Virtual learning: Possibilities and realization

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Abstract In the article it was important to consider two basic moments i.e., impact mode of using virtual environment at training process within one faculty of the University, directly at training quality and what outcomes can be reached therewith. The work significance consists of studying the virtual environment effect instead of traditional educational outlook and on-lining training in pedagogical sphere. We consider virtual (digital) educational resources, their potential adaptation to trainee’s personality and realization during academic process at the university. Virtual training at the university is a total of virtual educational resource. Information and educational interaction exists in the process of subjects and objects interrelation. An integration of information and pedagogical technologies takes place in the process of subjects and objects interrelation. Herein the training is connected with such human activity spheres as intellectual, cultural, emotional, social.

Keywords Virtual learning · Virtualization of education · Multimedia educational production (digital educational resources) · E-learning · Higher education

1 Introduction

In the contemporary world the idea of virtualization is considered and studied in philosophy, psychology, physics, biotechnology, arts, etc. Specific properties of virtual...
reality are its creation, actuality, self-reliance, interactivity. Virtual training process properties can be distinguished into the following key features:

- tentative uncertainty for subjects interaction;
- unique interaction for every type of their interaction including it with real educational objects;
- existence only during direct interaction.

Training process itself is the virtual as it includes subject-object relations. Virtualization of the given process is the virtualization of education.

The virtual educational environment is as a set of information resources provides complex methodical and technological support of educational process, educational process management, and also its quality. Therefore, it is possible to say that the virtual learning environment carries out the following functions: information and training, communication, control and administrative. Virtual interaction between educational process participants with help of information and communication technologies is implemented in virtual learning environment. The information and educational environment is the common information space and the virtual learning environment is considered as its part. The virtual learning environment is characterized by existence of virtual training environment, that is a complex of computer tools and technologies, which allows to control the educational environment content and communication of educational process participants (Burnett 2011).

Nowadays virtual learning environment represents a multipurpose system. Specific pedagogical, didactic and methodical technologies, necessary information resources (data and knowledge base, libraries, electronic training materials), modern software are implemented within this system.

Virtual education has many similarities with distance learning. However, in comparison the interaction between subjects and objects happens in real time, by directly interaction between the teacher, student and studied objects. At the same time, it should be considered that the teacher can act instrumentally, i.e., the teacher can be replaced by digital medium, computer program, etc. (Stacey and Gerbic 2007).

The international experience in the sphere of virtual learning is widely represented in a number of scientific articles. Rune Baggetun, Stig Mjelstad reports a novel perspective of integrating digital media in education (2006). In a research and development project they developed and tested a new tool (eLogg) aimed for use in primary and lower secondary schools. Cathy Burnett (2011) explores how different discourses may have patterned a group of students’ experiences of VLEs. She explores the student identities they associated with digital environments and the power relationships which seemed to pattern how they positioned themselves (or felt positioned) as learners. Michail Kalogiannakis (2004) presents a study about the new roles that some French physics teachers develop in class when they use ICT. The presence of ICT in class practice seems to affect both the role of the teachers and how they teach. Virtual Reality in math education have been considered by Kaufmann et al. (2000), Bouta and Retalis (2013). Modern electronic learning is connected with Learning Management System (LMS). Lyashenko and Frolova (2014) dwells upon the importance of needing to be aware of peculiarities of human development in applying IGL policies to education. Using learning management systems in business and economics studies in Hungarian
higher education is studied by Judit T. Nagy (2014). She considers all uses of LMS in teaching Business Mathematics in Hungarian undergraduate training from the point of view of the instructors. Her study – consistent with other studies – shows that LMS was commonly used by instructors for text-based communication and for delivering text-based learning materials.

Virtual learning is a process and result of communication of educational process participants in the virtual environment. Virtual learning is distinguished by the following advantages: mobility and interactivity of training environment, distance of learning, existence of information educational resources.

The purpose of virtual learning is to identify its place and its achievement of destination in the real world, including its virtual component by a person.

Multimedia learning production in the type of the digital educational resources is implemented in virtual training. Digital educational resources act as an objects of virtual reality and interactive modeling, cartographic materials, sound recordings, symbolical objects and business graphics, text documents and other training materials, which are necessary for the organization of educational process. The digital educational resource is considered to be an information object. If we consider that virtual training has an informative character, the learner’s main objective is to learn to use not only an access to information as source of knowledge, but also to use given information, which is not always structured and organized, and often may have unsatisfactory characteristics.

This article tries to reveal opportunities and plan ways of virtual learning implementation in higher education institution. The mobility of today’s university environment has put the problem of how to teach students outside the classroom? How and by what means to provide training to obtain the necessary amount of knowledge of students, regardless of the time intervals and distance and location of the learner?

We have tried to organize such training for the internal environment of the University with the help of web conferencing, video lectures, on-line seminars.

The motive for the study was the prospect of using a virtual environment for teaching students outside the university, for inclusive education. The purpose of our work is to explore the data on the organization of virtual learning, consider the organization and conduct webinars, video conferencing, chatting work with different categories of students. It was necessary to consider what kind of results and outcomes achieved by both teachers and students.

2 Methodology

In our work two categories of educational process participants were researched—students and teachers, and also an educational process of higher education institution itself. We traced the changes (social and adaptive, pedagogical, psychological and communicational), which had happened with educational process participants due to using new information technologies and involving students and teachers in a virtual environment of the training.

To clarify the results of our work we used different research methods. Our research was conducted in two stages: preparatory and experimental. At the first stage it was important for us:
1) to find out the level of students’ readiness and teachers to acceptance and applying of new information technologies;
2) anxiety level while using new information technologies;
3) to provide a preparation for reflective educational process management.

At this stage, a questionnaire of 64 students and 12 teachers of various age categories (28–65 years old) helped us.

By the end of the first period of the research, which lasted for an academic year we checked effectiveness of proposed techniques. Interrogation, survey questionnaire and students’ results of bachelor and magistracy allowed to define more preferred motivation criteria for using and realization of the virtual learning technology.

3 Main part

3.1 Virtual learning in the system of professional preparation for the future specialists

Virtualistics gives the opportunity for adequate inclusion of technologies of computer virtual realities in all spheres of human life: education, medicine, biotechnologies, etc. For instance, E. Blinnel developed virtual reality training platform as Fraunhofer IFF Learning platform (2010). Berns A., et al. in their works an experience with game design was presented as an application of 3-D virtual environments, and its impact on students’ motivation and learning. According to these authors’ opinions virtual space should be used to give students a basic preparation in the study of different language skills (2013). Jara C.A. et al. described virtual and remote laboratory called RobUALab as a web tool organization of practical experience of students in automation and robotics (2011). Fabrizio Consorti, et al. developed a meta-analysis of randomized investigations aimed to reveal and evaluate the effectiveness of virtual patients (VPS) as an alternative method in medical education (2012). As the results of virtual learning (as any other type of learning) student receives the necessary sum of knowledge, abilities, and gains professional competences. However, these results are not defined as forms of educational activity, but as basic philosophical meanings, building educational process.

As a result of virtual learning (as well as of any other form of training) a person receives necessary amount of knowledge, skills, acquire vocational competence. However, ultimate result of personal formation is determined not mainly by the form of training activities but rather by basic philosophical senses, on which the learning process built.

In this meaning, philosophical aspect of virtual reality as the basis of virtual training is important. Only in this case it is possible to speak about cultural aspect of educational system development. For creation of philosophical model of virtual learning it is important for us that the method of cognition is defined by cognizable object - concentration, not by who cognizes - such kind of conclusion contradicts existing ideas about cognition in modern school. Any object is capable to bring the person for understanding the internal meanings of life. Thus, there is no unified for everybody scheme of cognition education.
Theoretical and philosophical frameworks of virtual training are considered by Levy, Zanine, Rosa (2011). Some general principles and practical methods are important for virtual training. They can be significant for identifying virtual learning preconditions: a person’s attitude towards the world - sample of a pedagogically planned state; the content of education has gradual spatial expansion.

First of all, virtual learning is a process of human movement to new, unknown, implemented things because his interaction with the real world. In a broader meaning, a person’s virtual learning is considered as an expansion of his inner world to external level, and interpenetration of micro- and macrocosms. Creation of spatial model of virtual learning leads to presentation of his inner world as a set of extending spheres: intellectual, emotional and figurative, cultural, historical, social and others. All of them are closely connected, movable and form virtual learning space of the person.

Nowadays virtual education takes an important place in the preparation system of the future specialists, during rapid growth of scientific and technical potential the need for the highly qualified specialists, perfectly knowing the subject is growing rapidly too.

The virtual learning has common educational aim - person’s reveal and achievement of his mission in the real world, combined with his virtual and other opportunities. Virtual learning in professional preparation of the future specialists has a subject direction, and represents «open» virtual university of individual that is implemented in the process of continuous education.

The necessity of continuous education in the personnel training is considered by Xinghong Liu based on virtual learning: virtual learning communities or online communities are used by a variety of social groups interacting via the Internet. Different virtual communities, like real communities, have different levels of interaction and participation among their members. An important characteristic of a community is the interaction among its members (2012).

In the virtual education student has online access to digital libraries provided with powerful search systems. Learning can be done at home, or where the Internet access is.

Nowadays there is a necessity for modeling the virtual educational environment of the university based on competence-based approach to training future specialists (Kerimbayev 2012). One of the ways in implementation of virtual education in professional preparation of future specialists is using of virtual reality technology, where highly realistic simulation of multi-component space of professional activity supports dynamic interactive interaction with the student. In the given process a complex of psycho-pedagogical conditions, forming motivational readiness of subjects of professional preparation should be implemented to the virtual learning opportunities.

Development of a virtual learning environment of the university is an innovative modernization of professional preparation of future specialists, directed to improvement the quality of professional education.

Development of the virtual learning environment of the university should be built by taking into account the properties of the virtual reality, assuming the development where should be the phenomenon of the virtual worldview.

The virtual learning environment is implemented in pedagogical interaction, an invariant in space and time, interactive, epistemological and ontological independent (Kerimbayev and Akramova 2013). These attributes provide optimal conditions for the construction of various models and diversified and variable virtual learning programs.
At the same time, it should be taken into account that the virtual reality creates new forms of activity of the mind and consciousness, and reverse impact on the breed of their factors on human life. The virtual learning environment affects human cognition and transformation of reality, the activity of the individual, his self-worth, self-determination, self-realization. Therefore, a virtual learning environment of the university should be based on the recognition of the humanistic essence of personality-oriented professional education.

The virtual learning environment of the university consists of the main components: informative, integrative, communication, coordinating, developing and professional-orienting. The given cognitive and logical-subject components provide formation of individual conceptual system of professional knowledge, skills as the bases of the gained specialty.

When organizing a virtual learning environment of the university, educational models, methods and techniques of training the future specialists should be focused on the implementation of the virtual learning opportunities and provide a reflexive control of the educational process.

The virtual learning environment as a part of unified information space of the university can improve the training quality through the modernization of management, educational processes in an educational institution.

3.2 Virtual training possibilities

What are the possibilities of virtual education and what are the benefits of learning with the using of virtual technologies? First of all, it is necessary to distinguish the psychological and pedagogical possibilities, providing possibility of generating virtual images, developing theoretical, intuitive, creative virtual thinking of the learners.

According to the functional capabilities, the virtual training provides system, implementing complex interdisciplinary virtual training; resource, providing possibility of extension and deepening formal-logical reflection of causality connections of object function in virtual models with the using of digital educational resources of the virtual learning environment.

Such activities as poly-subject and mono-subject activities are implemented in the process of virtual training. Poly-subject activity is focused on the personal interaction model and provides the ability to perform the communicative interaction of educational process. Mono-subject activities are focused on self-development and self-realization of the individual and provide the ability to optimize students’ independent work within their interaction with the distribution of electronic educational resources.

The effectiveness of implementation of the virtual learning in the training of future specialists can be evaluated on the following criteria:

- formation level of motivational readiness of professional training subjects for implementation the possibilities of the virtual learning, as its intensification;
- organization of complex interdisciplinary virtual learning on the base of competence-based approach within the content of professional tasks, realized by the module and micro module of academic disciplines;
- the development degree of information and technological skills and abilities for the realization of the virtual learning possibilities;
creative activity and independence of the future specialist in implementation of possibilities of the virtual education.

4 Virtual training technology

4.1 Realization of virtual training possibilities

The realization process of the virtual learning opportunities in the preparation of future specialists is based on the system, subject-activity, differentiated, individual, procedural, and competence approaches.

The implementation technology of the opportunities of virtual learning in professional preparation of future specialists includes the following set of interrelated and interdependent structural components: the classification of the virtual training opportunities in professional preparation of future professionals; levels and stages of the implementation of virtual learning opportunities in professional preparation of future professionals.

Virtualization of education at the moment is a combination of full-time, distance education and self-education, which is caused by the rapid development of telecommunication systems, multimedia, mobile network (on-line) communication, etc. Here is an example of the portal “Virtual learning” created by the authors based on higher educational institution (Fig. 1).

The illustrated portal provides the ability to search and access all the necessary information on the topic of interest. The curricula, glossaries, articles, books (scanned for full-text reading), information about personalities, analytical and scientific-methodological centers are presented here. The structure of the portal is directed to interactive information content.

The specificity of this portal gives the ability to provide educational resources for learners «at a distance», opens an additional opportunity to study optional subjects from
the curriculum of the university, the original author courses and training materials. «Virtual learning» portal provides an advanced virtual infrastructure, including an electronic library, participation in on-line electronic conferences.

The opportunity to combine conducting traditional classes as well, as the virtual ones is presented for a teacher in the developed and offered virtual educational system. The teacher opens the site, connects to the system (video conference) and conducts usual classroom teaching. Students and postgraduates, who are not in the auditorium and who have access to the system, just connect up and «attend» the class in virtual mode, according to the schedule with other students. One of these fragments is shown in Fig. 2.

The realization of the given virtual training allows implementing the principle of students’ and postgraduates’ academic mobility, to introduce and implement the practice of double-degree education in the system of higher education institution. This allows students and postgraduates to get internships and training in leading universities abroad without interruption from their place of study. How is the system of virtual education that we created, implemented in the organization of the educational process on a chair? In 2012, in the midterm, four the 2nd year postgraduates specialized «Computer Science» were granted a 2-weeks practical study in Spain. Due to the website we created, all these undergraduates passed the planned curriculum and the course material without lags from other students.

Using this system, a postgraduate called Aigerim S., who had a long training trip in India, finished the second term of 2013 in a virtual mode, and passed the examinations through an on-line testing, which is one point of the contents of the developed site.

Notably, a promising direction in the implementation of the virtual learning is the implementation of inclusive education, an access to the educational process for students with disabilities and students who are unable to attend classes due to illness or other valid reasons.

The site is presented with the text chat which allows to chat during conducting of virtual learning. The chat supports a large number of concurrent user, due to the
asynchronous architecture in real time. The written message is received by others at once. Multiple users can communicate with each other in one chat room at the same time. During the lesson, students operate the chat to discuss the student’s material, expressing their opinions and views on a particular issue. Undoubtedly, it should be interesting to make communication pleasurable. Having analyzed the record while chatting online any student can make conclusions about the mastering of educational material. Figure 3 shows an example of a remote participant in the chat, but who is directly involved in the exchange of information in virtual mode.

Chat was used as a tool for virtual training. If initially it was used to support social communication, comment, further it was developed and became an auxiliary tool for the online seminars and conferences.

Video conferencing system includes the hardware and software components. According to the number of participants videoconferences were as follows:

- Personal (dialogue between the two parties);
- Group (communication between groups of participants);
- Studio (one speaker to the audience.)

Videoconference is organized by Open Meetings - server for the local network or the Internet, which allows utilizing an Internet browser, the Adobe Flash Player plug in. Open Meetings – server for the local network or the Internet- used for conferences.

Open Meetings allows you to apply the Internet browser plug-in Adobe Flash Player, creating different types of audiences. Members of videoconferencing can display documents, put to use graphics, control your TV screen and video conferencing.

The e-learning system can provide interactivity of educational process, to structure specific content and its modularity, repetition of the learning material several times, self-control and analysis of educational achievements, the privacy of an individual educational process.

![Image of a chat window](image.png)

Fig. 3 Fragment of lesson through chat learning
Distance learning, conducted in remote access, requires the organization of high-quality sound and picture. This can be achieved by using high quality cameras and audio communication devices that provide Wi-Fi-quality audio and full-motion video (Kerimbayev et al. 2014).

Electronic learning (e-Learning) can reduce the significant shortcomings of educational process.

In the development of ESU (Electronic System of Education) is important to highlight the following aspects:

- Methodological;
- Economical;
- Technical;
- Technological;
- Methodical.

Conducting lessons in on-line mode increase students’ cognitive interest and activity. The using of information and communication technologies of training presupposes existence of teachers’ skills to use computer technologies and interactive digital learning environments. Practice and experience show that students possess skills of working with computer, and sometimes become even more informed of latest updates in modern web technologies than other teachers. Today enough experience of using computer technology in training is accumulated.

Good technical equipment of audiences, including connection to the Internet channel promotes learning information and communication technologies, opens possibility of combining many studied subjects that makes it possible to fully realize their creative potential. Using computer technology training fully integrated training is implemented, which further allows to go from an isolated consideration of a various phenomenon of reality to their interconnected, complex study.

4.2 Testing virtual education technologies

It was important for us as developers of technology of virtual training in the high education institution, to know what kind of response the proposed technology has among teachers and students. Testing of virtual training gained good results and positive feedback from colleagues using the proposed technology in their own teaching practice. However, in the early stages of the introduction of technology, we are faced with such problem as the unwillingness of teachers to turn to account innovation in their work. Teachers of the older generation showed some conservatism and fear.

Therefore, we started the work on the implementation of technology with training seminars, where we tried to show and explain the benefits and need for the introduction of virtual education. After the workshop, we decided to investigate the motivational drivers for the development of the proposed technology. We distinguished the main criteria of motivation: an increasing interest in the proposed technology and the desire to learn new information technology (1), the possibility of self-improvement and raising their qualifications (2), providing students with a variety of forms and means of education (3), showing «solidarity» with teachers, colleagues, using this technology.
(4). To conduct the survey, we have identified two age categories - till 40 years old and more than 40 years old.

Oddly enough, but some older teachers showed the highest level of motivation to master the technology of virtual training by choosing categories 1 and 2.

The diagram below reflects the percentage and reflects the presence of motivation among teachers of different age categories (Fig. 4).

The experiment distinguished the interest of the younger teachers to explore alternative software and specialized application software.

The results related to the study of network technology, suggested the possibility and feasibility of virtual training. Indicators to assess the effectiveness of virtual education technology have the following results: increase in knowledge component, improving learning motivation, improving performance of the educational process.

“Virtual learning” portal can be positioned as a providing reliable access to the content according to the user’s interests, applications and services, organized in a unified one, offers a choice of educational content that corresponds to the requirements of state educational standards and requirements of the market, humanistic, which is associated with the development of the creative personality, civic education, moral and intellectual qualities of the future specialist.

Creating an educational portal “Virtual learning” is a logical step in the organization of a virtual learning environment at the higher education institution.

The most used and popular sections in navigating are the followings:

- Chat
- Tasks
- Lectures
- Library
- On-line test
- Conference

Among the “Course” section the students attended “Computer Science,” “Bases of e-learning,” “Creation and analyze of algorithms,” “Algorithms and their complexity,”
Theoretical bases of information learning means formation,” “Theoretical bases of information learning environment formation,” “Computer technologies of calculation in mathematical model,” “IT in education,” “Theoretical bases of Computer Science,” et al.

In the questionnaire we also asked students to indicate whether that resource had helped while preparing lessons, whether they had received the right material and the required information (Table 1):

| Visitors category | Yes, totally helped | Yes, partly helped | No, not helped |
|-------------------|---------------------|--------------------|---------------|
| Students          | 38 %                | 54 %               | 8 %           |
| Teachers          | 26 %                | 62 %               | 12 %          |
| Guest             | 42 %                | 55 %               | 3 %           |

5 Conclusion

Virtual training is a system of components provided by a set of integrated information and educational technologies to be implemented during interaction with subjects through virtual educational resources.

Opportunities and the realization of virtual learning provide complexity of construction and access to mass education, modularity, the ability to unify and standardize the developed teaching materials, their qualitative and quantitative upgrade; versatility and alternates.

It can be singled out the main components of a virtual learning, aimed at implementing the pedagogical principles and technologies of modern learning and training of future specialists. (Table 2)

Virtual training allows high-quality, transparent and available training. The presented virtual learning environment provides virtual learning, management of educational process and the quality control, directed on students’ professional development.

This article describes the experience of the introduction and implementation of virtual education technologies at one faculty of higher educational institution. We tried to show some positive aspects as well as problems arising from the implementation of

Table 2 The main components of virtual learning

| Main leading Idea | efficiency and intensification of training future professionals in the levels of diversification, variability, differentiation and individualization; |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Principles        | openness of virtual education, integrative and discreteness of virtual educational environment, scalability of virtual reality, individuality of adaptability of virtual reality technology, the cognitive activity of the subjects of professional training; |
| Tools and software| dedicated tools of hardware and software interface (Flash Player, Macromedia, Open Meetings, Moodle) and the possibility of computer virtual reality (WEB-technology, VR-technology). |
this technology. We think that the experience we have described may cause some interest in teaching circles, who seeks to implement a virtual education.

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