group is the text intended for. A lot of resources deal with rules for creating distance texts, e.g. Nocar (2004).

Unsuitability for Certain Kinds of Students

In spite of the fact that among the e-learning benefits belong also possibility of its adaptation to students' needs, sometimes there are high demand on e-learning users and it is evident that the e-learning is not suitable for everyone. A mostly declared e-learning benefit is its easy availability for handicapped persons. It is a truth though e.g. in cases of movement disable persons, however on the other hand the e-learning is not very suitable e.g. for visually impaired ones. We can state that recently there are offered LMS technologies and tools facilitating work with the system for visually impaired students, but it is so far not any ideal solutions.

Some students reject these new technologies because it is very difficult to learn how to operate them. Someone needs the paper form of a text available because he/she can study by means of it better and write necessary comments in the text down.

The e-learning is in many cases useful and effective, however not always suitable for an existing kind of teaching. Some knowledge and skills cannot be given the students by means of e-learning. There are e.g. communication and verbalization skills. Even such obstacles can be quite or completely removed in some cases (e.g. by means of video-conferences), however course creators and its students do not often have the necessary technologies and equipment. Another indispensable obstacle can consist in very demanding preparation of such a course in terms of finances, time and human resources. There is more suitable in such cases to use blended learning representing a combination of e-learning and the traditional teaching form.

5.3 TECHNOLOGY AFFECTING MODERN LMS

In order to be able to understand development tendencies affecting the form and functions of the advanced LMS, we will have to introduce shortly the technologies having affected the Internet development recently and which are even penetrating into the LMS area.

Web 2.0

The Internet provides us with a lot of services of which the most popular is called WWW (World Wide Web) or shortly „web“. Since its beginning this service has been intended for displaying (or listening to) information by the Internet users being situated or published here by other users, companies or bodies by means of so called "sites" (in other words also "web sites"). The important benefit of the information in the sites consists in the around-the-clock access to them. The environment with such available information started progressively to be called as "web“ and its software intended for access to the web is called as "web browser“.

Till recently the web worked in such a way that contents were situated in the web by a site administrator (often also called as "webmaster“) and other users could display the site content by means of a web browser. There were often static texts along with pictures or simple animations. As soon as the web content started to extend, it occurred a need to sort and look for information situated in particular sites. Because of those conditions users

started to enter into the process actively in order to create diverse sign-posts and catalogs here. These users however could administer only their own sites where they played a webmaster's role. Therefore it was not possible for the users to change the site content which they did not have the webmaster's role in. This time period characterized by receiving the web content by means of a web browser is called as Web 1.0.

Afterwards technologies occurred, which makes possible to dynamical changing of the web site content. The users had obtained possibilities to affect the content by displaying sites which became interactive in general. There were created the Internet browsers, time schedules, electronic shops, discussion servers etc. However it was not enough for the users to communicate interactively with the sites. They wanted to affect their content directly and to create new sites. The main requirement was that creating new pages and editing contents of existing sites would not be connected with technical obstacles and advanced technical knowledge of the users. It was already possible because of the technical development. The users have received possibilities to create the web contents in such a way that published information is available in the web immediately after saving. This change is called as "Web 2.0" and its typical example is e.g. the Wikipedia server or similar systems for blogs. The conception called as "Web 2.0" have obtained its popularity and there has started both simple and very advanced on-line applications. These on-line applications are also called as SaS (Software as Service) and among their typical representative belong e.g. the free available web e-mail services of Gmail, Hotmail etc. In the educational field we can identify just the LMS, whereas the advanced LMS contain tools typical for Web 2.0 using the particular technologies.

HTML5 and CSS3

The HTML (HyperText Markup Language) term means a language intended for creating web sites in the World Wide Web system. It is the language able to interpret the web browsers. We would not deal with technical details for our needs. It is enough for us to know that the HTML represents a basic building element of web pages being connected with the web and reflecting its development from very beginning. Because of it there are several HTML versions and their support is diverse in many browsers.

The CSS (Cascading Style Sheets) represents a language describing how should be displayed a site written in the HTML. It means in practice that a content and structure of an Internet site is saved in the HTML and by means of the CSS it is defined how its structure and

contend should be displayed. Without details we could demonstrate the HTML and CSS importance in following simple example:

There could be a following code in the CSS language in the Internet site or in a independent file connected with this side:

```
...
p {color: red}
...
```

The above mentioned code CSS means that the section text shall be displayed in red by the Internet browser. The <p> symbol marks just a section in the HTML language.

The Internet side then contains e.g. a following code in the HTML:

```
...
<p>Text of the Section</p>
...
```

The browser should normally display the section text in a standard way, however if it firstly reads a rule defined in the CSS, the section text will be displayed in red.

There are several versions in the CSS case accordingly as at the HTML. The last ones are the HTML5 and the CSS3. These versions have not been approved as standards yet (it is supposed to happen in 2014), however every current browsers support them in the important rate. A description of their features would require a separate book. Because of that we are going to focus on the features being important for functions and appearances of advanced LMS:

- **The drag and drop support:** Because of that it is e.g. possible for an e-learning course author to upload files into the course only by drag&drop to the browser window. He/she can also move various objects in the course and change simply appearance and structure of the course (e.g. transferring materials from one topic to another).
- **Animation:** Whereas there was not possible to create animations without support of other technologies in the older CSS versions, the CSS3 supports the animations directly. It can facilitate creating animations and their integrating in the LMS. Another benefit is that there is not any plug-in necessary for displaying these animations which without limitation facilitates displaying in mobile devices.
- **The support of direct entering videos and sounds:** There is possible to enter videos and audios direct in a site in the HTML5 case. Such inserted elements can be replayed by a web browser without a plug-in (typical a flash memory) It means in practice that an

inserted audio and video can be replayed in a lot of devices including mobile ones. Because of that the LMS usage in tablets and mobile phones can be extended.

- **The support of various styles for particular devices:** It can be supposed that a content shall be displayed differently in a desk computer, in a mobile phone and e.g. in a tablet. In addition to we can define displaying for printing, a voice synthesizer or a braille tactile feedback device
- **Support for off-line work:** Because of that it is e.g. possible partly functioning an on-line application if a user does not have the Internet connection available. In the LMS case is then possible that a student well have an access to an educational content even in the situation that he has an access from his/her mobile phone and does not have the Internet connection available.
- **Geologic location methods:** Simply saying, an Internet site can find out in what geological area an user looking at the site is. We can observe this practical application in the LMS today already. There is e.g. a plug-in unit for the LMS Moodle by means of which the course author can enter a task for various geographic areas. Such a way there can be displayed a different task for users from one country than for those from another country.

In addition to the above mentioned, the HTML5 and CSS3 allow to create web applications which resembles the classical applications in terms of their appearance and control. These new applications can be controlled easy and in some cases can even work without the Internet connection. There is a good advantage consisting in that there is a web browser enough supporting these technologies. If these technologies are used in the LMS, the e-learning course author can create his/her course in a computer or a tablet connected to the Internet.

5.4 TRENDS IN LMS

5.4.1 M-LEARNING, MULTI-SCREENING AND THEIR IMPACTS ON THE RESPONSIBLE LMS DESIGN

The HTML5 and CSS3 technologies are very well supported by most of the advanced mobile browsers. As an example can serve the Safari browser, which is used in devices with the iOS Operating System (iPhone and iPad). In the same way a standard browser in the Android system supports both the technologies. There are also browsers with the necessary support for other platforms. Some elements of these technologies have been designed just for mobile

devices since the very beginning. There is permanent increasing of user number with access to web sites and also to web applications from the mobile phones and tablets.

There is evident from the above mentioned that the advanced LMS cannot be operated without the HTML5 and CSS3 nowadays, whereas meaning these technologies for advanced learning may increase effectively in the short future. Because of that the e-learning course authors will obtain an easy operable and attractive environment which students can be able to come from more diverse devices to and because of it also more often.

We can state that the mobile information and communication technologies play an integral role in the educational area nowadays. They offer new tools for understanding study materials, the contribute to the pupils' ability to solve problems connected with common life, they reinforce their thinking and abilities to recognize the surrounding world, they support the ability of cooperation in a team and an ability to argue at project learning under using the ICT even in terms of on-line communication.

There is permanent increasing users' number coming to the Internet content not only from standard devices as notebooks, PCs, etc. in terms of an educational process, but they also utilize a diverse kinds of mobile equipment.

„…The mobile phone is not only in the Czech Republic the most used information and communication technology among individuals nowadays. In the second quarter 2011 the mobile phone was used by 94 % individuals above 16 years… (ČSÚ, 2011)" and numbers of these users are increasing permanently. There are especially so called smart phones, tablets (e.g. iPad), devices of the tabled PC type and readers of electronic books. This increasing tendency can be observed also among students who, in addition to, often utilize the Internet wireless connection by means of the Eduroam project supported by the CESNET z.s.p.o. association in terms of participated bodies. This connection is free for students in bodies participating in this project. It can be supposed that utilizing the above mentioned equipment intended for access to the Internet applications will obtain much more popularity at students ob both presentation and combined study forms in the future. (Matura, 2012)

The e-learning materials and other Internet resources are unfortunately not prepared for browsing by means of mobile devices in many cases. Because of that it is necessary to find a way of adapting e-learning materials and the LMS in such a way that thy will be usable even if an user comes to them by means these devices.

Educational processes by means of mobile equipment are in general called as "m-learning" (Lorenz, 2011). As already mentioned above, there are many various devices belonging to the mobile equipment category which can differ in reference to their parameters and presentations of diverse kinds of multimedia contents. A practical example of a m-learning can be demonstrated on the LMS Moodle which allows to adjust diverse kinds of appearances for diverse mobile devices. In addition to, the version for mobile devices has been designed in such a way that allows the automatic detection of devices and displaying and hiding particular elements of the application and adapts the display resolution.

Thanks to this utility there have been secured legibility and arrangement of the educational content even in devices with the very low resolution, as it is e.g. at mobile phones. As an example we would like to introduce displaying e-learning course in various kinds of devices (iPad 3, iPhone 4S).

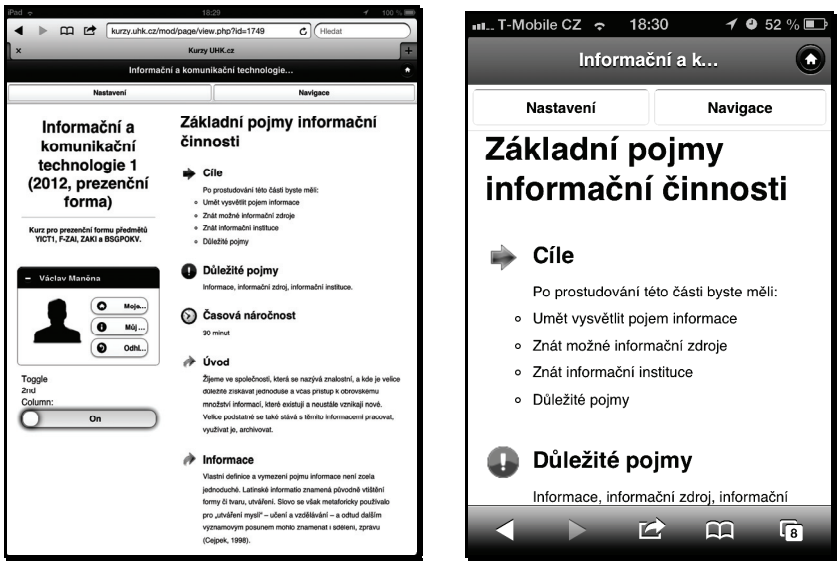

Fig.6 Displaying a learning text in mobile devices of iPad 3 (left) and iPhone 4S (right)
Displaying the side strip with a title and references intended for navigations in the course can be disabled by a user.

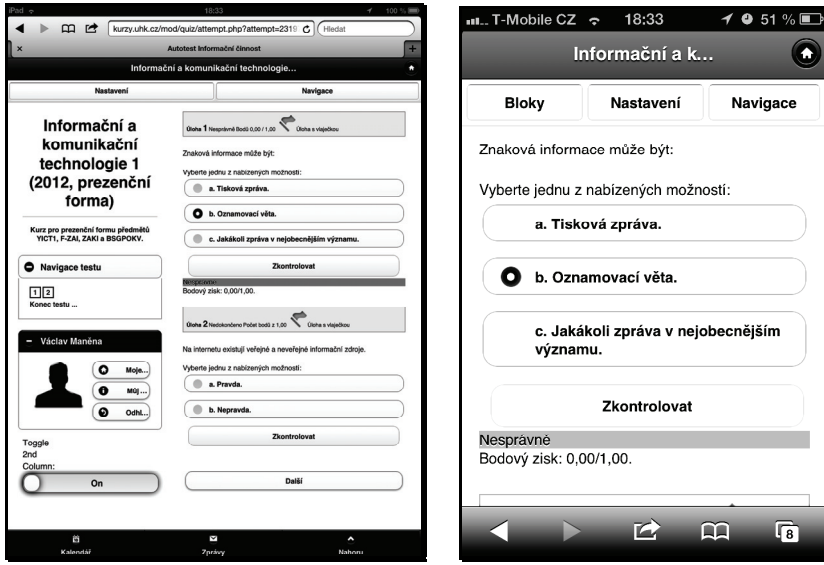

Fig.7 Displaying a test in mobile devices of iPad 3 (left) and iPhone 4S (right)
Displaying the side strip with a title and references intended for navigations in the course can be disabled by an user.

In 2012 the Google Company published study „The New Multi-screen World: Understanding Cross-platform Consumer Behavior" (Google, 2012). There were 1 611 respondents participating in the study and the Google Company had explored what way they behaved in the Internet and what devices they used for the access to the Internet In this respect there had occurred a term of multi-screening describing the typical behavior of current Internet users with the access to the Internet content from several various devices at the same time. There are two basic kinds of multi-screening: sequentional and simultaneous.

The sequential usage means that a user is switching among diverse devices during fulfillment of his/her task. A typical example from current life: We are looking at diverse ware in mobile equipment or we are looking for information about a culture event. We will perform purchasing the ware by means of our computer later

The simultaneous usage means that we use several devices for related or unrelated activities at the same time (see Fig.8).

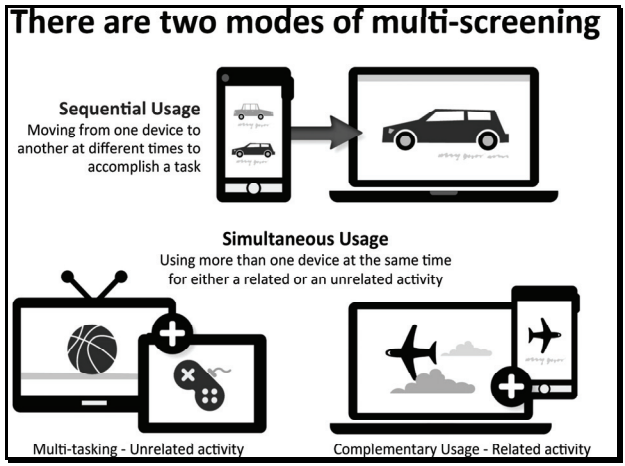

Fig.8 Presentations of multi-screening modes (Google, 2012)

The multi-screening represents a very strong tendency which both simple web sites and advanced web applications are adapted to. One of the responses to this tendency represents using the so called responsible design in web sites and applications. If a site utilizes the responsible design, its content and appearance shall be adapted to the given equipment and the web browser's window size. Because of that it is e.g. possible that in a case of page displaying in a small display of a mobile phone the elements on the site shall be automatically arranged below each other and instead of navigation references there will be displayed a pop-up menu which is more suitable for touch control.

Before starting the responsible design there was an option to display an optimized version of sites in tablets and mobile phones. In principle it is that a web site or application can find out from what equipment and with what browser the user is coming to. According to that a server will provide a special version of the site being suitable for an existing kind of the device and the browser. This principle has been presented in the foregoing text by means of displaying the LMS Moodle in the tablet and in the mobile phone (see Fig. X). This principle has been substituted progressively by the responsible design. Principles of operating the responsible design can be demonstrated in the following example of the LMS Moodle utilizing a special responsible topic.

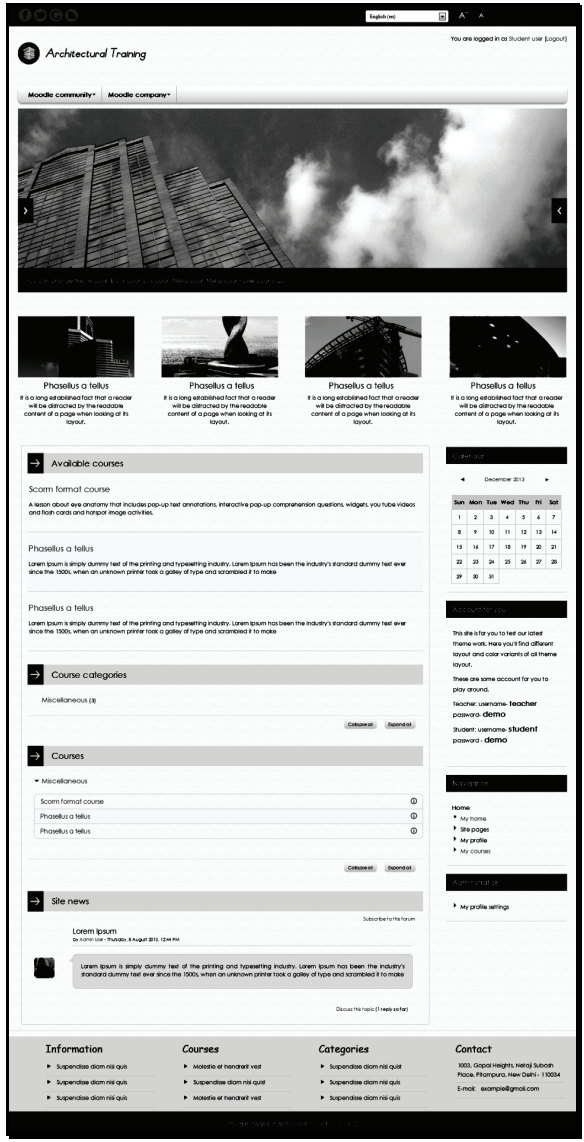

Fig.9 The LMS Moodle with a responsible topic displayed in a common computer (Moodle Themes, 2013)

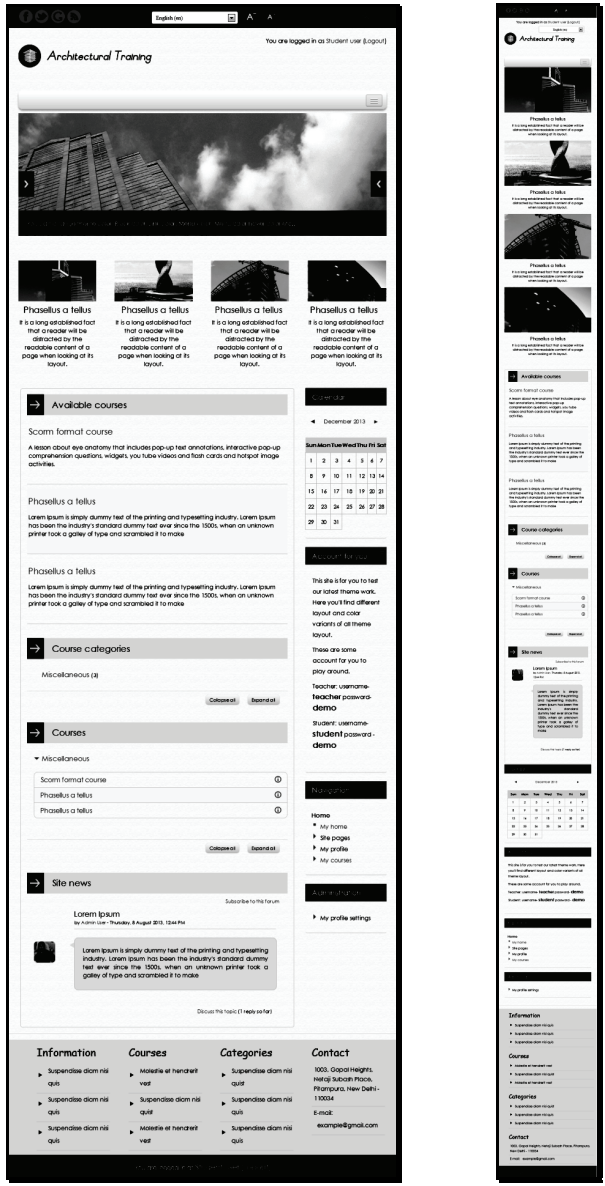

Fig.10 If the same topic is displayed in a narrower screen of the tablet (the left side) Some elements shall become narrower and a pop-up menu shall be displayed at the same time. The first sites shall be arranged below each other in the mobile phone (Moodle Themes, 2013).

5.4.2 WEBINARS

Webinars (also called web conferencing and online workshops) refers to a service that allows conferencing events to be shared with remote locations. In general, the service is made possible by Internet technologies and allows real-time point-to-point communications as well as multicast communications from one sender to many receivers. It offers data streams of text-based messages, voice and video chat to be shared simultaneously, across different locations. Applications for web conferencing include meetings, training events, lectures, shared whiteboard or short presentations from any computer. The word "Webinar" is a combination of the words "Web" and "Seminar". Webinars indicate the type of education that takes place over the web, ie, in terms of online seminar (Eduonline, 2013).

Main advantages of webinars

- Take place online, therefore students can study from distant places, they do not have to be in school.
- Webinars can be recorded and students can later see the record.
- Webinar can be a cheap alternative to present teaching.
- The participants can cooperate in real-time (shared whiteboard…)

Main disadvantages

- Webinars take place without direct contact with the teacher or other participants.
- Can not be used on subjects where teacher or students physically have something to show or practice.
- Participants need at least common user PC knowledge.
- Participants need some exta equipment (web camera, microphone).

Webinars can be realised with some standalone technology like Skype or web conferencing software. These technologies can be also integrated into modern LMS. As an example we can use the BigBlueButton software, which can be easily integrated into LMS Moodle (see Fig.11).

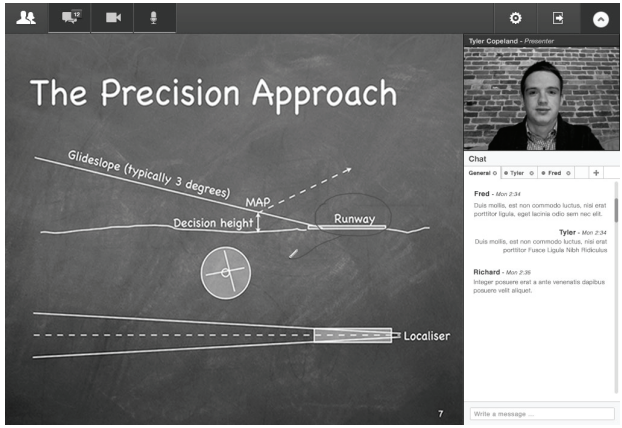

Fig.11 Exaple of BigBlueButton software (BigBlueButton, 2013)

5.4.3 GAMIFICATION

Gamification generally means transferring game elements into another environment. Basic gamification strategy is to achieve rewards for "players" (students or course participants) who accomplish desired tasks. Applying the principles of gamification into e-learning course can significantly improve the course attractivity and motivation of students. In case of LMS, gamification usually consists of the following tools and principles, that can be applied in e-learning course:

- Skill levels
- Score (students achieve points for completing tasks)
- Top scores or "Hall of fame"
- Virtual rewards

5.4.4 MASSIVE OPEN ONLINE COURSES

Massive Open Online Courses (MOOC) are online e-learning courses designed for unlimited number of participants. These courses are available on the web for all interested members of the public. The term MOOC established in 2008 Dave Cormier in connection with the course Connectivism and Connective Knowledge. This course consisted of 25 tuition-paying students in Extended Education at the University of Manitoba, as well as over 2.200 online

students from the general public who paid nothing (Parr, 2013). Later, other universities began to publish more courses that can be described as MOOC. One of the most famous examples of successful MOOC was the course artificial intelligence, organized by Stanford University. In this course studied over 160.000 participants. The popularity grew the most between 2012 and 2013. Currently, not only universities offer MOOC other educational institutions, but also commercial educational portals. One of the most famous is the portal UDACITY (https://www.udacity.com/). In the summer of 2013, the community around LMS Moodle created and published first MOOC, which was focused on teaching with LMS Moodle. Later in 2013, Ministers of Education of Member States of the European Union discussed the on the phenomenon MOOC. From the results of negotiations is clear that many member countries put significant weight on MOOC and support it not only in higher education, but considering the forms of its use for the work especially with talented pupils at the level of secondary education (Fryč, 2013).

6 COMPARATIVE ANALYSIS OF THE LMS SELECTED SYSTEMS

The e-learning represents one of options foe effective using information and communication technologies in fields of education elements of the e-learning started to be used at all universities with a target consisting in enhancing the education process quality. The information and communication technologies are used for supporting both cognitive processes and psychological education aspects. A pedagogue represents an irreplaceable factor in the education however his/her role has been changed. At the same time, a form of study materials has been changed. But the technology suitability cannot be judged separately in reference to the basic strategy of approach to its utilization during an education process. The e-learning technology can be used as a component of the education process itself, as an administration tool and also as a development tool intended for creating multimedia study materials. There are a lot of software tools in the market on diverse price levels to secure each of the mentioned functions. Many universities are developing some tools itself (Mikulecká, 2005).

It has been selected three of LMS-systems for the comparative analysis according to their accessibility (there are only two of the systems used at the University of Hradec Králové and one of them at the University of Presov). The other selection criterion is represented by the license type. We wanted to judge at least one available system. Because of the above mentioned reasons, there have been selected systems of Moodle, Blackboard and EnterpriseKnowledgePlatformTM for the particular comparative analysis.

6.1 MOODLE

The Moodle is a system intended for supporting education and its title originally represented an acronym of ModularObject-OrientedDynamicLearningEnviroment. The author of the first software was Martin Dougiamas and its first version was published in 2002. The Moodle has been developed as a tool supporting the social and constructive approach to the education.

The Moodle can be used for supporting in full-time, combined and distant form of study. It is provided free of charge as a free and open software under the GNU General Public License. A common computer, a tablet or a "smart" phone with a web viewer connected to the Internet are enough for working this software.

Basic characteristics of the Moodle are following ones:

Configuration and Organization - The Moodle is based on a template principle, which in a content is to be added. There is a very intuitive interface making an easy navigation possible. The whole page is presented in the „flat view“ format. It is configured in small units and organized around themes or in a weekly schedule (Fig.12). All blocks in the page can be configured individually and the particular elements can be moved or hidden easily.

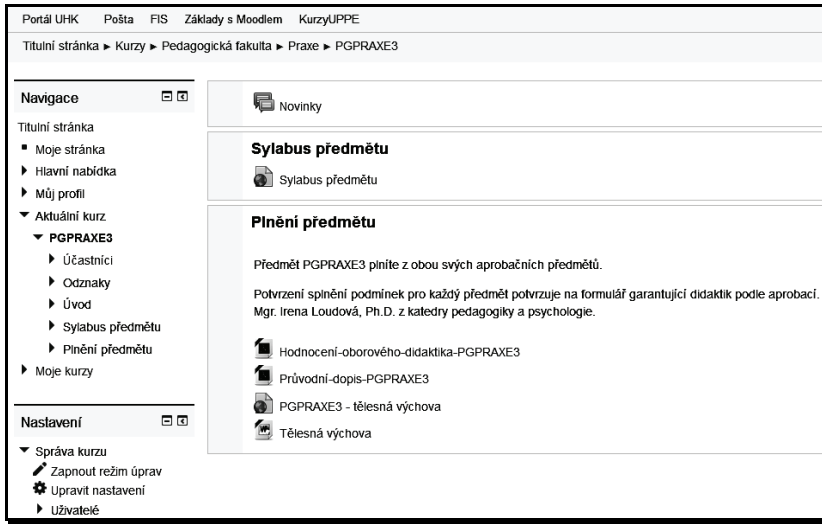

Fig.12 Start page of the course
(Faculty of Education, University of Hradec Králové, Czech Republic)

Course administration - The course administrator in the Moodle environment is easy. The access to all tasks of the lesson can be time-limited eventually protected by a password (i.e. the access is possible only with a particular password). There are movements of each student clearly registered in the system. A teacher can find out what time students spent in the course and what activities they performed indeed. Students can follow their educational results, the teacher can download results of students e.g. in the xls. format. The students can look at their tasks in a calendar and to write up all results for a particular day by the pointer's movement to this day. The calendar (Fig.13) is selectable and can be displayed in the front page.

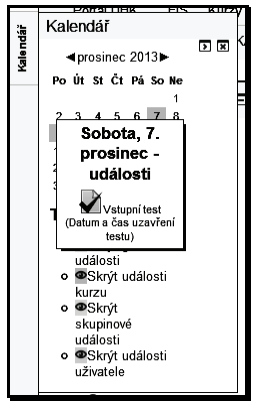

Fig.13 Calendar
(Faculty of Education, University of Hradec Králové, Czech Republic)

Contents an sources - The Moodle makes integration of whole resource series possible. There are any kind of text including html formats, graphics formats, video and audio (e.g. MP3 formats) among them. A Moodle's advantage is represented by contents creation thanks to the integrated HTML editor. The professional knowledge degree during text creation is the same as for work with any text editor (Fig.14).

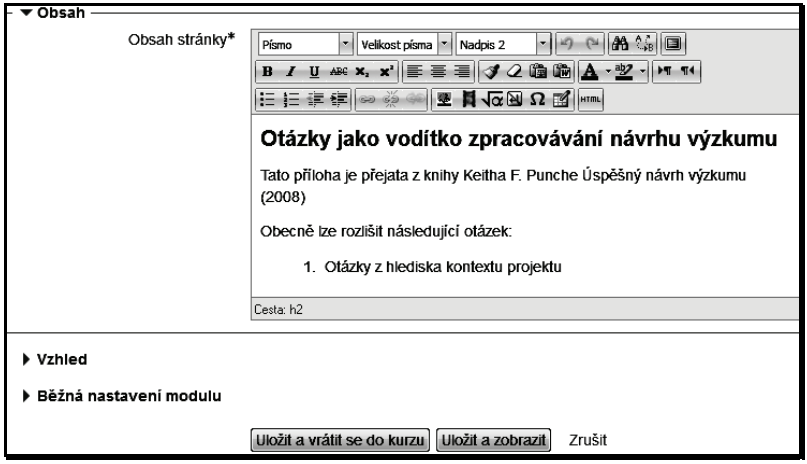

Fig.14 Example of contents creation
(Faculty of Education, University of Hradec Králové, Czech Republic)

Evaluation and testing procedure - There can be used diverse kinds of questions for the evaluation, e.g. fill-ins, multiple-choice, multi-choice (more than one answer can be selected), true-false, matching, short-answer (exact matching). All explicit questions ate provided with an automatic evaluation which can be adjusted by the teacher. Open questions are provided with boxes for comments and for the feedback. There are an interesting units or a tool of workshop (Fig.15) intended for mutual evaluation among students. All kinds of the evaluation can be time-limited and eventually protected by means of a password.

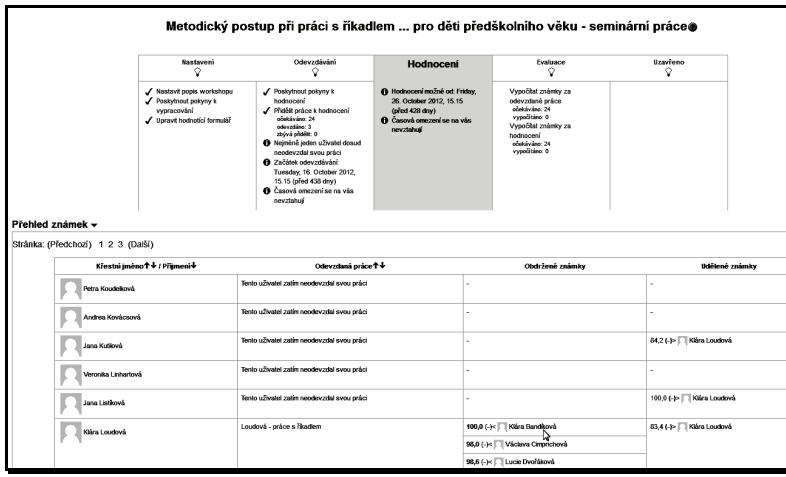

Fig.15 Example of the Workshop tool
(Faculty of Education, University of Hradec Králové, Czech Republic)

Cooperative learning - The system philosophy has been based on a social - constructive learning theory. Study tasks, activities or projects can be designed in such a way that they make cooperation between the teacher and students or between the students themselves possible. The students can be divided into groups, to communicate with each other synchronous by means of a chat or asynchronous in a discussion panel. The Wiki tool (unit) allows students to create a text together (Fig.16). The discussion panels can be adjusted in such a way that only the teacher or one of the students can start a new discussion topic (filament) (Fig.17).

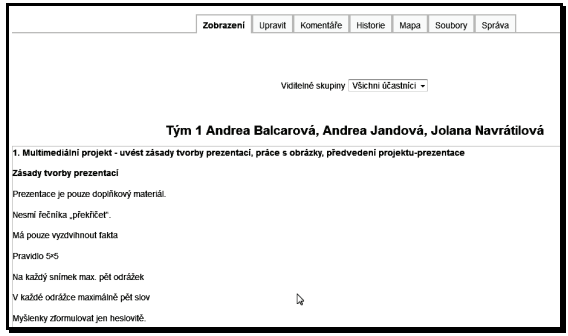

Fig.16 Example of the Wiki tool
(Faculty of Education, University of Hradec Králové, Czech Republic)

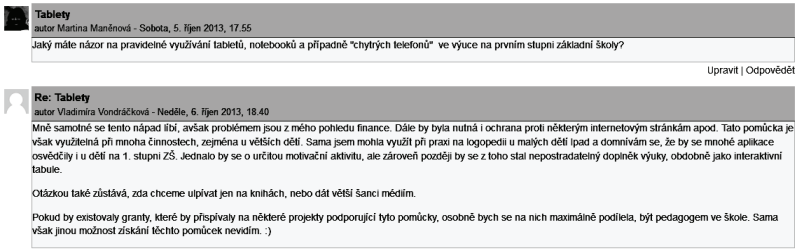

Fig.17 Example of a discussion panel
(Faculty of Education, University of Hradec Králové, Czech Republic)

6.2 BLACKBOARD

The Blackboard LLC Company was established in 1997 by Matthew Pittinsky and Michael Chasen (education advisors). The target of this company is providing consultation services and technical standards for on-line education. Its vision includes an user-friendly environment for concentration of study materials, references, syllabuses, etc. IN 1998 the Blackboard Company was connected with the CourseInfo LLC Company and the first software product for on-line education-learning control was issued. In 2004 the Blackboard Inc. Company merged with the competitive WebCT Company together and nowadays the Blackboard is used for on-line education by over 12 million users in more than 60 countries in the world. The system has been offered in 12 languages and it is used by more than 2,200 educational institutions. (Bradford and company, 2007, Jayson, 2006)

There are mentioned following possible benefits of the Blackboard educational system:

Increased Availability - Students can enter into the educational system via Internet anywhere and anytime. It is the benefit of all the educational systems being available via Internet. According to the survey from 2004 (Belanger, 2004) performed at Duke University in USA, the easy access to courses was mentioned as the most essential property of the course by 85 % students.

Quick Feedback - There are two kinds of feedback in this environment, namely faculty-initiated feedback and automated feedback. An immediate feedback can be used by a course manager e.g. for quizzes and tests. In such a case the students will receive the immediate feedback after they have responded questions in terms of the test. The students can see sample replies as well, e.g. at open questions. The faculty or the course manager can used the environment for a reflection on the course if they enter an anonymous question-form in reference to evaluation of the course or the teacher.

Improved Communication - There are several ways of communication in terms of the Blackboard. Among others there are most important announcements, discussions, virtual classrooms and e-mail. A tool or a function of the announcement is available for the students immediately after check-in the environment. The discussion represents an asynchronous tool, the virtual classrooms then represents a synchronous environment making live interactions between participants possible.

Tracking - It is possible to obtain statistical data about all the students enrolled in the particular course and also to follow particular activities of the students. The students can see their performances and advancements in the Gradebook (Fig.18).

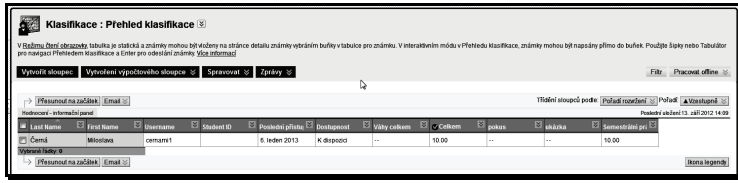

Fig.18 Gradebook Blackboard
(Faculty of Informatics and Management, University of Hradec Králové, Czech Republic)

Building Skill - The Blackboard supports other skills as well. There are organization of work, organization of time. Both tasks and tests are time-limited. A student has his/her calendar

available, which he/she can plan on performances of particular activities in terms of the course. Everything is displayed well-arranged in the home page (Fig.19)

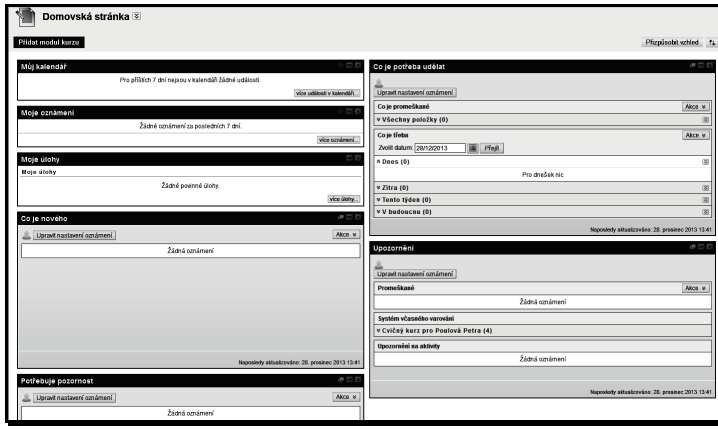

Fig.19 Home Page of Blackboard
(Faculty of Informatics and Management, University of Hradec Králové, Czech Republic)

Bradford (2007) presents also certain disadvantages or Limitations of the Blackboard system:

- It is more difficult to manage work with the software against expectations.
- This statement is connected with a study performed at the Hampton University School of Nursing (Servonsky, Daniels, Davis, 2005), where the Blackboard had been used in terms of postgraduate studies. Students of that type of study do not master technologies and work with them as the students of full-time form of study do. Because of that work with the Blackboard seemed to be more difficult for them.
- Some functions (options) can be limited by using a particular Operating System.
- The Blackboard uses Microsoft NT.
- Price.
- A yearly license can reach 200,000-400,000 dollars a year if more functions are used.

6.3 ENTERPRISEKNOWLEDGEPLATFORM™

EnterpriseKnowledgePlatform™ (EKP) represents an education control system having been developed by the NetDimensions Ltd. Company established in 1999. The company has its registered seat in Hong Kong and its branch offices in the USA, Great Britain, Germany, Denmark, Australia, China and Philippines. The system has been offered in at least 8 languages and available in three versions - EKP Bronze, EKP Silver a EKP Gold. The particular versions differ in availability of diverse functions only. There are following basic properties of the EKP system:

Clarity and Simplicity - The user can read news relating to his/her study in his/her home page (Fig.20); he/she has access to his/her personal calendar containing all events connected with his/her study; he/she has access to actual education units (courses).

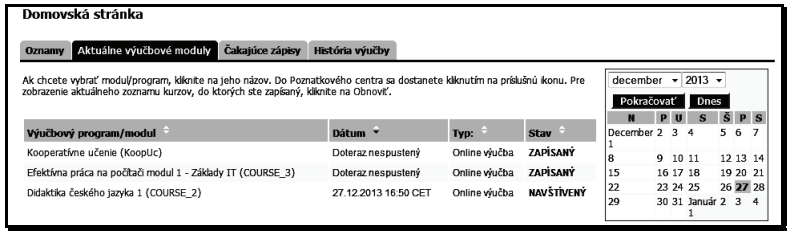

Fig.20 Example of a Home Page
(EKP of the Matej Bel University in Banska Bystrica, Slovakia)

A useful tool intended for easy orientation is represented by an observation center (Fig.21), which is a dynamic generated area containing all specific data about the course along with supporting information and communication tools. It is also possible to pass tests eventually certification related to the given unit by means of the observation center.

The particular units are organized in catalogs (Fig.22). It is possible to secure in such a way that every faculty or department possesses its own catalog in which the units are divided according to the way of performance, e.g. obligatory studies, obligatory elective studies, etc.

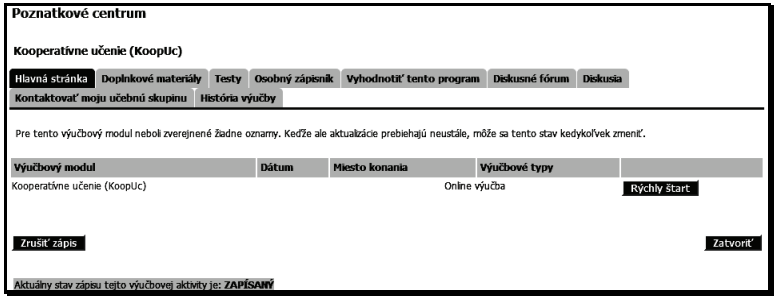

Fig.21 Example of an observation center
(EKP of the Matej Bel University in Banska Bystrica, Slovakia)

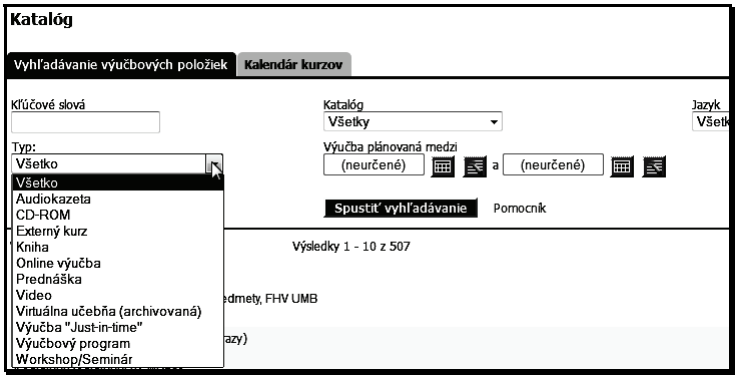

Fig.22 Example of a catalog including a material type
(EKP of the Matej Bel University in Banska Bystrica, Slovakia)

Communication Tools and Sharing Information - There is possible in terms of EKP to utilize internal mails, panels (Fig.23), chats, bulletin boards and news which are displayed in a home page of each user. A storage facility is intended for exchange of files, specifications, reports, tutor's training, namely between tutors and students and between students themselves. Files in the storage facility are arranged in the normal directory structure and each user has the access to his/her directories and to shared directories as well. Every directory or file has its owner in terms of safety and there is possible to set access rights for individuals, groups, organization units etc. Creating a curriculum vitae, which can be accessible to other users according to the adjustment, belongs to additional forms of sharing information about the user's person.

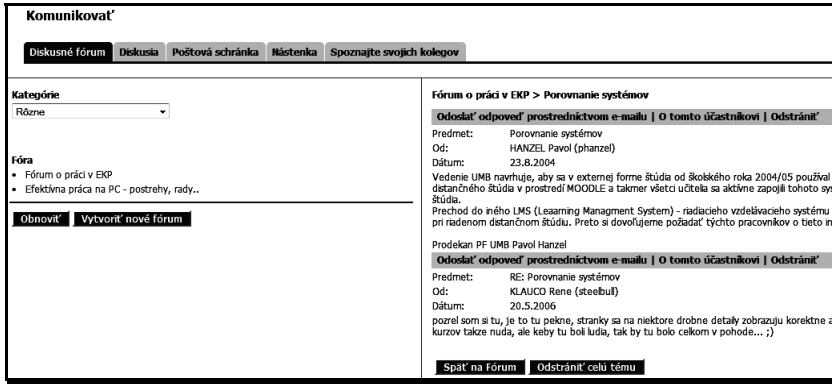

Fig.23 Example of a discussion panel
(EKP of the Matej Bel University in Banska Bystrica, Slovakia)

Evaluation and Feedback - A student's activities have been recorded since his/her enrollment for the course. So the tutor has comprehensive records about his/her students (time spent at the course, status of tasks, number and days of accesses, score achieved, results of tests, total and individual answers, etc.). Creating a recommended curriculum belongs to important rating tools. A print-out manager with over 40 predefined options is intended for evaluating different activities, but the user can create also his/her own print-out and to obtain required information in his/her own format.

Content Heterogeneity - The EKP like other LMS separates the education control process from creating on-line education courses. The EKP supports courses generated e.g. in MacromediaAuthorware, Macromedia FLASCH with AICC/SCORM support and tools of ToolBook II Assistant and ToolBook II Instructor. The educational content can be stored on a common server with the EKP, but it can be remotely induced from another web server as well.

Adaptability and Versatility - The EKP offers options for configurations and adaptability levels without additional interferences of its supplier. The base of these properties consists in possibility to define diverse user roles and access roles for particular functions of the system. One of the predefined user rolls has been assigned to every user. User accounts can be created by a system administrator by means of automated or manual procedures. It is also possible to adapt the environment appearance from the EKP menu including acceptance of the existing school design. There is possible to have predefined unlimited number of environment appearances in the system.

6.4 EVALUATION CRITERIA

The analysis has been focused on comparing LMS systems of Moodle, Blackboard and EKP. There have been selected the following basic comparing criteria:

- tools intended for generating contents,
- communication tools,
- tools for collecting and evaluating activities,
- tools for cooperation,
- price,
- displaying in tablets, iPhones or iPads.

Particular fields and tools had been evaluated by experts with long year experience with selected LMS (in particular Blackboard was evaluated by P. Poulová - Faculty of Informatics and Management of the University of Hradec Králové, Moodle was evaluated by M. Maněnová - Faculty of Education of the University of Hradec Králové and EKP was evaluated by S. Ligas - Faculty of Education of the of the Matej Bel University in Banska Bystrica). The verifier of the Moodle had access to the LMS Blackboard and also EKP and so could consequently be tested the utility of the particular tools.

6.5 COMPARISON SELECTED SYSTEMS

There were versions of Moodle 2.5, Blackboard 9.1 and EKPSilver 4.6. being available for the comparative analysis. The analysis's results are contained in table 4.

	Price
Moodle	-
Blackboard	about 200 CZK for an user and a year (calculated from the multi license)
EKP	e.g. unlimited license EKP Silver for 1,000 participants 280,000

Table 4 Basic tools of selected LMS

		Moodle	Blackboard	EKP
Generating content of study	Page	x	x	x
	URL	x	x	x
	File	x	x	x
	Folder	x	x	x
	Legend	x	x	x
	Book	x	x	x
	Lecture	x	x	x
	Syllabus	-	x	-
	Lesson plan	-	x	-
	Integration with study contents of other LMS	x	x	x
Communication tools	Discussion panel	x	x	x
	Chat	x	x	x
	Reports	x	x	x
	Inquiry	x	-	x
	Comments	x	x	x
	Blogs	x	x	x
	Survey question-form	x	x	x
	Quickmail	x	-	x
Collection and evaluation of activities	Task, On-line text, Set, Off-line activity	x	x	x
	Workshop (Self and Peer Assessment)	x	x	x
	Safe Assignment	-	x	-
Tools for cooperation	Dictionary (index)	x	x	x
	Database	x	x	x
	Wiki	x	x	x
Tests		x	x	x
Tracking		x	x	x
Statistics		x	x	x
Group mode		x	x	x
Language adjustment		x	x	x
Gradual loosening		x	x	-
Calendar		x	x	x
Internal mail		x	x	x
Certificates		x	x	x
Virtual classroom		-	x	x
Video				x

6.5.1 Displaying in Tablets and Mobile Phones

Currently the users of not only e-learning courses but general users of the Internet start to use access to the Internet not only on desk-size computers, notebooks but also on tablets and mobile phones (e.g. iPad, iPhon). One of the criteria was displaying a view at particular LMS in a tablet. The results are contained in Fig.24, 25, 26.

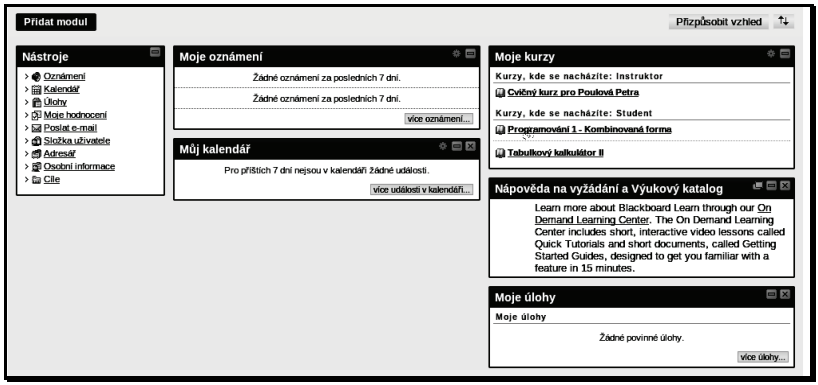

Fig.24 Displaying a course in LMS Blackboard 9.1 in a tablet

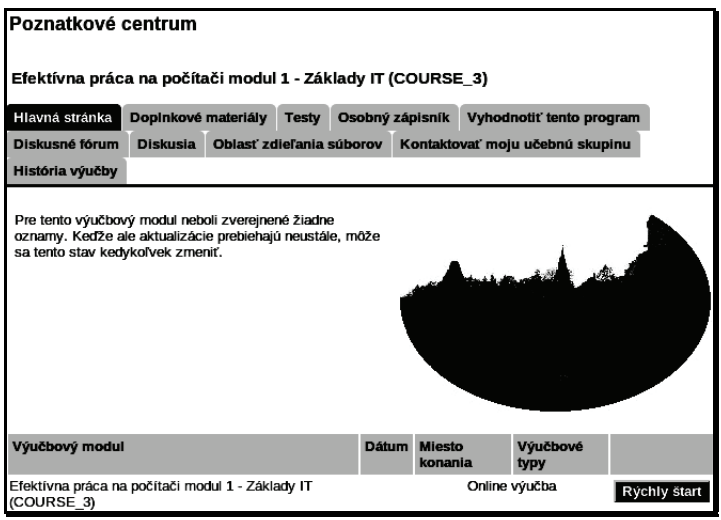

Fig.25 Displaying a course in LMS EKP Silver 4.6 in a tablet

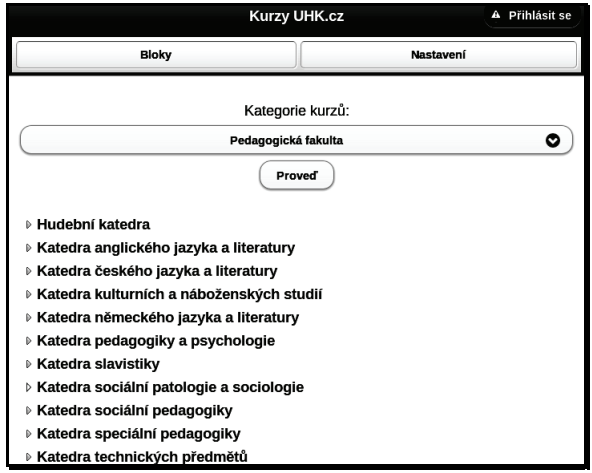

Fig.26 Displaying a course in LMS Moodle 2.5 in a tablet

6.5.2 Analysis Summary

According to the analysis results there are 80 % tools with the same Blackboard and EKP, which means there are similar working tools in particular LMS. They are different in 20 % tools. The tools of Syllabus and Lesson Plan contain only the Blackboard as a direct tool. In the others this tool is substituted by a particular file. The Blackboard contains Safe Assignment as a specific tool which is intended for protection against a plagiarism and for checking submitted tasks in reference to the central database. The system can maintain a database of before submitted tasks (for an organization or for a bigger association) and perform checking an current submitted work in reference to this database.

All the surveyed LMS contain tools for cooperation, i.e. created tasks can be evaluated by students mutually (Moodle and EKP - Workshop, Blackboard - Self and Peer Assessment), the students can participate in generating contents (Wiki, dictionaries, databases). Tools for communication contain all three LMS as well. There are discussion panels, chat and mails in different forms.

The criterion, which differentiates the system under surveys mostly, is a price and displaying in tablets (mobile phones). The Moodle is provided free of charge and its tools are basically non different in reference to remaining two systems which are provided against a payment.

The e-learning Moodle system offers options for optimization its mean for diverse types of display devices. In terms of LMS Moodle there is possible to adjust divers types of appearances for different kinds of mobile devices. In addition to, the version for mobile devices has been designed in such a way that makes possible automatic detections and displaying and hiding particular elements of the application and it can adapt the display resolution of the given equipment. Thanks to this utility there is secured legibility and clarity of the education contents even in the instruments with very low resolutions, e.g. in common mobile phones (Maněnová, 2013).

7 COMMUNICATION AND COOPERATION WITHIN LMS

7.1 DEFINING BASIC TERMINOLOGY

Communication represents an integral part of an educational process not only at classical classes, however also in a virtual educational environment. In reference to a communication being performed in terms of education processes we can meet a term of "education communication" in the literature. Průcha (2005) has specified "education communication" as a process of exchanging information between participants of the educational-pedagogic process. It is intended for reaching educational-pedagogic target. Information is also conveyed in both verbal and nonverbal ways. The education communication is controlled by specific riles which determine rights of communication participants. There is both space and time dimensions. Průcha (2009) has featured following characteristics of the education communication:

- It takes place by means of both verbal and nonverbal manifestations as a sequence of communication activities and situations.
- It is controlled by a teacher and it posses specific rules determining roles and rights of communication partners.
- It is intended for diverse functions: It serves as presentation of an educational content, for implementing pedagogic-educational targets, to control a class, to create a relationship between teachers and pupils and among the pupils themselves, for relaying information being not in direct relationship to the education.
- It generates a particular psychological climate in the class and at the same time is affected by this climate level.
- It posses its specific features at schools in different countries depending on kinds of national (ethnic) culture.

Kasíková et al. (2007) presents following limitations of the education communication:

- space limitations of the education communication (it is taking place in rooms intended for that purpose, classes, workshops, labs, gyms, school libraries, etc.);
- time limitations (unilaterally determined period of time by means of timetables, time period of an educational unit, absence from communication during pupils' home preparation, etc.);
- determination contents and programs of the communication (teachers' freedom affected to some extent by educational curriculum for an educational unit, lesson subjects, etc.);

- limitations of education communication by behavior rules (being limited by social roles of both the teacher and the pupil, by relationships between a subordinated an a superior);
- influences of space configurations of pupils in reference to the education communication (there is important a layout of the teacher and the pupil in a classroom);
- effects of an educational way in reference to the education communication (there were prevailing verbal expressions of the teacher during classes very often);
- the education communication limited by organization ways of classes (the way of communication can be influenced by all three basic educational forms - collective, group and individualized ones);
- it effects the social role asymmetry on the education communication (it is given by the teacher's social role and by the pupil roles, by a social statuses of the teacher and of the pupil, which are diverse ones).

The Internet as a communication medium has brought new elements of human communication and its influence is stated as enriching one (information availability, interactive data exchange, communication speed), however as constraining one as well (effects on speech and thinking quality). Vybíral (2000) is highlighting the influence of electronic communication over languages in reference to stylistics, syntactic, compositions and even styles. He has introduced following reasons for impoverishing the language:

- participants of a speech are responding without thinking, with lower number of corrections during speech actions and even after their finishing;
- participants accept the mutual shared language with limited vocabulary;
- participants have insufficient cultivated vocabulary;
- a used language can reflect a resistance against conformal users of the literary language.

At the same time the author puts his mind to discussions in the Internet from two points of view: a discussion as "blab-mouthing", i.e. series of communication exhibitions which means the dialog is represented by normal ordering shorter or longer monologues often with vulgarism elements and on the other hand, the discussion as a constructive process, i.e. participants come in a discussion, they put proposals forward, ask questions, agree or disagree, regulate and control the discussion and come into agreements.

There can be added further following limitations in reference to a communication context in a virtual educational environment:

- Absence of nonverbal communications, i.e. the communication does not take place face to face;
- negative impacts on behavior regulations during the communication (cybernetic mobbing);
- problems of cheating and plagiarism;
- higher demands on the teacher's work organization (virtual consulting classes, on-line chats out of working hours, participation in discussions, following students' activities outside present classes, etc.);
- problems being connected with engineering equipment (slow connection to the network, program incompatibility, deleted versions, etc.).

In spite of the above mentioned limitations there are a lot of advantages in reference to the communication in the virtual educational environment by means of tools for both synchronous and asynchronous communications.

The cooperation (from Latin "cooperare" - to work together) represents a complex social phenomenon which became the research subject of a lot of scientific branches (as e.g. sociology, politics, history, psychology, etc.) and which can be sorted according to diverse points of view. (Kasíková 2007).

Mareš (2013) points to the terminological heterogeneity of translations of the "collaborative learning" and "cooperative learning" terms. Different authors are given following differences:

- Both terms refer about people cooperation during their learning. The "collaborative learning" term represents a larger sense, however, the "cooperative learning" one represents its special case.
- There are two different expressions. Collaborative learning expresses an attitude of an individual person to learning, his/her life philosophy which refuses competition and rivalry of people. There is not an education method or mode. Cooperative learning is a particular educational method which is used at schools.
- There is practically the same, however there is the difference that the collaborative learning is used at universities and at education of adults, on the other hand the cooperative learning is used at secondary and elementary schools.

Because of that terminological heterogeneity, Mareš (2013) has introduced a term of "cooperative education" which is described as a case of social learning at which pupils are learning in small groups. The group has a common target and solves a common task. The coo-

perative education involves a common division of labor, mutual assistances, seeking for a common solution, discussing diverse opinions, mutual social dependence during reaching the common target, a group reward in cases of fulfilling the task and achieving the common target. The cooperative education can enrich the education process with mutual cooperation, because of this it is connected with higher performance and better maxims in comparison with a fact everyone would learn myself.

We can meet the cooperation principle in the cooperative education which started to be used in the USA in the second middle of the 20th century. According to Petlák (2004) its subject-matter is:

- The partnership - pupils learn better when they have possibility to cooperate in one project. The competition principle is substituted by the partnership.
- The flexibility - there are a lot of ways of the cooperative education implementation.
- The mutual assistance - all of them muss assist to each other, the cooperation is positive for each pupil.
- The cognitive complexity - a pupil can be involved into different cognitive, social and psychological situations which he/she learns how to react in.
- The variety of social situations - the education leads to assumption of the correct behavior, to elimination of the mutual competition, to the mutual tolerance, etc.
- The improvement of the self-evaluation - if the group is successful one, the pupil learns to see himself/herself as positive one as well. He/she feels not being alone and that he/she can find help of his/her fellow-pupils.
- There are following requirements which should be respected by a teacher for effective cooperative education implementation: (Turek, 2010).
- Securing a positive mutual dependence of the group members in terms of "Either we swim together, or we drown".
- Securing a mutual contact of the group members - space configuration in such a way that the pupils in the group can see face to face each other.
- Reinforcing the personal responsibility of the group members - the teacher should make sure that all the team members are involved in the work.
- Improving both interpersonal and communication skills of the pupils - the cooperative education bears new demands on the pupils: Adaptation to the work tempo, communication skills, leader skills, adaptability, conflict resolution, etc.

- Co-ordination of groups' work - in order to achieve educational targets, in order to secure correct relationships in the group, in order not to waste the working time at the expense of other activities, etc.

The cooperation represents one of the essential elements of community functions. In spite of the global world trends consisting in upbringing an individual being able to establish himself /herself in the competition environment which is based on competition in many times, we are parts of teams (no matter whether of private or working ones) in our real life. The cooperation represents here an inevitable social skill. Cooperation approaches to upbringing and an education responding on actual needs of the society create a potential which can substitute to solutions of essential problems of the nowadays world.

In terms of necessity of cooperation during the educational process there is not surprising that the needs of learning social skills are reflected in the approach to electronic learning.

According to Mareš (2013), the cooperative education by means of computers is connected with two following problems:

The existing social interaction among people cannot be implemented easily. It does not work spontaneously, it must be organized. Its launching is connected with bigger problems than keeping it in operation. The social interaction must be well-considered and integrated in a program. An education system must create a positive mutual dependence of pupils or students on runs and result of mutual learning.

The second problem is represented by absence of effective emotional aspects of the social interaction. A remote work brings a lot of emotional saturated situations. Evaluation of contribution of each member of the group is especially demanding because the teacher is not present at the cooperation.

The dynamical development of ICT, especially of the Internet and his www services, is connected with a lot of challenges in reference to electronic education and along with the web 2.0 introduction also new options for communication and cooperation support in the virtual educational environment.

7.1.1 On-Line Tools supporting Communication and Cooperation

If we want to speak about communication and cooperation in connection with the electronic education, it shall be necessary to remember development phases of the Internet and their effects on the education.

Zounek (2012) has described development phases of Web 1.0 and Web 2.0 in details.

The first phase of Web 1.0 had been characterized especially by static publication of information or knowledge on the web in the hypertext form; because of that it is called the cognitive one. There was most unilaterally distribution of information because no every had the possibility to publish in the Internet, there were only users having expensive and relatively sophisticated technologies. Other users had a lot of information available in such a way, however they could not participate in its creating or evaluations (e.g. by means of comments).

About 2005 were introducing new platforms and applications bringing essential changes. Their philosophy is based on users' communication, cooperation and sharing different kinds of information. In addition too, they are available for users in Internet mostly free of charge and are relatively easy in terms of controllability because they do not require any specific (technical) knowledge. In that respect the Interned has been progressively changing to a form being in general called as web 2.0 or even as web 3.0. This phase can be determined as a (social) constructive one. The web 2.0 differs in reference to the original Global Area Network especially by creating the space intended for community creations and sharing resources in terms of that the Interned user leaves the passive receiver role and starts to connect himself/herself as an active fellow creator of its dynamic content.

On-line tools supporting the communication and cooperation represent one of the main pillars of the e-learning 2.0 conception, whose principle represents crating, sharing and repeated using ("recycling") information, experience and skills in terms of a comprehensive learning community (Table 5) and filling all dimensions of social learning (Brown, Adler in Zounek, 2012).

In this work part will be described basic features of tools supporting cooperation and communication according to Zounek (2012).

Table 5 Tools supporting cooperation and communication

Tools supporting Communication and Cooperation		
Asynchronous Communication	***Synchronous Communication***	***Team Cooperation***
E-mail *(G-mail)* **Discussion Panels** Mikroblog *(Twitter)*	**Instant Mesaging** *(ICQ)* **Internet Phone** *(Skype)* Sharing Screen *(Join.me)* Live streaming *(Ustream)* Live blogging *(Coverit Live)* **Webinar** *(Adobe Connect)*	Exchange of Files *(Save.it)* Weblog *(Blogger)* **Wiki** *(Mediaw Wiki)* Administration and Sharing Documents *(Google Documents)*

(adapted according to Kitsantan, Dabbagh in Zounek 2012)

7.2 COMMUNICATION TOOLS

Discussion Panel

The discussion panels represent together with e-mails the main tools of the asynchronous communication. They can be characterized as web sites or their parts in terms of which users can publish their opinions or responses to contributions of other participants. The asynchronous communication form means that the discussion participants cannot be connected to the Internet at the same time. Basic forms of on-line discussions:

- independent working discussion panels - there are especially discussions of professional or special interest groups, panels providing consultancy, etc.;
- discussion panels as parts of web sites and gateways - a classical example is represented by news servers which are collecting a feedback to their articles and presented topics by means of the discussion panels;
- discussion panels as parts of virtual environments - there are the discussion panels intended for communication of dedicated groups of users of diverse systems - a typical example are panels in courses in terms of the LMS-environment.

Benefits:

- anywhere available;
- they can reduce coyness about discussions of some students;
- conservation of the paper history;

- back analysis of papers can help understanding the view on given problems;
- flexibility;
- possibility of moderating by students themselves.

Disadvantages:

- non-uniform participations of the students in discussions which can be connected with unsuitable discussions;
- deterioration of social relationships in the group;
- long waiting for replies;
- incorrectness of responses;
- demands on moderating in cases of high numbers of students;
- it is not suitable for demanding topics requiring other communication forms as well.

Instant Messaging (IM) and Internet Phones

Instant messaging is another wide-spread way of communication, which is very similar to the chat. There are large series of communication protocols and clients. Special programs are mostly intended for its usage. Messengers' benefits are their option of the asynchronous communication despite they are primarily intended for the synchronous communication. If a participant is not connected, there is possibility to send him messages which will be displays immediately after his/her connection. The leading ones is ICQ, however the whole series of others belong to it (Google Talk, Jabber, Windows Live Messenger, MySpaceIM, Yahoo!, Messenger, etc.).

The Internet phones and especially the Skype program are very popular in the last years. The Skype allows next to phoning by means of the Internet also sending text messages and other series of functions (sending files, references, etc.) which are identical to some clients of the instant messaging). In addition to there are other interesting functions, e.g. recording speeches or sharing desktops. The Skype allows also conference talks (even moderated ones) in which over dozens of participants can communicate. Benefits rest in the fact that all series of services are provided free of charge. However there are also paid versions of many services with higher comfort and quality. Nowadays it seems that this type of communication is overruled by social networks, especially by the Facebook and/or the Google+.

Benefits:

- easy communication between students and the teacher (especially in combined study forms), i.e. so called virtual consultation classes;
- options of saving communication records;
- options of sending files as a part of the communication;
- options of communications with foreign students and experts;
- options of research talk implementation;
- basic services are free.

Disadvantages:

- limited security, risks of virus attacks, abusing contents, etc;
- technical problems (a slow Internet connection, failing the Internet, etc.);
- overloading due permanent communication;
- it could be not acceptable foe people preferring personal contacts.

Webinar

It is clear that there is a combination of the "web" and "seminar" words, i.e. a seminar being implemented in a virtual environment by means of a free application or an on-line service (e.g. bigbluebutton.org), however there is the possibility to use commercial products as well. Their potential rests in access to education for participants, who are in diverse places at the same time. The applications make possible to carry out a traditional lecture, a seminar or a workshop. Participants have all necessary tools for education available. They can communicate in audio-visual or text ways (chat). There can be available presence of a teacher or a presenting student for all of them as well. There is possible to share the screen or a certain part of a computer application of any of the participants or to make remarks in a virtual blackboard which all other participants can see. Files can be play up to a webinar as well. By means of webinars it is possible to perform different forms of evaluations or even examinations.

Benefits:

- overcoming both local and time limitations;
- flexible education time selection (there is not any binding in reference to a particular room);
- lower costs of action arrangements (eliminating travel costs, expense allowances, costs of room rentals, energy costs, etc.).

Disadvantages:

- demanding preparations;
- students must be presented at the same time (problems of timing);
- insufficient technical equipment of participants;
- limited security (unsuitable for seminars requiring private spheres, problems with copyrights, etc.).

7.2.1 Communication in terms of Moodle Tools

Discussion panels, chats, administrations, inquiries, question-forms, blogs, comments, surveys and quickmails can be used for communications in the virtual Moodle classes. Each of the mentioned tools has its own particularities and suitable utilizing their combinations offers large possibilities for teachers consisting in securing the continuous management of courses, providing support and assistance for students or making more effective the virtual communication among particular participants in the courses.

Discussion Panel in Moodle

Immediately after a course in LMS Moodle having created, this tool offers a special kind of the discussion panel - the News panel which however is not intended for discussions of professional problems. It is used by a teacher (a tutor) for unilateral communication towards students. The teacher's contribution has mainly managerial features (general messages in reference to the course, changes of examination times, changes of education times, etc.). Students cannot add their contributions.

For our research purpose we are going to use possibility of creating our own discussion panel which shall respect our particularities corresponding with research tasks. The Panel Type tool allows set limitations for running a discussion panel by the tutor. Focusing particular panel types shall be divided mainly according to numbers of participants and discussion subjects or contributions being added into the panel:

- a common panel for general use - any participant of the course can add discussion subjects and respond to contributions;
- a simple (easy) discussion - only one of the discussion subjects can be displayed for all the course participants;
- each of the course participants can launch one discussion subject;

- questions and answers - a student must firstly react on the teacher's added contribution and consequently there will be displayed other contributions for him/her, i.e. answers of his/her fellow-students (Drlik et al. 2013).

We are striving to obtain the students' view on discussions at the virtual class room and at the normal one. We selected two subjects from practice, which could be actual, interesting and controversial for students. We consider using tablets, notebooks or smart phones for education at elementary schools as an especially actual subject along with using an interactive blackboard for the same purpose.

Chat in Moodle

The etymological composition of the "chat" word is derived from the English word of "babble", which is typical for an informal English communication.

The using Chat tool has its peculiarity in the Moodle. The most often reason for its use is represented by communication of the teacher and a student, namely if the students seeks the teacher for assistance in solutions of problems or tasks. Compared with informal chats in other panels, there is supposed more "formal" expressions of students, eliminating emotive words, etc. The chat make talking in real time possible, however there is not possible from practical points of view to secure the permanent teacher's presence in the virtual room. Because of that it is recommended to determine an exact time of virtual tutorial classes when the teacher is present and the students can turn to him/her with their requirements. Another peculiarity of the chat in the Moodle represents an option to save implemented chats, i.e. their archiving during selected periods of time. Because of the fact that everyone can see these implemented chats each of students of the course can follow the chat history which can be considered a partly substitution of FAQ. Scope of chats being accessed to students depends on the teacher's discretion. Chats of more personal features and confident problems being not connected with all the students can stay in strict confidence.

In terms of the Moodle (Fig.27) the chat can be performed among participants only in the synchronous way, i.e. in terms of real-time. Chats can represented one-shot activities or they can be repeated every day, week, etc. regularly. Records of chats are saved and can be accessible for each of the course participants or for selected users only by virtue of an adjusted authorization.

The chat is extraordinarily useful if the course participants cannot see face to face each other, e.g. because of following reasons:

- regular meeting participants of distance study from different places and countries;
- students who are not able from diverse reasons to come to an individual consultation with a tutor;
- meeting students performing their practice training out of their schools;
- controlling and monitoring introduction of younger age children into the world of social networks;
- a discussion with an invited expert from abroad or from another town.

Fig.27 Example of displaying the Chat tool in the Moodle

Messages in Moodle

There are simple and short references on the part of the teacher to students or among students themselves. The Moodle is striving deliver each of the massages as soon as possible. During the next activity of a message recipient the message shall display in the pop-up window and the user can either ignore the message or come to it. If the user decides to ignore the message, this message will stay in the Moodle and the system shall try to deliver it later. If the user select the "Change over to messages", then a form for sending messages appears and the user can see beside the actual message also the foregoing one.

Using messages in the Moodle does not bother the students by clicking into new windows of other servers ant the communication becomes more transparent.

7.2 COOPERATION TOOLS

WIKI

It is necessary to differentiate between the Wiki as a software technology/environment and particular projects being carried out in the Wiki environment and submitted to a particular subject or content. Sometime this distinction is expressed by the wiki-software or wiki-web terms. There are thousands of wiki-webs. The Wikipedia is the most known and largest among them. Both students and teachers can create interesting educational materials for universities by means of Wiki projects. The not-for-profit organization of Wikimedia Foundation itself, which operates the Wikipedia, administrates several other projects based on the Wiki. Every Wiki tool is constructive and cooperative and can be used for cooperation of students in terms of any school projects.

It is very important in reference to a learning process that the Wikipedia along with every Wiki can store all versions of an article permanently (at the Wikipedia under the History marker) and there they can be compared with each other; in a case of any change there is clear who had performed it. Students' works can be evaluated easily in such a way. There is also an interesting option consisting in using these progressively improved versions of the articles in the Wikipedia as materials for study (seeking for strange mistakes) or for research.

Benefits:

- the stable source with current contents;
- a social - cooperative experiment (a community project as a valuable expression of the civil society);
- non-demanding managing the basic editing;
- good recording participants' work (archiving development changes of every page);
- good tools of the team communication;
- necessity of saving formulations on clear determined style levels;
- an offer of most accessible experience regarding the text performance in the „non-wysiwyg“ mode.

Disadvantages:

- it is not ideal for students' work on one item (in contradistinction to the Google Documents it does not allow to follow work of simultaneously editing participants);
- interferences with editing by foreign users of the Wikipedia;
- a low or variable level of the contents.

Because of the fact that it has been selected the LMS Moodle for research by virtue of the comparative analysis, we deem necessary to pursue options of utilizing tools for supporting communication and cooperation in the Moodle.

7.2.1 Cooperation in terms of Moodle Tools

WIKI Moodle

The Wiki in the Moodle system offers possibility to create cooperative pages by students direct in the window of the web browser without to know the (X)HTML. The students can create pages in two modes:

- individual modes which allows to students to modify their created pages only;
- common Wiki which allows to students to modify pages created by other students as well.

Mutual work brings also a risk consists in a fact that during many modifications can be unwillingly removed parts having been added by other students. This risk is prevented by means of the "Page History" tool in the Moodle, which can save contents and forms of every Wiki page along with information by whom and when the pare was created.

The Wiki (Fig.28) brings a lot of interesting options for the school practice. Beyond creating team projects the Wiki can be used as a brainstorming environment, for common creation of documents for using software (e.g. utilizing Moodle tools), collaborative creating stories, etc.

Fig.28 Example of displaying the WIKI tool in the Moodle

8 RESEARCH ON THE USE OF COOPERATION AND COMMUNICATION TOOLS IN LMS MOODLE

Among many of discussed disadvantageous of e-learning belong insufficient motivation of students, inability of self-work along with its organization eventually even self-learning. The common practice of e-learning is an individual study.However a student can feel lonely and isolated in the cybernetic space. A teacher cannot be always available when the student needs him/her and because of the student's loneliness can get deeper. Zounek (2012), there is not any „face to face“ communication, etc. The individual studylacks the cooperation elements being supposed an important part not only education, but also successful functioning at teams (both working and private ones).

During information preparations of the project, in study processes of problems, we have found that existing researches in terms of e-learning had brought especially quantitative approaches and they are focused mainly on feeling courses as units without specific focusing on the communication and cooperation tools. The tools used in terms of e-learning and communication quality from students' point of view was explored by Bremer and Bryant (2005), Machado and Tao (2007). Wright (2003) has arranged criteria of evaluating e-learning courses. Also Kearsley (2000), Benigno and Trentin (2000), Šimonová et al. (2011, 2012, 2013), etc., was engaged in those problems. As the domestic author, Klement (2011) described very closely approaches to evaluating electronic study materials intended for implementation of the e-learning educational form.

In terms of utilizing LMS Moodle we went from analysis of courses created in the given environment. We were focused on utilizing particular tools in the courses. There was selected for analysis of e-learning courses the courses of the Primary and Preprimary Education of the Faculty of Education in the University of Hradec Králové and also of the Faculty of Education of the University in Prešov because it is similarly as the Primary and Preprimary Education of the Faculty of Education in the University of Hradec Králové focused on the education of teachers for Nursery Schools and the 1st grade of elementary schools. There were analyzed totally 383 courses (251from the Faculty of Education of the University in Prešov and 132 ones from the Primary and Preprimary Education of the Faculty of Education in the University of Hradec Králové).

Analysis results:

- The most common part of the e-learning courses are study materials intended for self-study - tool file (100 %), tasks focused on self-work of students - tool task (average 75 %), continuously or final tests (average 77 %) and URL references (average 42.5 %).
- The Chat communication tool is used in average to only 6.5 %.
- The Panel communication tool is used in average to only 31.5 %.
- The Wiki cooperation tool is used only at the Primary and Preprimary Education of the Faculty of Education in the University of Hradec Králové only to 1 % (at one of the courses).
- The Survey tool is used to 2 % at the Primary and Preprimary Education of the Faculty of Education in the University of Hradec Králové.

There have not been used in terms of individual courses such tools as the dictionary, lectures, inquiry, question-form, workshop, book, description, folder and page.

According to our opinion, such conceived e-learning courses (i.e. the courses containing the file, task, test, URL reference tools) do not take into account such important educational aspects as e.g. communication, cooperation and mutual interaction of learning participants in the virtual environment and do not use possibilities offering by educational control systems.

8.1 RESEARCH OBJECTIVES

The main research target consisted in founding the affect of utilizing the LMSMoodle specific tools on subjective evaluating the e-learning courses in point of view of pedagogic students for elementary schools, namely the students from the Faculty of Education of the University in Prešov and the students from the Faculty of Education of the University in Hradec Králové.

There are following partial targets from the main research target of the project:

1) Comparison of the subjective evaluation of a "classical" e-learning course, i.e. without utilizing specific tools and an e-learning course with utilizing specific tools, namely in terms of students of every college and consequently between each other.
2) Finding utilization of the Moodle specific tools by means of the Moodle internal statistics in terms of students of every college and consequently between each other.

8.2 DEFINING THE RESEARCH PROBLEM

We had conceived the following research problem for purposes of the research project: Utilizing specific tools in the LMS Moodle from the student's point of view. We observed following tools focused on communication (chat, discussion panel, administration) and cooperation (Wiki) as specific ones.

In following lines we will transform general research targets into operational area, i.e. we have formulated following particular research question in reference to the existing problems:

1) How did students' knowledge change?
2) How do specific tools of LMS Moodle affect subjective evaluating an e-learning course by students.
3) Is subjective evaluating an e-learning course with specific tools by Czech students different from the subjective evaluation of Slovak students?
4) What time did students spend in the e-learning course?

By virtue of the research target formulation, research problems and research questions we have estimated following hypotheses:

H1: *We suppose that students who will work at an e-learning course with specific (communication and cooperation) tools shall have better results in a knowledge test than the students who worked at an e-learning course without those tools.*

H2: *We suppose that an e-learning course utilizing specific (communication and cooperation) tools shall have more positive evaluation than an e-learning course without those tools.*

H3: *We suppose that students who utilizes an e-learning course with specific (communication and cooperation) tools shall have often use (attend) the course than the students who worked at an e-learning course without those tools.*

Utilizing specific tools of the e-learning course represents an independent variable. Knowledge of students, the course evaluation by the students and frequency of course attendance depend on those which are dependent variables.

Operational Abilities of the Independent Variable

Because of targets of our research we have decided to follow two basic categories of activities connected with the college-level study. They are the communication and the cooperation. In both of categories we had pursued the difference between subjective evaluations of the course by participants who had the specific Moodle tools available and the ones who did not. As the specific Moodle tools, which had been the subject of our research and parts of an e-learning course for an experimental group, we observe tools for communication (discussion panels, chats, messages) and the WIKI - cooperation tool.

The Discussion Panel - tool was used in a simple discussion form, i.e, there was only one discussion topic displayed for all course participants. We wanted to obtain students' opinions of two particular topics which could be interesting for the students. We consider using tablets, notebooks or smart phones for education at elementary schools as an especially actual subject along with using an interactive blackboard for the same purpose. Topics were used in different times.

The Chat - tool makes for the experimental group possible communication between a teacher and a student and also among students themselves. The communication with the teacher took place in exactly determined time (of virtual consulting lessons, once a week). The teacher was present and students asked him/her their questions. The chat makes also possible communication among students themselves. The chat between the teacher and students represented a repeated activity once a week (virtual consulting lessons). Chats among students themselves were spontaneous activities according to individual needs of the students.

The Message - tool was intended for exchanging simple and short references from the teacher to students or among the students themselves.

The Wiki - in the Moodle system offers possibility to create cooperative pages by students direct in the window of the web browser without to know the HTML. Students can create pages in the Common Wiki mode where they can modify other students' pages as well. The students were divided into teams of 3-5 members with a task to prepare a final seminar paper, i.e. a preparation of an education lesson at elementary school using ICT. Each of the teams received different topics of the seminar paper.

Operational Abilities of the Depend Variables

Depend variable 1 represented performance of students in a knowledge test (a post test). Depend variable 2 represented a rate of subjective evaluating the e-learning course in individual categories expressed as a summary evaluation index on a scale.

In terms of the research it was necessary to solve following tasks:

- preparing a research tool, a question-form and a test;
- modification of an e-learning course in the subject of ICT didactics at elementary school focused on communication and cooperation tools (at the Faculty of Education of the University in Prešov and at the Faculty of Education of the University in Hradec Králové);
- preparing and activating selected specific LMS Moodle tools (a chat, a discussion panel, messages, Wiki);
- creating a methodical manual for work with the selected specific tools;
- specifications of topics of group student works.

8.3 RESEARCH METHODOLOGY

Two basic approaches to the research are used in psychology and pedagogics: qualitative and quantitative ones. Some authors have complemented these two approaches by which they create a space for a mixed approach (design model) (Skutil et al. 2011). We had proposed the mentioned mixed model as a basic design of our research project. We wanted to use a methodological triangulation which comprises a triangulation between methods focused on maximization of the obtained data validity. Quantitative and qualitative approaches go from other epistemological prepositions and mainly deal with other problems. They used other analytical approaches and provide with different conclusions. These conclusions are not better, worser or competitive (Švařiček, Šeďová et al. 2007).

8.3.1 QUANTITATIVE METHODS

The quantitative research in the pedagogy is based on natural science methods and supposes that human behavior can be to certain extent measurable and predictable (Creswell, 2009, Hendl, 2005). The traditional quantitative research can has either an experimental form (active changing a situation with a certain intent) or non-experimental one, also called as ex post facto, where the situation will non be changes and "the independent variable or

variables has (have) already appear and an explorer starts observation the depend variable or variables (he/she studies independent variables retrospectively because of their possible relations and effects in reference to the variable or variables" (Kerlinger, 1972, page 357).

According to Pelikán (2011), Chráska (2009) and Gavora (2000) basic methods and ways of data collection in the quantitative focused research are question-forms, observations, scaling, interview, content analysis of texts, experiments, didactic tests, sociometric tests and a semantic differential.

The quantitative approach was used to verification of our designed hypothesis and in terms of it an experimental method and a question-form-survey were used. Inasmuch as utilizing LMS Moodle tool was one of the research targets, the specific LMS Moodle tools were analyzed quantitatively in terms of frequency and time.

Experiment

Because of features of the hypothesis formulated which supposed that utilizing specific research LMS Moodle tools had statistic impact on the subjective evaluation of the e-learning course by students, we had decided to use the experimental method for the course verification. According to Ferjenčík (2000), the experiment is intended especially for finding basic relations. In order to suppose some causality between two variables (in our case there are specific Moodle tools and evaluation by a student), it must be met three basic conditions:

- What we supposed to be a reason must timely precede to an expected effect (result). In our case the A change (integrating specific LMS Moodle tools into the e-learning course) preceded the B change (evaluations of e-learning course students).
- The supposed reason and its effect must correlate with each other, i.e. mutually changed. The A change supposed the B change.
- There is not any other explanations except for the change of the B affect by the A variable.

A pedagogic experiment supposed (Pelikán, 2011):

- An exact determination of variables entering into the experiment.
- The variables, which should stay relatively constant, should be under control of an explorer in terms of possibilities.
- In order to secure proving a change, i.e. that the change was evoked by intervene experimental variable, it is necessary to divide experimental persons into two groups. One of

them is an experimental group, another one is a control group. These groups should differ only in such a way that there is used an experimental variable in the experimental group, at which we want to find, if it is an intervening variable. The process in the control group is proceeding in the same way as in the experimental group, only there is not used the experimental variable.

- The decision which of the group is experimental and which control one along with dividing persons into particular groups should me made according to random selection.
- It should be several measurements made, especially at the input, in order to ascertain that there is not any important difference in terms of features which are not the subject of interest. Other measurements shall be usually made at the output which target is based on findings whether the intervening experimental variable affects depend variable.

In our case the intervening variable represents using the specific Moodle tools. Depending on this intervening variable we have followed the students' performance in terms of a knowledge test and further their subjective evaluation of the e-learning course by means of a question-form survey.

Question-Form

The question-form belongs to one of the most used methods in the research. It is used in social sciences for bulky and quick finding facts, opinions, preference, values, motives, needs, interests, etc. (Gavora et al. 2010). For purposes of our work we have created a non-standard question-form with scaled items. During creating that question-form we went from the studies of Bremer and Bryant (2005), studies carried out at the California University Humbolt in 2005, study Machado and Tao from 2007, study Wright (2003) and work of Klement (2011).

The final question-form consisted of three parts. The first part was focused on general information about a course (whether there are rules for work in the course, a course design, availability of multimedia, etc.). Following two parts of the question-form should provide with more detailed information about communication and cooperation in terms of an e-learning course.

In terms of a pilot evaluation, 28 students of the field of study "a teacher of elementary school" were addressed. Those students have had at least one year experience in reference

to work or study in LMS Moodle at the Faculty of Education of the University of Hradec Králové. They received the question-form at beginning the academic year.

How already mentioned above, the basic target consisted in the question-form evaluation. From the 28 of submitted question-forms, 23 of them were consequently elaborated, i.e. all the questions were answered. The question-forms with no all answers responded were excluded from other elaborations.

The data obtained were processed by means of statistical program NCSS2007. It was calculated the question-form reliability in terms of a whole and also of its particular parts and the value of Crombach's α was not lower than 0.7812. At the same time interviews with the students were performed with focusing on clarity and understanding the particular items.

8.3.2 QUALITATIVE METHODS

A target of the qualitative research consists in understanding and revealing how people understand and interpret the world which they are living in. The attention is focused on an individual, his/her attitudes, opinions, view at the topic under research and its interpretations. The topics are based on the real environment and they are close to respondents. The qualitative research neither confirms nor contradicts what is known, however it mostly generates new theories, reveals new or changes the existing views at the world. It is focused especially on exploring and complex matters without their splitting. It is mainly focused on environment unifications, situations, persons and time (Gavora, 2006). According to Svatoš (2010): Individual features appear especially during mutual interactions among the research participants, which is connected with findings of individual man fates and its presentation.

Basic ways of collecting data at a qualitative research differ according to rate of interests of research workers. There are especially observations, interviews, content analysis of products (copier of official documents, diaries, records) and audio-video materials (pictures, photos, video-records, audio-records, etc.) (Gavora, 2006, Hendl, in Průcha, 2009). As other resources of research data we have selected interviews with respondents in the form so called interviews in focus groups (Gavora, 2006, Svatoš, 2010).

Focus Groups

The focus group method is a typical representative of qualitative research processes. Our application was targeted on findings approaches of respondents (teachers at the 1st grade on elementary schools) in reference to utilizing information and communication technologies in their authentic practice.

A subject-matter of the focus group is a group interview with selected participants. The focus group represents a research method by means of are data obtained by utilizing group interactions which originate spontaneously and are proceeding during discussions to a before determined topic. *„The discussion topics must be selected by the research worker because of it, who will present it to the group consequently. The discussion focus is usually defined more freely, in order to the group discussion could develop into several directions"* (Maňák, Švec Š., Švec V., 2005, p. 67)

8.3.3 RESEARCH PROCESS

The research was performed during the fall semester of academic year 2013/2014. The fall semester started at both Faculty of Education (in Prešov and in Hradec Králové) on Tuesday, September 24, 2013. Students of both the faculties were randomly divided into two groups, one of them was randomly (by ballot) selected as a control one ant another as an experimental one. There was created an e-learning course of the ICT didactic at elementary schools for both of the groups before the semester start. The course for the experimental group consists of specific LMS Moodle tools focused on supporting communication and cooperation. The students passed an input test (pretest) at beginning the semester and an output test (post test) at the semester end. The taught subject itself has scope of 2-hour-workshop in a week. The experiment lasted 13 taught weeks and was finished on Friday, December 20, 2013.

The obtained data were statistically proceeded in the NCSS 2007 program. There were used Kolmogorov-Smirnov test, D'Agostino-Skewness test, D'Agostino Kurtosis test a D'Agostino Omnibus test for testing data standardization. For testing hypotheses we used Student's test and Mann-Whitney test and selected importance level $\alpha = 0.05$.

8.4 RESEARCH SAMPLE DESCRIPTION

In reference to the research sample it was a basic task to define features of the basic set (Pelikán, 2011), because of that we selected the intentional selection method in terms of which participants of the research investigation are selected according to their particular properties. Common features of the basic set were limited as follows:

- maximum rates of knowledge of study under supporting e-learning courses eventually electronic study supports;
- minimum knowledge of wort at e-learning courses based on own experience;
- own experience with study at the Faculty of Education at the University of Hradec Králové or at the Faculty of Education at the University in Prešov.

A following task connected with determining and selecting a suitable group of respondents was creating a selected set (Pelikán, 2011) which is a part of elements selected from the basic set. We determined necessary common features characterizing necessary Properties of the selected set and making precise focusing on the data collection possible. These features respected the above mentioned properties of the basic set. Properties of the selected set were limited as follows:

- a suitable member of the selected set is a student of the teaching field for the 1st grade of elementary schools because he/she is acquainted with the study under supporting e-learning courses and with the following higher level of study only for the teaching field for the 1st grade of elementary schools existing in the Faculty of Education of the University in Prešov;
- a suitable member of the selected set is a student of the teaching field for the 1st grade of elementary schools being registered in LMS Moodle in the Faculty of Education of the University in Hradec Králové or in the Faculty of Education of the University in Prešov, because he/she has certain experience with work at e-learning courses.

Based on mentioned features and with regards to study plans there was selected the subject of Didactic of information and communication technologies for elementary schools which is similar at both the Faculties of Education. Such a way we obtained two selected sets, one was represented by teacher students for elementary schools in the Czech Republic and another in Slovakia.

There participated in the research totally 60 students of the second year of following master study of teaching at elementary schools from the Faculty of Education of the University in

Prešov and 57 studens of the fourth year of following master study of teaching at elementary schools from the Faculty of Education of the University in Hradec Králové. There were 100 % of women.

8.5 RESEARCH RESULTS

8.5.1 PEDAGOGICAL EXPERIMENT

Because of the research method used at the pedagogical experiment, the students of both the faculties were randomly divided into a control group and an experimental one. In order to meet the basic requirement of the pedagogical experiment, i.e. the same input parameters in both control and experimental groups, the students passed the input test (pretest). Basic values of descriptive features of pretests of both experimental and control groups are contained in Table 6.

Table 6 Pretests- descriptive features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
S control group pretest	48,40	9,85	27,08	63,33	36,25	48,33	-
S experimental group pretest	46,60	11,20	13,33	70,00	56,67	44,17	-
C control group pretest	50,10	10,09	32,5	67,50	35,00	48,92	-
C control group pretest	51,00	7,97	31,42	67,00	35,58	52,25	-

In order to meet input parameters of the pedagogical experiment there was tested a hypothesis in reference to pretest results. Formulating the hypothesis we based on a zero hypothesis:

H_0: *There was not any statistical difference between scores of input tests of both control and experimental groups.*

The test results are contained in Table 7. It was confirmed that there were not any statistical differences between scores of input tests of both control and experimental groups of students of both Faculties of Education in Prešov and in Hradec Králové.

Table 7 Comparing inputs

	Mean	T-Value	Z-Value	H_0
S control group (Sk_vs_K)	48,40	0,6187	0,9658	Accept
S experimental group (Sk_vs_E)	46,60			
C control group (Cj_vs_K)	50,10	-0,3723	-0,4462	Accept
C experimental group (Cj_vs_E)	51,00			

Because of better clarity there are box plots shown in Fig.29 along with displaying means and total layouts of the input test values.

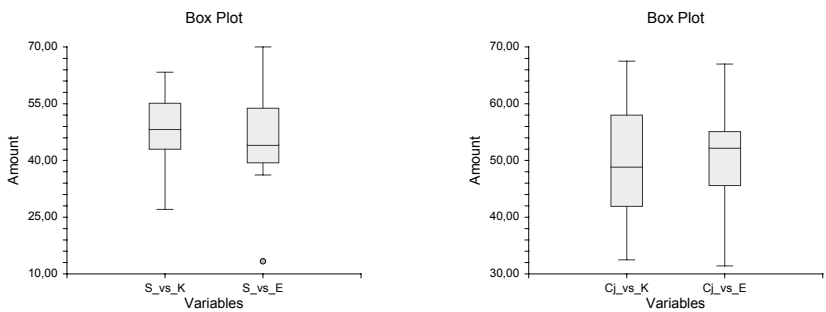

Fig.29 Box plot of pretest results of both control and experimental groups in Slovakia and in the Czech Republic

In the end of the course the students of both groups passed an output test - post test focused on knowledge. Test results for all groups are contained in Table 8.

Table 8 Post tests- descriptive features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
S control group posttest	56,00	9,51	37,25	75,33	38,08	55,75	-
S experimental group posttest	51,50	12,47	29,17	79,16	49,99	51,33	51,33
C control group posttest	79,70	18,38	50,00	100,00	50,00	85,75	100,00
C experimental group posttest	94,60	7,67	72,75	100,00	27,25	98,33	100,00

By virtue of the obtained data we were able to test the first determined hypothesis:

H1: *We suppose that students who will work at an e-learning course with specific (communication and cooperation) tools shall have better results in a knowledge test than the students who worked at an e-learning course without those tools.*

For testing purposes we went from formulating the zero hypothesis:

$H1_0$: *We do not suppose any statistical important difference between test scores of students of both experimental and control group.*

Results of the tests (T-test and non-parametric Mann-Whitney test) are contained in Table 9 and in Fig.30.

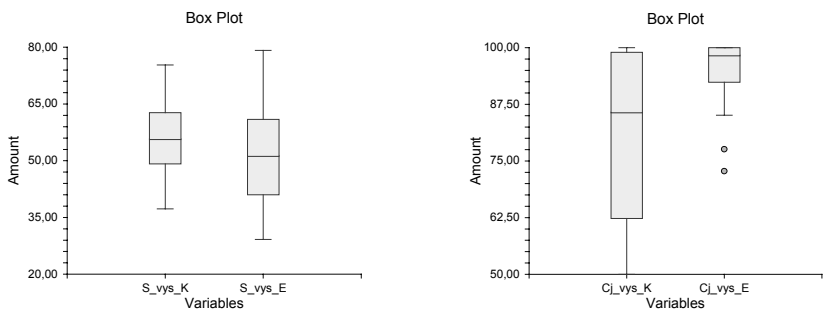

Fig.30 Box plot post test of Slovakia students and of the Czech Republic students

Table 9 Comparing outputs

	Mean	T-Value	Z-Value	H_0
S control group (Sk_vys_K)	56,00	1,5261	-1,5983	Accept
S experimental group (Sk_vys_E)	51,50			
C control group (Cj_vys_K)	79,70	-3,4008	-2,3319	Reject
C experimental group (Cj_vys_E)	94,60			

We can observe that the zero hypothesis was not contradicted at the Slovakia students, i.e. there was not confirmed the statistical important difference between test scores of the control and experimental group. On the contrary at the Czech students the zero hypothesis was not confirmed and because ot that we may state that there is a statistical important difference between test scores of the control and experimental group.

WE selected a question-form focused on evaluating the e-learning course for testing the H2 hypothesis. As already mentioned, the question-form consisted of three parts. Each of the parts was evaluated independently and then the form as a whole. The description features of the question-form parts are contained in tables for particular groups (table 10-13).

Table 10 Question-form of the Slovakia control group - description features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
General Information	110,10	11,15	81	130	49	110	104
Communication	40,10	6,92	21	49	28	40	40
Cooperation	14,20	1,89	10	18	8	15	15
Overall	164,40	16,77	117	194	77	165	165

Table 11 Question-form of the Slovakia experimental group - description features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
General Information	104,20	20,66	43	134	91	111	111
Communication	41,90	7,41	19	50	31	43	-
Cooperation	14,10	1,96	9	18	9	14	14
Overall	160,20	28,41	71	197	126	168	-

Table 12 Question-form of the Czech control group - description features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
General Information	120,90	10,41	91	133	42	124	121
Communication	44,80	3,37	38	51	13	46	46
Cooperation	13,70	2,71	8	18	10	14	16
Overall	179,40	12,69	142	199	57	181	181

Table 13 Question-form of the Czech experimental group - description features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
General Information	119,80	7,74	103	130	27	121	-
Communication	46,20	3,72	36	50	14	47	49
Cooperation	13,50	1,94	10	17	7	14	14
Overall	179,50	10,48	152	194	42	180	175

We went from general formulated hypothesis H2:

H2: *We suppose that an e-learning course utilizing specific (communication and cooperation) tools shall have more positive evaluation than an e-learning course without those tools.*

Testing having finished, we formulated a zero hypothesis for total evaluating the course along with its parts:

$H2_{01}$: *We do not suppose any statistical important difference between the control and the experimental group.*

Then we analogously formulated zero hypotheses for particular parts of the course:

$H2_{02}$: *We do not suppose any statistical important difference between the control and the experimental group.*

$H2_{03}$: *We do not suppose any statistical important difference between the control and the experimental group.*

$H2_{04}$: *We do not suppose any statistical important difference in reference to evaluating cooperation tools used in courses between the control and the experimental group.*

Results of evaluating courses as a whole are contained in Table 14 (hypothesis $H2_{01}$). We can observe that there is not any statistical important difference between evaluating both the Czech and the Slovakia students in the both control and experimental group. Their evaluations do not differ. However, there was rejected the zero hypothesis between students of

both faculties at the control and also experimental group. It can be stated that total evaluations of courses by the Czech and Slovakia students are different. The Slovakia students have evaluated the courses as a whole statistical importantly lower as the Czech students (Table 14, Fig.31).

Table 14 Question-form of T-tests-overall

	Mean	T-Value	Z-Value	H_0
S control group	164,40	0,6902	-0,1092	Accept
S experimental group	160,20			
C control group	179,40	-0,0192	-0,1952	Accept
C experimental group	179,50			
S control group	164,40	-3,4746	3,3035	Reject
C control group	179,40			
S experimental group	160,20	-2,3523	2,3974	Reject
C experimental group	179,50			

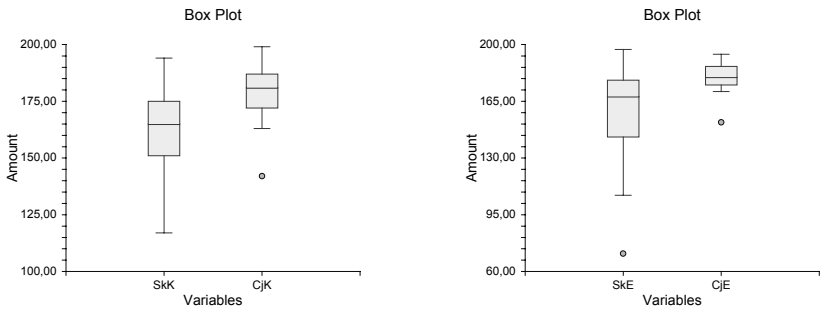

Fig.31 Box plot of evaluating courses as a whole - control groups of Czech and Slovakia students and experimental groups of Czech and Slovakia students

Table 15 contains test results of parts of courses focused on general information (hypothesis $H2_{02}$). The results are similar as for the evaluating courses as a whole. There is not any statistical important difference between evaluating the general parts of the courses by both experimental and control groups. However, we can observe a difference between appraisal of

the Czech and Slovakia students. The zero hypothesis was rejected here. Results are displayed also by means of Fig.32.

Table 15 Question-form of T-tests-general information

	Mean	T-Value	Z-Value	H_0
S control group	110,10	1,3726	-0,8656	Accept
S experimental group	104,20			
C control group	120,90	0,3389	-0,7812	Accept
C experimental group	119,80			
S control group	110,10	-3,5322	3,4437	Reject
C control group	120,90			
S experimental group	104,20	-2,6179	2,7887	Reject
C experimental group	119,80			

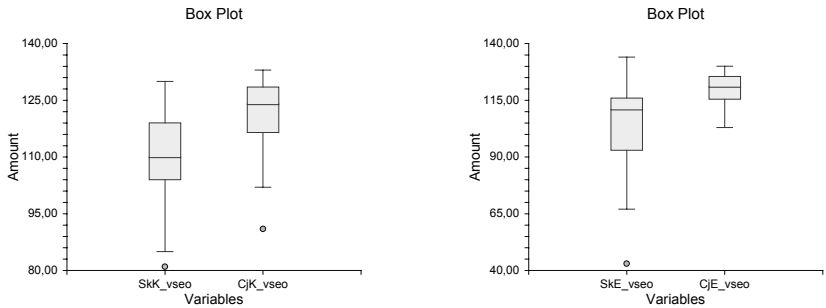

Fig.32 Box plot of evaluating the general part of the courses - control groups of Czech and Slovakia students and experimental groups of Czech and Slovakia students

The courses for experimental groups were enriched of tools for communication and cooperation. Because of that we were focused especially on evaluating hypotheses by means that students' opinions were evaluated quantitatively. Evaluating hypothesis focused on parts focused on communication is contained in Table 16. It is evident from the results that even if the courses for experimental groups were extended of tools supporting communication, the zero hypothesis ($H2_{03}$) was not rejected. The evaluations of the Czech and Slovakia students are different (Fig.33).

Table 16 Question-form of T-tests-communication

	Mean	T-Value	Z-Value	H_0
S control group	40,10	-0,9521	1,3592	Accept
S experimental group	41,90			
C control group	44,80	-1,1484	1,5323	Accept
C experimental group	46,20			
S control group	40,10	-2,8905	2,5902	Reject
C control group	44,80			
S experimental group	41,90	-1,9865	2,1027	Reject (Mann-Whitney)
C experimental group	46,20			

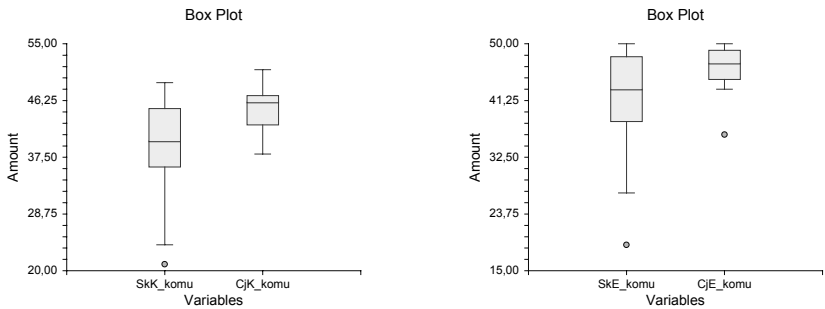

Fig.33 Box plot of evaluating the communication part of the courses - control groups of Czech and Slovakia students and experimental groups of Czech and Slovakia students

The cooperation was represented by creating Wiki according to randomly created groups in the courses for experimental groups. Testing hypothesis $H2_{04}$ (Table 17) having finished, we may state that using the Wiki tool did not affect the evaluation of course parts for cooperation. There had not been rejected the zero hypothesis in any of the tested cases.

Table 17 Question-form of T-tests-cooperation

	Mean	T-Value	Z-Value	H_0
S control group	14,20	0,1535	-0,2936	Accept
S experimental group	14,20			
C control group	14,20	0,2566	-0,4109	Accept
C experimental group	13,50			
S control group	14,20	0,8776	-0,4628	Accept
C control group	13,70			
S experimental group	14,20	1,0425	-1,1319	Accept
C experimental group	13,50			

The subject of our interest was also comparing frequencies of accesses to the courses. We went from the hypothesis:

H3: *We suppose that students who utilizes an e-learning course with specific (communication and cooperation) tools shall have often spent more time at the course than the students who worked at an e-learning course without those tools.*

We had formulated a new hypothesis for testing number of accesses:

$H3_0$: *There will not be any statistical important difference between the number of accesses to an e-learning course at experimental and control groups.*

There were tested both experimental and control groups and consequently compared the control groups (Czech ones and Slovakia ones) and the experimental groups (Czech ones and Slovakia ones).

Basic features of variables under test are contained in Table 18, test results are then summarized in Table 19.

Table 18 Descriptive features

	Mean	Standard Deviation	Minimum	Maximum	Range	Median	Modus
S control group	131,60	20,30	89	167	78	133	-
S experimental group	169,90	24,09	115	203	88	178	-
C control group	143,50	62,77	35	251	216	164	-
C experimental group	178,10	45,83	80	260	180	189	-

Table 19 Results of T-test and Mann-Whitney test for $H3_0$

	Mean	T-Value	Z-Value	H_0
S control group	131,60	-5,8820	-4,5448	Reject
S experimental group	169,90			
C control group	143,50	-2,2156	2,0836	Reject
C experimental group	178,10			
S control group	131,60	-1,2630	-1,2537	Accept
C control group	143,50			
S experimental group	169,90	0,7737	0,9479	Accept
C experimental group	178,10			

There is evident from the results that the zero hypothesis was not confirmed between control and experimental groups (of Czech and Slovakia students). Because of it we can state that the experimental groups of students attended the e-learning courses more often. This result implied logically from contents of the experimental courses, where the students shall have participated on discussions, chats and WIKI. It is evident from Table 19 that the Czech students in both experimental and control group attended the course more often than the Slovakia students.

We were also interested in the access layout, i.e. if the students used the courses continuously during the semester or in certain periods only. Fig.34-37 show the access layout for all the courses being utilized for the purpose of the pedagogical experiment.

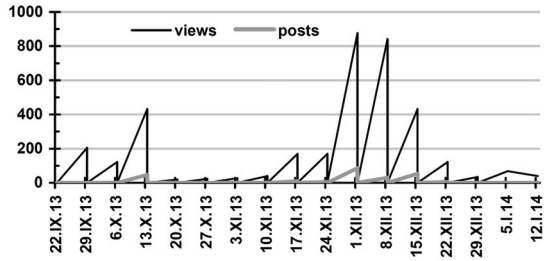

Fig.34 Frequency of accesses to the course - Czech students - experimental group

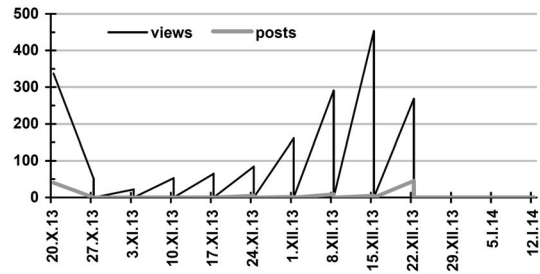

Fig.35 Frequency of accesses to the course - Czech students - control group

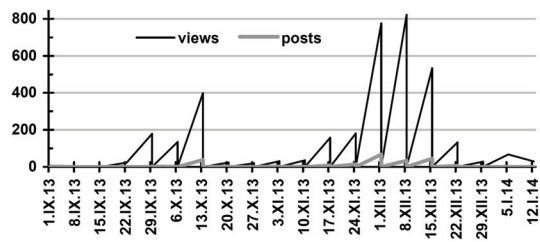

Fig.36 Frequency of accesses to the course - Slovakia students - experimental group

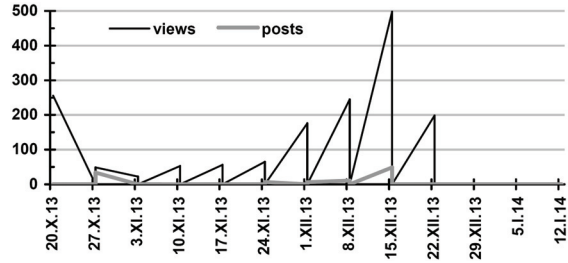

Fig.37 Frequency of accesses to the course - Slovakia students - control group

Displaying the frequency of accesses is similar for all courses. At beginning the semester students register themselves in the course and trace conditions for meeting subjects and course contents. The number of accesses is then increasing to the semester end because of fulfilling the subject conditions.

The experimental groups had their courses enriched of specific tools focused on communication and cooperation. Frequencies of utilizing those tools in particular experimental groups are contained in Fig.38.

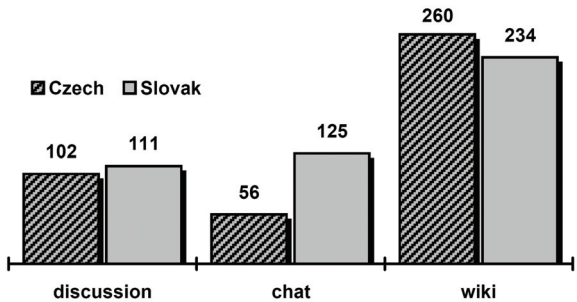

Fig.38 Comparing numbers of accesses to specific tools of e-learning courses

8.5.2 FOCUS GROUP - REFLECTION OF SPECIFIC TOOLS

The focus group consisted of five female students of the experimental group from the Faculty of Education of the University of Hradec Králové. There were female students of the fourth year who passed teaching most of the subjects under supporting e-learning courses from the first year. They had known the Moodle environment and the Forum tool which is intended for leading off-line discussions and used them especially for the feedback practice. Another focus group consisted of five female students fro the experimental group of the Faculty of Education at the University in Prešov, who are studying the two-year-MA study.

We wanted to obtain the students' feedback to the introduced tools The e-learning courses mostly contain basic study materials completed with references. self-tests, tests and home-work (see analysis of courses). The students are currently accustomed to work with those materials and evaluate them very positive. *„Well, we have the materials together and do not have to find for something for a long time," „we cam print the materials and write our comments in that," „we can download necessary texts according to references."*

Self-tests are used less, mainly before a commended test: *„I sometimes makes a self-test," „I am making the self-tests before a written exam, i.e. before a credit test," „It is cool, I will try to click the test on my computer and then I'm cleverer at the credit test."* If the teacher uses tests continuously, the responses are more inconsistent: *„Every-week-tests are a little stressed...," „if we must write tests continuously, it forces us to be always alert...," „I have been accustomed to tests during the semester, in forces us to study continuously...," „one must think about it during the semester in order not to forget, however there in one test less in the credit week."*

Submitting tasks - seminar papers did not any difficulties: *„The file I can upload without any problems, but firstly I was afraid whether it comes," „firstly I was not quite sure whether I had correctly uploaded, but now it is OK."*

Forum as a discussion tool is relatively proved at the the Faculty of Education at the University in Hradec Králové. Students used it for a practical feedback especially for appraisal of continuous practice in the fourth year. The students are accustomed to open evaluating their practice and approaches of the teachers. They work with the Forum regularly, they even add photo - documentation of their practice, interesting situations in a classroom or photos of pupils' works. Opinions of using the Forum tool have been positive: *„I quite enjoy to discuss in the Forum, I have already accustomed that even teachers respond," „it is not so*

informal as the Facebook, but I enjoy reading opinions of my fellow-students and their experience," „I thing one will have to become accustomed to discuss and give his/her opinion to something."

Chat has been introduced as a tool so far not used at any of the Faculties. Students have become accustomed to use the Facebook and other social networks.They have a comparatively critical opinion to the chat in the Moodle: *„The chat in Moodle can see a teacher, the chat in the Facebook cannot see anyone and because of that we as fellow-student prefer to use the Facebook,where we have established a special group, I do not like to go to the Moodle for a chat, because I have it connected with the school, because there is only work there, but in the Facebook there is a combination of work and amusement."*

Wiki - the tool for cooperative teaching has not been used so far in the Moodle either at the Faculty of Education at the University in Hradec Králové either at the Faculty of Education at the University in Prešov. Cooperative teaching is not common in general. In terms of the experiment we had tried to introduce this teaching method by means of the e-learning environment. The students fulfilled the task though, they created WIKI pages, however their responses were embarrassed: *„We got together and agreed and one of us fulfilled that," „we did not even understand that it should facilitate our work," „I think we should learn to work with it more, to try it on some more informal topic, I know from ma practice that children enjoy cooperative teaching, but there was not much on it for us."*

We were also interested in recommendations of students how to make teaching supported by an e-learning course better. We partly expected their opinions and because of that they have been instructive for us:

- *„The education as a whole-life tendency should not differentiate: now I am studying for school and then for my life because of that the LMS should take it into account and make it more interesting and possible for a combination of the private and the school life,"*
- *„when the Moodle is used at school, then from the 1st years the teachers should show possibilities how to use it for communication, cooperation… not only You have materials and tests there and it is all! We should work with the Moodle from the very beginning in terms of every subject. We as students of the fifth year did have to remember passwords for the Moodle which we had entered very long ago…,"*
- *„as we had training in using the MAIS information system in the first year, so we should have training in Moodle now, e.g. as a part of our matriculation. The Moodle should be*

used by teachers more in order not to loose continuity and not to forget passwords, the way of work…!"

We wanted to understand opinions and relationships of responders in the focus groups to the e-learning courses and especially to didactic tools used in terms of the "Didactic of information and communication technologies" subject. We state in a short summary that all inquired teachers have had a positive approach to e-learning courses as a support of teaching and they have taken them as an integral part of teaching. They have also been aware of conditions which are to be met for effective work at these courses. It is evident from their opinions that the specific tools must have been introduced since the first years as an integral part of courses, the students have to become accustomed to their using.

8.6 FINAL SUMMARY OF RESEARCH RESULTS, INTERPRETATION AND DISCUSSION

The main research target consisted in founding the affect of utilizing the LMS Moodle specific tools on subjective evaluating the e-learning courses in point of view of pedagogic students for elementary schools, namely the students from the Faculty of Education of the University in Prešov and the students from the Faculty of Education of the University in Hradec Králové. In order to meet that target, we went from partial intentions and proposed research circles: The research survey consisted of three part studies, comparing knowledge of students obtained under supporting an e-learning course, a question-form survey focused on subjective evaluating the e-learning course and an interview in the focus group. We had selected this version in order to obtain a more comprehensive view at the problems under the research.

How did students' knowledge change?

We pursued results of knowledge tests at all the groups and then compared average values of total scores by means of Student's t-test and Mann-Whitney's test. There was not confirmed any statistical important difference between the control group of the students of the Faculty of Education in Prešov (average score 56.0, standard deviation 9.51) and the experimental group (average score 51.5, standard deviation 12.47). On the contrary at the Czech students there was confirmed the statistical important difference between the control group (average score 79.7, standard deviation 18.38) and the experimental group (average

score 94.6, standard deviation 7.67). We supposed that using specific tools could evoke better students' interests in the subject and because of that a higher study effort as well. There has been increasing knowledge in general here (Table 20), however it cannot be due utilizing the specific tools.

Table 20 Comparing results of the pretest and the post-test

	Mean pretest	Standard Deviation pretest	Mean post-test	Standard Deviation post-test	Differencee
S control group	48,40	9,85	56,00	9,51	7,60
S experimental group	46,60	11,20	51,50	12,47	4,90
C control group	50,10	10,09	79,70	18,38	29,10
C experimental group	51,00	7,97	94,6	7,67	43,60

How do specific tools of LMS Moodle affect subjective evaluating an e-learning course by students?

There is neither diverse evaluation of the complex nor its parts between the control and the experimental group. There was not proved any effect of using specific tools on the evaluation of the e-learning course. There was evident according to interviews with students that using the specific tools except for the Forum tool had been new for the students, they had not met with those tools in any course so far and in our opinion that was the main effect on the subjective course appraisal. The chat has been used by students in diverse forms, its utilization at the course cold be affected by the teacher's presence. The students mentioned during the interview that this tool could be more suitable fir them if the chat could be opened for the students only.

Is subjective evaluating an e-learning course with specific tools by Czech students different from the subjective evaluation of Slovak students?

There was evident from results that the evaluations of the Czech and Slovakia students were different, namely in reference to the total course evaluation and to the part of general information, communication tools. The WIKI evaluation (the tool for cooperation) was not different. The Czech students had evaluated the courses higher in general than the Slovakia students. According to our opinion it is connected with the number of courses being utilized by the students and there is a custom to use blended learning in general. In terms Faculty of Education at the University in Hradec Králové of the European Union project of "Innovations and globalization of the professional training the teacher in the 21th century" at the Faculty of Education at the University in Hradec Králové there have been created e-learning courses to all the teaching subjects expect for upbringing. Students then are working at the courses and using common tools.

What time did students spend in the e-learning course?

If we compare particular statistics of the coursed which shows the frequency of accesses to a course during some periods of time, we will not find any essential differences (Fig.39). Students of experimental groups had more accesses, it was given by utilizing specific tools. They were connected in discussion panels, used the chat and created the seminar paper in terms of the WIKI. The frequency of their course attendances was increased in the semester end, when they submitted tasks and prepared themselves on the final test.

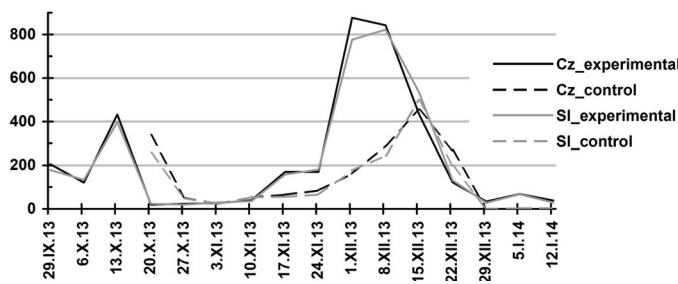

Fig.39 Frequency of visits courses

9 CONCLUSION

Today's world is marked with a rapid development of the next generation of distance education. Thanks to the possibilities to transfer multimedia content via cable TV, satellite or most notably internet, nowadays there are almost ideal conditions for modern forms of distance learning. With the advent of affordable technical solutions for digital communication a number of distance learning possibilities aroused for anyone anywhere in the world.

Information and communication technologies have brought new quality into educational process. During direct learning it is the teacher who mediates the subject matter with their activity (voice, mimics, the choice and application of teaching methods) and with the help of material didactic tools. The use of these tools as well as the teacher's authority influence, to a certain degree, what and how is learnt by students. The use of e-learning in educational process requires specially prepared and adjusted materials, elaborated didactically, methodically, psychologically, graphically and socially to correspond with the demands of students for self-study materials. However, the "human factor" is frequently missed by the students, therefore modern LMS systems have implemented tools which enable teachers to have a closer contact with students whilst using e-learning technologies.

The present publication analyses e-learning as one of the possible uses of information and communication technologies in educational process. Its theoretical part discusses the issues of technology-based education, the use of e-learning in various fields of education, and offers a course creation perspective. Furthermore, this part addresses the topical understanding of the term Learning Management System and its related trends.

The first empirical study compares learning support systems; the following empirical part of the publication focuses on the specific tools used in the learning support systems. More particularly, the present study provides the insight into the use of communication and cooperation tools. The publication suggests that courses composed only with basic tools (file, tasks, tests, URL links) do not respect significant aspects of learning in virtual environment and do not use the full potential offered by the Learning Management Systems. The authors assume that the use of specific tools in e-learning courses may contribute to generally positive understanding of the whole course.

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RESUME

The impact of information and communication technologies, most notably the internet, on contemporary society including educational system can be marked as phenomenal.

The implementation of new technologies into learning is a subject of expert discussion with different conclusions. On the one hand, there is full support of ICT integration into education; on the other hand, there are voices that approach the issues of massive ICT implementation into learning with care or even with scepticism.

It can be argued that the potential use of latest online technologies can be compared to the use of television, radio or printed media, which is considered to be a common aspect of our everyday life, and it is purely individual whether they become "a good servant" or "a bad master." In the context of the young generation, also called "multitasking" or Y generation, it is provoking to scrutinize their understanding of new technologies in learning; in this case it is particularly blended learning as a method not only for mediating information, but mainly for bringing new possibilities in communication and cooperation via the Learning Management System.

Information and communication technologies have brought new quality into educational process. During direct learning it is the teacher who mediates the subject matter with their activity (voice, mimics, the choice and application of teaching methods) and with the help of material didactic tools. The use of these tools as well as the teacher's authority influence, to a certain degree, what and how is learnt by students. The use of e-learning in educational process requires specially prepared and adjusted materials, elaborated didactically, methodically, psychologically, graphically and socially to correspond with the demands of students for self-study materials. However, the "human factor" is frequently missed by the students, therefore modern LMS systems have implemented tools which enable teachers to have a closer contact with students whilst using e-learning technologies.

The present publication analyses e-learning as one of the possible uses of information and communication technologies in educational process. Its theoretical part discusses the issues of technology-based education, the use of e-learning in various fields of education, and offers a course creation perspective. Furthermore, this part addresses the topical understanding of the term Learning Management System and its related trends.

RESUMÉ

Dopad informačních a komunikačních technologií a zejména internetu na současnou společnost, vzdělávací systém nevyjímaje, lze označit jako fenomenální.

V odborných diskuzích zaznívají na implementaci nových technologií do výuky odlišné názory. Na jedné straně se setkáváme s podporou začlenění ICT do vzdělávání a naopak zaznívají i názory, které k masivnímu využívání ICT ve vzdělávání přistupují opatrně, ba až skepticky.

Podle našeho názoru, je možné využívání nejnovějších online technologií přirovnat k používání televize, rozhlasu, či tištěných médií, které považujeme za přirozenou součást našeho života a je na každém z nás, zda se v našem životě stávají "dobrým sluhou", nebo naopak "špatným pánem". V kontextu současné mladé generace, která je považována za "multitasking" generaci, Y generaci, považujeme za zajímavé poodhalit její vnímání na využití nových technologií ve výuce, v našem případě blended learningu jako na metodu nejen zprostředkující informace, ale jako na metodu přinášející nové možnosti komunikace a kooperace prostřednictvím systému pro řízení výuky.

Informační a komunikační technologie přinesly novou kvalitu do vzdělávacího procesu. Při tradiční prezenční výuce zprostředkovává učitel obsah látky vlastní aktivitou (hlasem, mimikou, výběrem a aplikací učebních metod) a pomocí materiálních didaktických prostředků. Způsobem jejich využívání a vahou své autority do určité míry ovlivňuje, co a jak se studenti naučí. Využití e-learningu pro podporu výuky vyžaduje i speciálně připravené a upravené studijní materiály, které jsou po didaktické, metodické, psychologické, grafické a v neposlední řadě i sociální stránce zpracovány tak, aby korespondovaly s požadavky studentů na samostudium. Mnohdy ale "lidský" faktor studenti postrádají a proto moderní LMS systémy mají implementovány nástroje umožňující vyučujícím bližší kontakt se studenty i prostřednictvím technologií.

Předložená publikace analyzuje e-learning jako jednu z možností využití informačních a komunikačních technologií ve vzdělávacím procesu. V teoretické části jsou diskutovány otázky vzdělávání prostřednictvím technologií, využití e-learningu v různých oblastech vzdělávání a pohled na tvorbu kurzů. Nechybí ani aktuální vymezení pojmu Learning Management Systém a s tím související trendy.

Název:	New perspectives on communication and co-operation in e-learning
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Návrh obálky:	Lenka Drtinová
Vydal:	ExtraSYSTEM Praha
Rok a místo vydání:	2013, Praha
Tisk:	Tribun EU, Brno
Vydání:	první
Rozsah:	164 stran
Náklad:	250 ks
AA/VA:	AA 9,84 (text 9,08; obrázky 0,76)/ VA 9,95

ISBN 978-80-87570-16-6

9 788087 570166

ISBN 978-80-87570-16-6