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ПРИМЕНЕНИЕ ТЕХНОЛОГИЙ ВИРТУАЛЬНОЙ И ДОПОЛНЕННОЙ РЕАЛЬНОСТИ В ОБРАЗОВАТЕЛЬНОМ ПРОЦЕССЕ: ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ

***Аннотация:** процессы глобализации и информатизации в современном мире оказывают влияние на все сферы общественной жизни. Это включает в себя и образование. Стремительно развивающиеся компьютерные технологии внедряются в системы образования людей во всем мире и уже широко используются во многих учебных заведениях. Задача современного образования состоит не только в получении и усвоении человеком новых знаний, но и в создании альтернативных методов обучения, ориентированных на способности и интересы учащегося. В настоящее время для достижения этой цели используются различные инновационные методы обучения, позволяющие человеку воспринимать информацию более четко и структурированно. Изобретения VR и AR относятся к числу передовых изобретений в современной цифровой экономической системе. По мнению экспертов в области технического развития, рынок устройств VR / AR является одним из самых перспективных. Его продукция используется в качестве инструмента в образовательной деятельности для обеспечения вовлеченности студентов в учебный процесс.*

***Ключевые слова:** виртуальная реальность, дополненная реальность, информационные технологии, образовательный процесс.*

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**APPLICATION OF VIRTUAL AND AUGMENTED REALITY
TECHNOLOGIES IN THE EDUCATIONAL PROCESS:
PROBLEMS AND PROSPECTS**

Abstract: *the processes of globalization and informatization in the modern world have an impact on all spheres of public life. This includes education. Rapidly developing computer technologies are being introduced into the education systems of people around the world and are already widely used in many educational institutions. The task of modern education is not only to receive and assimilate new information by a person, but also to create alternative teaching methods focused on the student's abilities and interests. Nowadays, to achieve this goal, various innovative teaching methods are used that allow a person to perceive information more clearly and in a structured manner. VR and AR inventions are among the cutting edge inventions in today's digital economic system. According to experts in the field of technical development, the VR / AR device market is one of the most promising. Its products are used as tools in educational activities to ensure student involvement in the learning process.*

Keywords: *virtual and augmented reality, information technology, educational process, advantages and disadvantages.*

Virtual reality (VR) is a set of technical means and installations that allow reproducing a new world and transmitting information about it to a person through the impact on his sense organs. This technology also allows a user to interact with objects in virtual space, preventing him from being just a passive observer.

The immersion in alternate reality is facilitated by certain devices. Such equipment includes glasses, helmets, even entire rooms with graphic surfaces. A professional acoustic system allows the subject to orient to heard sounds in order to move in space. Communication with objects from the virtual world is provided through special items of clothing, for example, gloves that transmit temperature changes. Cameras installed on the equipment monitor the movement of a person and ensure his safety.

The quality of the assimilation of knowledge acquired during the period of study is dependent on the level of student's involvement in the educational process. Based on the results of various psychological and scientific studies, it can be noted with confidence that a person remembers best of all information that affects several senses or that is repeated from time to time. One of the examples confirming the previously mentioned fact is the research of R. Karnikau and F. McElrow, which resulted in the creation of the «Learning Pyramid» model (pic. 1).



Pic. 1. Learningpyramid

Any material, easy for visual perception, helps to attract student's attention. Interpretation of complex phenomena in the form of a multitude of visual elements,

various schemes simplifies their understanding. Group discussion helps to explore the problem from different angles, and active participation may allow you to remember all nuances through regular repetition of information. Visual material, simple for visual perception, attracts student's attention and allows him to focus on educational process. Discussion of new information in a team also contributes to the qualitative assimilation of new knowledge by a person. The most effective method in learning process is practice, the direct application of the acquired skills in life. But, unfortunately, in modern realities, the implementation of the most effective methods of assimilating information is hindered by various technical and material restrictions that do not allow full-fledged experiments. Certain activities are also associated with a high risk to human health. Their specificity presupposes a certain level of competence of the performer. Due to the existing hazards that can harm a person, the student may not be allowed to access some technological installations that require special skills during work.

Using VR technology, people can reproduce any phenomena, create other worlds depending on the goals of the subject. Such properties of the aforementioned invention open up wide possibilities for its application in various spheres of public life.

Augmented reality (AR) is a technology that allows to combine a layer of the virtual world with the physical environment by adding new objects to the reality in order to improve the perception of any information.

The introduction of VR / AR technologies is worth it when other learning methods are difficult to implement, ineffective, or too expensive. Here are some other advantages of using augmented reality in the educational sphere.

Three-dimensional graphics provide an opportunity to clearly simulate complex processes with various details, from the movements of objects in space to the movement of atoms. Another unique feature of this invention is the ability to increase or decrease the speed of the procedure, depending on the desires of the student. The objectivity of modeling in virtual space is limited only by computing power and the results of scientific knowledge about the ongoing process. VR devices can be used as

a mechanism for practicing particularly complex, dangerous elements without risking the life and health of the student.

The use of this technical development also allows people to easily organize the educational process in a playful manner and is perfect for conducting excursions to historical sights and eras.

Thanks to the interactivity and visibility of VR programs, all information which is heard and seen by a person is well and quickly assimilated by him.

This method of teaching is also compatible with the current self-isolation.

Repeated reproduction of objects created in the virtual world and projected phenomena do not require additional costs. And thanks to the possibility of revising information, a person can perfectly prepare for certain situations that await him in real life, study all processes in great detail.

Undoubtedly, like any other technical achievement, VR and AR devices have some flaws and shortcomings. Some of them are the side effects that occur after prolonged use of the device: headache due to sensory imbalance. For example, due to technical limitations, the image that changes when the head is turned may be delayed. The subject, trying to reduce the difference between the expected and received information, respectively, overexert himself, the effect of motion sickness appears. Regular flashes, bright and rapidly changing images can provoke an epileptic seizure. That is why the use of VR and AR devices is allowed for people over 13 years old. Also, VR equipment is standardized and cannot take into account absolutely all the user's traits. Wearing helmets and goggles can cause discomfort for people with vision problems.

Various technologies connected to VR headsets restrict the user's movement, so the developers are striving to release wireless technology. However, to solve the problem of autonomy, it is necessary to use a new type of batteries that increase the weight of the headset, which leads to a decrease in the ergonomics of the device. And to troubleshoot problems with delays in the transmitted image, it is necessary to purchase powerful and expensive equipment, which leads to an increase in the cost of device components and, in general, to an increase in the price of goods. In short,

developing safe and affordable VR devices is a daunting engineering challenge for developers.

Creation of high-tech products, quality images and believable graphics requires a lot of material costs and human resources. The work is attended by qualified workers from various fields of activity. In this regard, the development of VR / AR projects is an expensive and very time-consuming process. Therefore, the cost of the final solution is high.

Nowadays, researchers are trying to assess the possibility of using virtual and augmented reality technologies in education. They are conducting experiments where VR / AR technologies are used as means of teaching people of different ages.

According to the results of one of them, it was revealed that among schoolchildren of grades 5–6, information studied using AR technologies was assimilated much better (by 23.1%) compared to that obtained by traditional method.

Summing up, it is worth noting that VR, AR technologies represent a serious scientific achievement in the information environment. Their use is possible in completely different areas of public life, including educational. Unfortunately, widespread use of virtual augmented reality devices is still impossible due to their high price, based on the laborious work of specialists. Nevertheless, the developers do not stop and strive to create the most ergonomic and high quality devices.

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