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# THE DIGITAL TRANSFORMATION OF AN EDUCATION SYSTEM. THE VIRTUAL REALITY AS NEW EDUCATIONAL SPACE

**Abstract.** Reforming of the higher education happens in the conditions of rapid development of information, virtual and communication technologies. Not only knowledge and ability of users of the computer and other information sources, but also ability to analyze and apply them to own development in everyday life become essential factors of the modern society. Influence of information technologies especially crucial in youth life is today. The contemporary education, the higher school, in particular, sets as the purpose to provide equal information access, providing the system of the higher education with safe and necessary conditions of its receiving. The virtual model of training as an essential component offersinformation transfer, in particular, is information to the educational environment (virtual).

**Keywords:** the virtual space, digital transformation, educational environment, ICT.

The Strategy "Kazakhstan - 2050", the President's Speech "NurlyZhol - The Way to the Future," the national idea " MangilikYel" they all refer to a system of social values, which officially have a national status and guide the movement towards the future".

Intercorrelation of state programs and further development of digital economy will allow gaining multiplicative economic effects. According to experts, the contribution from the joint implementation of the digital agenda to GDP growth of EAEU will be almost twice higher, than a donation from the application of national digital programs by the countries of the Union separately. And the start of joint digital projects can enhance positive effect still considerably.

At the current stage of development of society computer technologies intensively take root into many spheres of action of the person, and it also concerns educational process. Information computer technologies find broad application in middle and high school of comprehensive schools.

Use of computer technologies in educational activity is considered from a position of the creation of the latest training programs and techniques. At the same time forget about specific influence of conditions of training with the use of the computer on the development of mental processes of school students.

The problem of psychology and pedagogical consequences of the use of information technologies in various spheres of action demands expanded the discussion.

Technology affects human cognitive abilities and their lifestyle. This situation is fair for various historical eras, spheres of action of the person, and also types of its thinking. General characteristics of thinking of individuals which belong to different sectors of society, age groups, etc. mean.

Development of the new information environment of society allows creating enormous opportunities for the human progress, for the successful solution of different professional, social and other problems. Those members of the community who will have a necessary set of abilities and knowledge of orientation in new information space will manage to use the present possibilities.

The evidence is clear: We're in the midst of a data boom, driven by the increased ability to gather, store and analyze data with a seemingly endless reduction in the cost to do so. Leaders ready to take advantage of these trends and harness the power of data will be the ones who create the future in 2018 and beyond.

The last year shows a high interest of customers to digital education. The e-learning share in the total amount of corporate training significantly increased. It is easy to predict that in the 2018th more organizations will use electronic forms of education.

There are primary trends on which experts advise to pay attention.

1) Outsourcing. According to the report of the Docebo company "Digital training: market trends and forecasts (2014-2017)" (E-Learning Market Trends & Forecast 2014-2017), only 58% of the educational budgets of the company spend for internal programs and 58% – for initiatives which are implemented by forces of third-party specialized firms.

Self-training – it is excellent, but it is not enough to favor. It is necessary to involve the "narrow" experts owning knowledge in the field of neurosciences, psychology, and media.

2) Training happens during the whole days

Now training happens not only on the operation and an audience, and nearly 24 hours a day. The companies will provide to a staff an opportunity to study at any time and in any place, and for this purpose, it is necessary to take care of the development of the appropriate mobile applications and educational modules.

3) The relation to study changes

Also in the report of Docebo attention to the change of the relation to corporate training is paid, first of all, from employers. 96% agreed that successful educational initiatives positively influence the productivity of employees; 78% – consider an educational factor as an opportunity for stuff career and professional development, and 87% of respondents think it as the form of compensation packets.

Many experts consider different types of information technologies as the means contributing to the development of systematic scientific thinking, constructive figurative thought, imagination, spatial and associative thinking, an intuition, variability that is those qualities of the person which provide most development of its creative abilities. Computer skills change social and economic communication in society, a kind of activity of his members, thereby becoming a critical common cultural element.

Higher education has always been fertile ground for the creation of new, boundary-pushing technology. Universities and colleges have always been at the cutting edge of new technologies, driving development and creating the next generation of scientists, developers, and entrepreneurs. Virtual and augmented reality technologies are at the frontier of development right now; the market is forecast to reach $13.9 billion in 2017 (IDC), and change is happening at a frenetic pace. Professors and students alike are exploring the various disciplines where immersive imagery and audio can be impactful, and the adoption rate is only accelerating.

Distance Education and Learning Technology Applications (DELTA) at NC State University is using virtual reality in Introductory Biology: Ecology, Evolution, and Biodiversity (BIO 181)to immerse students in field-based experiences. Mendel Grammar School in Opava City, Czech Republic is teaching students about the anatomy of the eye in biology classes with the Oculus Rift. St. John's School Boston, Massachusetts is using Minecraft and VR to create immersive experiences. Penn State University in Pennsylvania is training students to do things in the virtual world as a precursor to doing it in the real world, increasing the efficacy of learning. The University of British Columbia in Vancouver is experimenting with virtual lecture halls.

There are also less obvious applications for VR outside the physical sciences, such as in law. The University of Westminster has built a virtual space for criminal law students, in which they hunt for clues to construct a murder case. Rather than merely reading witness statements, they can walk around a building and judge whether someone would have been able to see the crime, explains Markos Mentzelopoulos, senior lecturer in computer science at Westminster.

Regarding VR making things more participatory, that's a win-win for both college students and professors. While lecturing can certainly still be valuable, the multimedia associated with say a virtual field trip to Roman ruins (an actual VR app made on our platform) is more memorable and can lead to more engagement. VR allows for a true "Choose Your Adventure," with students empowered to explore and delve deeper with multimedia hotspots into areas they want to investigate further.

At present such concepts as, "the virtual reality" and "virtual society» need a definition. It is necessary to solve a problem of adaptation to new requirements of life in the virtual society where scientific knowledge will play a paramount role.

Effect of presence – the problematic mental phenomenon, directly observable in case of interaction of the person with reality, excellent from ordinary. In psychological studies, the concept of "mediated reality" is considered.

Besides using VR for teaching or learning, some academics are studying the impact VR will have on society as a whole

Virtual reality technology in the educational process and psychology as a scientific study was studied by Nigel Foreman, a professor at Middlesex University (Great Britain). Foreman in his studies illustrated opportunity of VR technology for children with physical disability. This group of children had difficulties in wayfinding, especially in new places. For some period children had an opportunity to practice in virtual navigation. The author found that after VR training children with a disability felt more comfortable in the new environment.

Leading in the development and implementation of "serious" electronic games and training applications remain the United States, Britain, and then Russia. It should be noted that even a student in the outermost reaches has a phone that allows downloading mobile applications that have access to the Internet. Such technologies enable communicating with the teacher and classmates/classmates at a distance and at the same time fulfill part of the assignment. International studies of PISA, TIMMS, PIRLS also highlight an integral part of functional and informational literacy.

A review of previous studies conducted in the world:

Armed forces: in 1981, a prototype flight simulator for the US Army was created; in 1996 - appeared the game Marian Doom, helping the army team to study a specific sequence of attacks, ammunition, tactics of effective communication, the ability to work in a team. The British Army has a license to use it;

Healthcare: In 2010, electronic applications were introduced in Japan, which are intended for medical professionals, often simulators and used for training. The learning process takes place through the acquisition of experience, as well as the analysis of sessions.

Business Administration: IBM conducted a study aimed at revealing the relationship between leadership in online multiplayer games (MMORPG) and leadership in reality. During the game, the following tasks were solved: assessment and selection of personnel, motivation, encouragement, identification, and development of talented employees creating a favorable atmosphere in the team; analysis of the flow of light and often incomplete information that requires quick and correct solutions with various and long-term consequences.

Social sphere: In Great Britain, 10% of young people make up the category of people who are not employed in educational and labor activities. In the process of their training computer training are used on various platforms.

Education: The 4-dimensional model proposed in 2004 (Sara de Freitas, Martin Oliver) includes a structure of interrelated elements. The model consists of 4 aspects: individual and group characteristics of the students, the style of their training, the knowledge acquired, the choice of training methods that correspond to the needs.

According to the statistical data of the site http://countrymeters.info/en/Kazakhstan, for 2017 as a whole in the republic, there are 12 820 235 people over 14 and under 65 who form a contingent of real buyers taking into account the above categories.

In its pure form, useful information technologies are based on virtual reality technology, mobile applications intended for the pupil of a small school are not available in Kazakhstan. The Moodle.org system is mainly used by higher education institutions of Kazakhstan, where distance learning is working. The system has not spread to schools, although it has vast potential. These technologies will entirely solve the issue of an alternative to obtaining the necessary information on the subject and developing the academic competence of the pupil of a small school. The potential of VR technologies is impressive. From the psychological and pedagogical point of view, these technologies will actively develop different thinking points aimed at forming a modern young state in the mental literacy of a citizen.

At present, there may be isolated cases of applying effective information technologies of a character nature, but no scientific and applied research has been conducted. It should also be noted that at this stage,

electronic textbooks on subjects in the DVD format of the publishing house "National Information Center" have been developed, and stores are filled with foreign production.

The proposed development will have fundamental differences and competitive advantages:

1. Kazakhstan brand: cultural and historical topics in all subject areas;
2. availability in the state and other languages;
3. a wide range of consumers;
4. Development of mental literacy rural schoolchildren.

The ICT will help the students of a small school to develop practical skills on the subject in conditions convenient for him: place and time, by phone or computer, via an Internet connection or on a disk. At the core of mobile applications and VR-technology lies the principle of the simulator, the which will form a skill aimed at the development of academic competence. Work in the Moodle.org the system will allow you to connect with groups of students from other classes and schools to perform design, creative or research work, to get in touch with the teacher.

The level of technology currently allows Kazakh programmers to develop the proposed product of intellectual property with subsequent commercialization. Since 2007, all secondary schools are connected to the global Internet and are equipped with basic packages of programs for the development of computer literacy and the latest information technologies. The level of knowledge of domestic programmers, their "technical" flair, contacts with colleagues from Russia, far abroad, open access for participation in international projects, the fast possibility of specialized technical equipment serve as a basis for virtualization of education in a small school complex.

Leading groups in the field of research, development are:

- Electronic Arts Inc. NASDAQ: EA - the second most abundant publisher and developer of computer video games for various platforms, known for its sports simulators (FIFA, Madden NFL, NHL), as well as a series of popular franchises (US Need for Speed, The Sims, Battlefield)).

- EA Games includes console games of various genres for a broad audience: Battlefield, Dead Space, Need for Speed, Mass Effect, Dragon Age and Star Wars: The Old Republic, Unites studios: Bio Ware (Canada, USA), Criterion Games (England), DICE (Sweden, USA), Ghost Games (Sweden), Visceral Games (USA).

- EA SPORTS as a license develops sports simulators (Madden NFL, FIFA, NCAA (football), NHL (hockey), NBA LIVE (basketball), Tiger Woods PGA TOUR (golf) and UFC) and a series of sports arcades (Canada, USA)

- Maxis (The Sims and SimCity), PopCap (Bejeweled, Peggle, and Bookworm), All Play (mobile and web devices available on Pogo.com, Monopoly, Scrabble, Game of Life).

Application of technologies of virtual reality in training allows:

– to make training materials clear and exciting to students;

– to reach complete immersion in training process at the expense of 3D - visualization, and elements of gamification.

Of course, a lot of things depend on features of perception: it is more habitual and simpler to someone to perceive the text "at sight," i.e., from printing carriers. However, for those who easier observe a media format, VR technologies are capable of making training process fascinating. For example, looking in a window, students would see the countries and events about which the teacher says: the history of KievanRus', forming of volcanoes, migration of waterfowl.

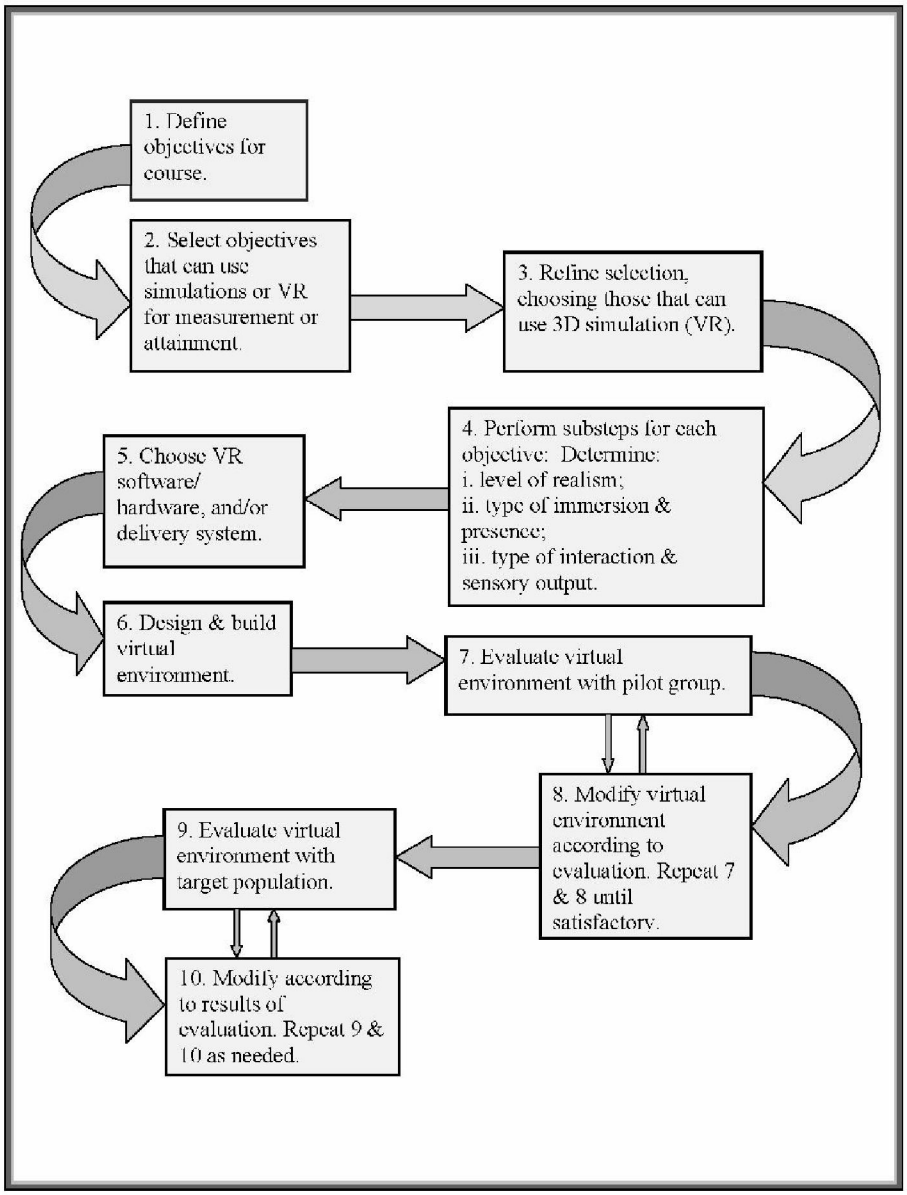
VR technologies create the virtual space immersing students in the world of any subject, helping to concentrate on its studying. Studying the chemical equation in the cool room equipped using VR technologies, students get in the chemical reaction, observing connection of particles. Application of technologies of virtual reality in training allows:

– to give to the student directly, but not theoretical, experience;

– to reduce an influence of the distracting factors interfering perception of information;

– to explain the phenomena, difficult for understanding, and subjects.

Scientists support an application of VR technologies for training as promoting understanding and storing of material worldwide. It is easier to master any skills if to train in the interactive, three-dimensional environment




How to create VR technology in education

VR technologies – it not only the screens and points intended for a perception of information by students but it also the multipurpose panel for the teacher. The teacher receives a signal from displays of students, starting materials and controlling the progress of their studying. It can also become part of three-dimensional virtual reality to explain the happening processes or to pay attention of students to any details.

It means formation at it such qualities of the personality as initiative, responsibility, a reflection, a self-assessment and self-checking, readiness for self-education, self-development, and self-improvement that is valuable from line items of the modern employer. Thus, we see that the real and virtual space gives to the person who is in it it is more than advantages. This concept represents the model of the new area of professional education which support happens means of the modern information technologies in a real and virtual environment. The VR technology requires the reorganization of educational space and development of the evidence-based system of integration of scholarly activity.

The lining of the relations in new educational space requires the realization of pedagogical approaches to a coating of pedagogical activities. We attempted judgment of the new modern scientifically – pedagogical research as the real and virtual space. Based on the ideas which are already available in educational literature lines, types, characteristics of the real and virtual space were defined.

Table 1 – Activities of the teacher in real and virtual space

| Realspace | Activitiesoftheteacher | Thevirtualspace |
|---|---|---|
| Abstract of occupation, textbook, methodical recommendations | Preparation for occupation | The scenario of occupation, representing freedom in a choice of forms, methods and methods of training, Internet resources, materials of colleagues in network interaction |
| Primary activity of the teacher | Mainstages of occupation | More independent activities of the trained |
| To be in time, execute the scheduled | Occupation purpose | To organize activities of the trained: on setting of the educational task; on search and information processing; on action methods |
| Thepreferentiallyfrontal | Form of occupation | Preferentially personal and/or group |
| It is created by the teacher | Educational environment | It is constructed trained together with the teacher |
| Object, marks | Results of training | Object, metaobject, personal. Creation of a portfolio |

The concept of the real and virtual space specifies opportunity essentially to other pedagogical line items of the changing educational situation. It is considered to be what precisely the teacher causes changes in consciousness of the individual conditions which are trained using the organization and application of educational technology. If we enter concept of the real and virtual space as conditions of construction of the educational environments (real and the virtual), then the traditional pedagogical line item is exposed to severe modification. The teacher stops being a saver of educational reality, becoming the organizer of conditions for the appearance of different educational environments in the real and virtual space.

Table 2 – Ratio of characteristics of the real and virtual space and abilities of the teacher

| Characteristic of the real and virtual space | Activities of the teacher in the changing educational space |
|---|---|
| The space is part of the conditional practice. A subject of constructive activities as teacher, and trained it arises on a joint different the practician. | Ability to project the predicted result, for lining of symbolical construction |
| The space is dynamic, indefinitely, movably, all the time changes | Ability to select necessary of the possible |
| The space weakens a static educational situation, showing reality of other situations | Ability to regulate receiving educational result |
| The space is directed on internal forms of the relations of participants of the educational project - the relation to own "I". | Knowledge of the opportunities and ability to use them in an educational situation |
| The space is image of probable changes which combines in itself different potentials of educational situations. | Ability to build the strategic line of an educational program |
| The space is the cogitative intermediary. Construct of joint imagination of the teacher and trained. | Ability to build the strategic line of an educational program together with the trained |

Activities of the teacher in permanently the changing educational space are object scientific research, for the formation of a basis in training of future professionals.

Use of the virtual technologies needs thorough training: the software, plans, manuals on program management, manuals, instruction individualization, special training of teachers.

The virtual technologies, the virtual reality as the sociocultural phenomenon, are essential means of cognitive activity which influences the mental world, culture, and spirituality of the identity of the third millennium.

**REFERENCES**

[1] Cronin P. (1997). Report on the Applications of Virtual Reality Technology to Education // HCRC, University of Edinburgh, Electronic Document: http://www.cogsci.ed.ac.uk/~paulus/vr.htm

Howard-Jones P., Ott M., van Leeuwen T., De Smedt B. (2014). The potential relevance of cognitive neuroscience for the development and use of technology-enhanced learning. Learning, MediaandTechnology, (aheadof-print), 1-21.

[2] Jennett C., Cox A.L., Cairns P., Dhoparee S., Epps A., Tijs T., Walton A. (2008). Measuring and defining the experience of immersion in games. International journal of human-computer studies, 66(9), 641-661.

[3] Robertson G.G., Card S.K., Mackinlay J. (1993). Three views of virtual reality: nonimmersive virtual reality. Computer, 26(2), 81.

[4] Ott M., Pozzi F. (2008). ICT and Cultural Heritage Education: Which Added Value?. In Emerging Technologies and Information Systems for the Knowledge Society (P. 131-138). SpringerBerlinHeidelberg.

[5] Classen C. (1997). Foundations for an anthropology of the senses. InternationalSocialScienceJournal, 49(153), 401-412.

[6] Basu A., Johnsen K. (2014, March). Ubiquitous virtual reality 'To-Go'. InVirtualReality (VR), 2014 iEEE (P. 161-162). IEEE.

[7] Roussou M. (2004). Learning by doing and learning through play: an exploration of interactivity in virtual environments for children. Computers in Entertainment (CIE), 2(1), 10-10.

[8] Garris R., Ahlers R., Driskell J.E. (2002). Games, motivation, and learning: A research and practice model. Simulation & gaming, 33(4), 441-467; Dede C., Salzman M., Loftin R.B., Ash K. (1997). Using Virtual Reality Technology to Convey Abstract Scientific Concepts // In "Learning the Sciences of the 21st Century: research, Design and Implementing Advanced Technology Learning Environments", edited by Jacobson, M. J., Kozma, R. B., Lawrence Erlbaum

[9] Veselovsky V.N. Philosophical bases of information paradigm. Arzamas-16, 1997.

[10] Heyzinga Y. Homo ludens. Chelovek Player / Lane with нидерл. V.V. Oshis. M.: EKSMO-Press publishing house, 2001.

[11] Big encyclopedic dictionary. A.M. Prokhorov. Publishing house: Soviet encyclopedia, Leningrad Gallery Fund of 1993, 1632 p.

[12] Foreman N. (2009). Virtual Reality in Psychology. In: Virtual Reality in Education, edited by T AMikropoulos (Greece), V S Pantelidis and C J Chen (USA). P. 225-252.

[13] Rose F.D., Foreman N. (2004). Virtual Reality in Psychology // In Foreman N., Sutton J. (Eds.), Current UK Psychology. Hanoi, Vietnam: "Politics" Publishing House (In Vietnamese).

[14] Chikhman V.N., Shelepin Y.E., Foreman N., Passmore P. (2009). Incomplete 2-D image perception at viewpoint variation of 3-D objects. Russian Journal of Physiology, 95, (4), 324-334.

[15] Korallo L., Foreman N., Boyd-Davis S., Moar M., Coulson M. (2012). Can multiple "spatial" virtual timelines convey the relatedness of historical knowledge across parallel domains? Computers and Education, 58 (2), 856-862.

[16] Elkonin D.B. Game psychology. 2nd Prod. M.: Gumanit. prod. Center of VLADOS, 1999.

[17] http://libraryno.ru/1-2-2-informacionnye-produkty-i-uslugi-2015_informatika/

[18] https://mob-edu.ru/blog/articles/mmso-anons/

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## БІЛІМ БЕРУ ЖҮЙЕСІНІҢ САНДЫҚ ТРАНСФОРМАЦИЯСЫ. ВИРТУАЛДЫ ШЫНДЫҚ ЖАҢА БІЛІМ КЕҢІСТІГІ РЕТІНДЕ

**Аннотация.** Жоғары білім реформасы ақпараттық, виртуалды және коммуникациялық технологияларды жедел дамыту жағдайында жүріп келеді. Қазіргі заманғы қоғамның маңызды факторлары компьютерлер мен басқа да ақпарат көздерін пайдалануды білу ғана емес, оларды күнделікті өмірде өз дамуына талдау жасау және қолдану мүмкіндіктерін арттыру. Жастардың өмірінде ақпараттық технологиялардың әсері өте маңызды. Қазіргі заманғы білімі, әсіресе, жоғарғы мектеп ақпаратқа тең қол жеткізуді қамтамасыз етуге, жоғары білім беру жүйесін қауіпсіз және қажетті шарттармен қамтамасыз етуге бағытталған. Виртуалды оқыту үлгісі негізгі компонент ретінде ақпараттың арнайы ақпарат пен білім беру ортасына (виртуалды) ауысуын қарастырады.

**Түйін сөздер:** виртуалды кеңістік, цифрлық трансформация, білім беру ортасы, АКТ.

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## ЦИФРОВАЯ ТРАНСФОРМАЦИЯ СИСТЕМЫ ОБРАЗОВАНИЯ. ВИРТУАЛЬНАЯ РЕАЛЬНОСТЬ КАК НОВОЕ ОБРАЗОВАТЕЛЬНОЕ ПРОСТРАНСТВО

**Аннотация.** Реформирование высшего образования происходит в условиях бурного развития информационных, виртуальных и коммуникационных технологий. Важными факторами современного общества становятся не только знание и умение использования компьютера и других источников информации, но и способность анализировать и применять их для собственного развития в повседневной жизни. Влияние информационных технологий особенно важно в жизни молодежи на сегодняшний день. Современное образование, высшая школа, в частности, ставит целью предоставить равный доступ к информации, обеспечивая систему высшего образования безопасными и необходимыми условиями ее получения. Виртуальная модель обучения как базовая составляющая предусматривает передачу информации в специальной информационно-образовательной среде (виртуальной).

**Ключевые слова:** виртуальное пространство, цифровая трансформация, образовательная среда, ИКТ.