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**INTERACTION OF VIRTUAL SPACE AND MODERN
EDUCATIONAL ENVIRONMENT**

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Abstract

In the research problems of this article, the interaction of virtual space and the educational environment and the emergence of a new reality – the virtual educational environment – a set of tools, technologies that allow you to synchronize the content management of the modern educational environment and the communication process of users are updated and substantively studied. The global information environment expands the possibilities of interaction and transforms the educational environment into a virtual educational environment. This is a rapidly developing, multi-level, multifunctional system that combines pedagogical, didactic and methodological technologies specific for the interaction of participants in the educational process; information resources: databases and knowledge, libraries, electronic educational materials; modern software and training tools: software shells, electronic communication tools. It is important to emphasize that training in the latest information space is not antagonistic in relation to the available forms of training and does not reject educational trends at all levels of the educational system. In a modern knowledge-based society, it is necessary to connect people to distributed knowledge created in a social, virtual, digital environment and education. Trends in the development of the digital economy, virtual space, the digital economy, educational life itself, new learning needs affect the development of a methodology in the field of the education system, strategy, paradigm for finding new expressions of what is really important now, in the near and distant future, in relation to evolution of learning concepts for the digital economy.

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1. Introduction

1.1. Development of a regulatory framework for the development of the education system

In accordance with the concept of the Federal Target Program for the Development of Education for 2016-2020 (Concept of the Federal target program for education development for 2016-2020, 2016), among the tasks facing subjects, participants in the educational process, experts, the most important are: the foundation of structural and technological innovations in education; the development of modern devices for optimal interaction in the educational environment of higher professional and additional education; modernization of educational programs in educational systems aimed at achieving the modern quality of educational results and optimal results of social and professional growth (Somkin, 2019). According to Sorin Christie, normative support is a prerequisite for the optimal functioning of the educational environment and includes a set of axioms, laws, principles (design, implementation), rules that streamline the new reality in the education system in the context of building a methodology for researching specific sciences – social and human – at the macro level, micro level, including in empirical analysis (Cristea, 2017). According to Florica Orțan, the rationale for developing a regulatory framework is based on the vital need to resolve problems that arise in the areas between the educational and socio-professional activities of the young generation (Orțan, 2017).

1.2. Digital paradigm development

Strengthening modern higher and postgraduate education in an innovative strategy based on a focus on cooperation for continuous interactive communication in research and innovation is the key to competitiveness in the pan-European economy (Getso & Bakon, 2017). Virtual educational environments, developed from this point of view, will allow you to individualize, interactively orient the education system to complex activities (Ioyleva, 2014). Thanks to the use of multimedia, activities in the virtual environment and in the education system as a whole become at a higher level of communication, which allows this area of learning in the virtual environment to be included in the complex paradigm of virtualization and digitalization of education (Buryak et al., 2017). The development trends of the virtual space and the educational environment should cover information technologies that lead to new learning paradigms, among which is the new digital connectivity, that is, interaction in the virtual educational environment (Herlo, 2017).

2. Problem Statement

The scientific problem of the study is to resolve the contradiction between theoretical knowledge about the interaction in the virtual space in the educational environment and its application in practice, in particular, the theoretical component is associated with the lack of a clear mechanism for the study and description of communication technologies for the interaction of virtual space and the educational environment by empirical methods; the practical component is explained by the need to solve the problems of integrating communication technologies of virtual space into the educational environment using a set of research methods, including theoretical and empirical components.

3. Research Questions

This study addresses the following issues:

3.1. The genesis of the interaction process based on communication technologies and the formation of virtual space in the educational environment;

3.2. Studying the modern mechanism for expanding interaction based on communication technologies of virtual space and the educational environment when creating digital education;

3.3. Interpretation of the integration process of communication technologies of virtual space in the educational environment in the development of digitalization of education and analysis of the results.

4. Purpose of the Study

The purpose of the study is to conduct a comprehensive assessment of the content of the process of interaction between virtual space and the educational environment based on infocommunication technologies for optimal integration of virtual space and the educational environment.

This goal delivery implies the following task delivery:

4.1. Identification of the features of the modern stage of development of the educational environment, virtual educational environment and virtual space in the construction of digital education;

4.2. Description of the mechanism of interaction between virtual space and the educational environment;

4.3. Analysis of preliminary results of an empirical study of the interaction process depending on the level of integration of information and communication technologies in the educational environment, virtual space for optimizing digital education.

5. Research Methods

When performing the study, the following theoretical and empirical methods were used: analysis of sources and literature, synthesis, comparative method; quantitative sociological method: a survey; qualitative methods: focus group research.

6. Findings

1. Having studied the basic approaches of various authors, the authors understand the educational environment as a system of influences and conditions of personality formation according to a given model, taking into account the opportunities for its development contained in the social, educational and spatial-subject environment. The initial basis of the concept of the educational environment is the idea that the

mental and social development of a person during his training should be considered in the context of the ecopsychological and didactic approach “subject – environment”, which performs the following functions: adaptive, formative, educational. According to Panchenko (2018) the emergence and development of computer technology has had huge importance not only for the industrial production, but also to the other aspects of society: education, medicine, culture. The proper principles of organizing the living environment are an important means of socializing the personality of students in the continuing education system. The final synthetic characteristic of the educational environment is its effect on the subject, the inhabitant of this environment. The environment can both activate socially significant activity of students and, conversely, oppress it (Antonovskiy & Barash, 2019).

2. When analyzing the process of introducing interaction in the virtual environment into the educational environment, the works of the following authors were used as a theoretical and methodological basis (Zinchenko et al., 2015). Virtual space is a kind of intangible space that can be recreated only with the help of basic and additional means, such as virtual reality helmets, virtual reality glasses and so on and so forth.

3. Virtual reality (VR) – a technically created world (environment and objects), transmitted to a person through his sensations: vision, hearing, smell, touch, and others. Virtual reality simulates both exposure and response to exposure. To create a convincing complex of sensations of reality, a computer synthesis of the properties and reactions of virtual reality is performed in real time.

4. Virtual space is now at the peak of its popularity, many IT companies are engaged in both creating software for VR and creating various hardware to enhance the effect of user presence. The virtual world created using special technical means is transmitted to the user through his senses – the user can visually observe the artificially created 3D model of the surrounding world, interacting with virtual reality in real time. The innovative technology of interaction in the educational environment using virtual reality is actively used abroad in such social and humanitarian fields of science as medicine and education, etc. (Caraiane & Nicolae, 2017). The main features of such training are: orientation of the system to complete mastering of the content of educational material, including the requirement of full mastery the previous section as an indispensable condition for the transition to the next; individual work of the student at his own pace; use of lectures only for the purpose of motivation and general orientation of students; the use of innovative teaching aids – guidelines for the presentation of educational information in any form; current assessment of students' learning of material in sections of the training course by assistants (undergraduates, graduate students, students who have perfectly mastered the course).

5. The innovative and progressive nature of virtual reality is due to its features such as: the use of high-quality textures and high-quality three-dimensional models of objects; navigation that allows the user to move around in the world of virtual reality, to study objects from different sides, to approach or move away to the required distance; processing data on user actions in real time with the subsequent response of the virtual environment (changing the tilt of the head, using controllers, etc.). The learning management system (LMS) is the basis of the educational activity management system in the conditions of continuous interaction in the educational environment. Its main use is the development, management and distribution of online training materials with local access. The system may include more than many types of products

for training: individual tasks, design and research work, educational elements, books, teaching and test materials, essays, cases, and so on and so forth.

There are a number of LMS that carry out their distance learning via the Internet. Thus, the learning process can be easily carried out in real time by organizing online lectures, seminars and webinars. Distance learning systems (English e-Learning Management System, e-LMS) are characterized by a high level of interactivity and a high territorial and geographical coverage, allowing all subjects of the world who have access to the Internet to participate in the learning process.

Advantages of using advanced technologies in building the latest e-LMS systems:

- 1) the realism of the built virtual environment and conditions;
- 2) the efficiency of the resources used in comparison with real devices and mechanisms;
- 3) direct participation in the learning process;
interest in a new, modern approach to the educational process;
- 4) improving the quality of assimilation of information, the development of creative thinking, the ability to generalize and classify (Kovyleva, 2014).

6. The virtual educational environment, which is the result of the interaction of virtual space and the educational environment, allows you to create simple and intuitive systems for the perception and assimilation of new educational material for students. These systems provide enhanced interactive perceptions of the feed. An individualized learning process, which is provided by a modern adaptive mechanism, allows you to create conditions depending on the user's needs and learning goals. The combined use of these technologies opens up the widest possibilities for creating an almost perfect digital learning environment aimed at affordable and adaptive learning. Virtual learning environment (included in the virtual educational environment) – a set of computer tools and technologies that allows you to implement content management of the educational environment and the communication process of users.

7. In the virtual educational space and in its component – the virtual learning environment, a rethinking of the role, functions and activities of the student from the standpoint of the formation of his educational and professional autonomy (independence) takes place. This means the formation of personality traits such as initiative, responsibility, reflection, self-esteem and self-control, readiness for self-education, self-development and self-improvement, which is valuable from the perspective of a modern employer. Similarly, we see that real-virtual space gives a person who is in it more advantages. This concept acts as a model of the latest digital space of continuing professional and additional education, as well as directly continuing education, which is facilitated by means of modern information technologies in a real and virtual environment. Speaking about the real-virtual space, we come to the conclusion that the search for ways to solve the problem of transforming the educational space requires the development of a scientifically proven system for integrating the real and virtual educational space, providing for the types of classes for a teacher who is able to optimally adapt to a constantly changing educational process (Frolova et al., 2018).

8. The market for advanced technologies of virtual and augmented realities is just beginning to actively show its capabilities. Today it is difficult to understand how and in which direction virtual reality

will expand its borders. Scientists, theorists and practitioners are sure that the field will not be limited to entertainment, it will also extend to large segments of the markets for the sale and treatment of various phobias. VR and AR devices replace our familiar monitors. In the coming years, we will be able to feel the image and plunge “inside” the film, game or model.

One of the biggest problems is reducing frames per second. Instant tracking of head movements is important for immersion in the virtual world. Even a small frame delay leads to the loss of proper quality for complete immersion. On the part of sensory gyroscopes, a small delay in the measurement of movements is almost eliminated today. But software manufacturers have a narrow effect on the subsidence of frames that may arise during material processing. One of the main inconveniences of going deeper into the virtual world is motion sickness – the user in virtual reality glasses observes environmental changes, but doesn't really experience them – sensory dissonance happens – the observed image of movement is not confirmed by the feelings of the human body. The results of this may be nausea, dizziness, and other symptoms of "motion sickness". The problem of using Oculus Rift (virtual reality glasses) by people who wear glasses and have vision problems also worries a significant part of potential buyers of the device. The developers tried to prevent this problem in advance. Several technologies have been developed regarding this issue: Binocular adjustment and optical inserts. However, serious eye diseases, such as astigmatism, according to the developers, can only be solved with the help of special programs. Often there is eye fatigue during long work in front of the monitor. The developers claim that the eyes will not get tired anymore, but vice versa – less. The fact is that our eye requires different focusing. In real life, we constantly change the focus of vision from objects in front of us to distant objects and vice versa. Sitting in front of the monitor, the focal length does not change, it is harmful to the eye muscles and causes eye fatigue. Oculus Rift will force our eyes to change focus as it happens in reality (Zinchenko et al., 2015).

Over the past decade, virtual educational laboratories have been widely distributed that can simulate the behavior of objects that are in real life in a virtual educational environment and help the student to gain new knowledge in various subjects: chemistry, physics, biology, etc. One of the intentions of the invention of virtual laboratories – attraction to complete visualization of the mastered processes, and one of the main tasks is to provide the opportunity to prepare the learner for the most perfect training *iyatiyu* and understanding their nature, and to the optimal interaction in the educational environment (Butucea, 2017).

In the current circumstances, when the implementation of information and communication technologies in the digital education system of Russia is so relevant, the number of educational institutions that expand the possibilities of the traditional form of distance learning is increasing. Especially since today, most young people use a personal computer without difficulty and skillfully use the information received from the Internet; it is often more convenient for them to enter the global network than to search for the material they need in traditional printed educational methodological literature.

9. The virtual educational environment (included in the virtual educational space) is a rapidly developing, multi-level and multi-functional system that combines:

pedagogical, didactic and methodological technologies specific for the interaction of participants in the educational process;

information resources: databases and knowledge, libraries, electronic educational materials, etc.

modern software: software shells, electronic communication tools.

It is important to emphasize that learning and interaction in the latest information (digital) space is not hostile to existing forms of learning and does not in any way reject the existing educational trends. The new is directly integrated into these systems, supplementing and developing them, and contributes to the creation of a moving educational environment. In Canada, the USA, and China, a virtual space realized with the help of communication technologies is very successful in continuous and distance education. On the territory of these countries, whole institutes have appeared that use VR technology. Using a personal computer and virtual reality goggles, you can attend VR lectures, trainings, conferences, while in another country.

10. When conducting direct research, the research sample is represented by: 100 respondents selected spontaneously; 20 interviewed respondents; 4 groups of focus group research: not relevant to the educational environment – 15 respondents; 15 respondents related to interaction in the educational environment; consumers of educational services in a virtual educational environment – 15 respondents; teachers – 15 respondents.

11. Summing up the preliminary results of the survey, it was possible to formulate the following research findings:

1. The vast majority (100%) of respondents are familiar with the following terms:

– educational environment; – virtual space; – information and communication technologies (ICT).

2. The vast majority of respondents agreed with the following statements:

– the educational environment is a system of influences and conditions of personality formation according to a given model, taking into account the opportunities for its development contained in the social, educational and spatial-objective environment (80%);

– virtual space is a system in which reality is completely represented by virtual images, in a fictional world that does not exist in reality (76%);

– information and communication technologies is a combination of methods, production processes and software and hardware integrated for the purpose of collecting, processing, preserving, disseminating, displaying and using information in the interests of its users (80%).

3. For the majority of respondents (82%), the curriculum is most important in the educational process (structure of students' activities, control over their activities, teaching style, forms of training, content of training programs and so on).

4. The majority of respondents (80%) believe that virtual space brings an innovative and progressive character to the educational environment.

5. The majority of respondents (76%) consider that the virtual practice of activity is a priority goal of the virtual space in the educational environment for the learning process.

6. The classic way to immerse and manage virtual space (using a personal computer, smartphone) is simpler and more convenient for the vast majority of respondents (92%).

7. The majority of respondents (80%) are familiar with the concept of a QR code.

8. The majority of respondents (78%) are familiar with the concept of LMS (Learning Management System).

12. A general analysis of the results of the survey in the form of questionnaires and focus group studies allowed us to formulate the following research conclusions:

- 1) the majority of respondents perceive the term virtual space as an object that helps to imitate reality. Here we can say not only about the Internet as a whole, but also about an actively developing space that has reached a new level of interaction with the audience, not only with large groups of people, but also the target consumer;
- 2) the majority of respondents are most impressed with such communication technologies of the virtual space as: electronic libraries, interactive online exhibitions, web conferences, webinars;
- 3) the majority of respondents believe that communication technologies for creating a virtual space in the educational environment are actually at a low level in Russia, and most find it difficult to answer at what level they are in the world, since they do not use international platforms;
- 4) the majority of respondents say that they notice the use of communication technologies of virtual space in the educational environment, but the quality of performance is not up to standard;
- 5) the majority of respondents considered the advantages of using communication technologies of virtual space: the possibility of remote work, less material costs, the absence of a personal factor (teachers and other students), the possibility of learning at any time; minuses, the majority of respondents noted: harm to human physical health; possible detrimental effects on the psyche, weak motivation system;
- 6) the majority of respondents gave their recommendations on improving and developing communication technologies, from writing code to designing educational projects.

7. Conclusion

With the advent in the process of obtaining lifelong education, as well as the interaction and integration of virtual space and the educational environment, such a component as informatization, information and communication technologies, it has become rational to modify the tasks of interaction of subjects in the educational environment and the formation of a new augmented reality.

The main ones are: an increase in the quality of training of specialists based on the use of modern information and communication technologies in the educational process; software package, the use of active and interactive teaching methods and, as a result, enhancing the creative and intellectual components of educational and research activities; integration of various types of educational activities (educational, educational, methodical, educational, research, etc.); adaptation of information technology training to the individual characteristics of the student; providing continuity and ensuring continuity in training and development in the field of continuing and professional education; development of information and communication technologies of distance learning; improving the program-methodological support of the educational process in lifelong education.

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