

**VIRTUAL REALITY TOOLS AS AN INNOVATIVE SOLUTION TO  
IMPROVE THE QUALITY OF EDUCATION**

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During the years of independence, our country has been carrying out large-scale work to replace the morally and physically obsolete fixed assets inherited from the previous system with the most modern equipment and high technologies, and to transition to an innovative economy by introducing technological innovations and achievements of science and technology into production. The adoption of the Action Strategy for Five Priority Development Areas of the Republic of Uzbekistan in 2017-2021, the announcement of 2018 in our country as the Year of Support for Active Entrepreneurship, Innovative Ideas and Technologies was also an important step in this direction. For, "Innovation means the future. If we begin to build our great future today, we must do this primarily on the basis of innovative ideas, an innovative approach."<sup>1</sup>

The need to introduce innovative technologies into the activities of various sectors of the economy has become increasingly urgent in recent years. This is a reflection of the growing understanding by society that the prosperity of Uzbekistan and the improvement of the economic situation in the country and all spheres of its life are impossible without innovations in production, management, and finance. It is innovation that leads to market renewal, improved quality and expanded range of goods and services, creation of new production methods, product sales, and increased management efficiency. "Sustainable socio-economic progress cannot be imagined without innovative development, broad scientific and technical cooperation and the introduction of new technologies, scientific and technical achievements."<sup>2</sup>

The efficiency of the national economy, economic growth, sustainability of

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<sup>1</sup>Послание Президента Республики Узбекистан Шавката Мирзиёева Олий Мажлису. Тошкент: Ўзбекистон, НМИУ, 2018. 6.20.

<sup>2</sup> Киселёв А.М., Шубин И.С., Захаркин В.С. Инновационные технологии на железнодорожном транспорте // Технические и математические науки. Студенческий научный форум: электр. сб. ст. по мат. I междунар. студ. науч.-практ. конф. № 1(1). 2012.

vertically integrated systems, territorial complexes and foreign economic activity are largely determined by the functioning of transport. One of the main types of transport in our country is rail transport, the efficiency of which, in turn, in modern conditions directly depends on how quickly and harmoniously radical modernization and implementation of innovative solutions will be carried out, including in the training of new personnel.

Nowadays, the process of training a specialist does not take into account the cognitive styles and preferences of the student, which contradicts the old approach, considering the student as a subject of the educational process. While the future specialist should become an object to whom it is necessary to convey information in the correct, competent way and push in the right direction. One of the main problems in training students of railway workers is the difficulty of perceiving the technical equipment and components of transport mechanisms, the small amount of visual demonstration material, and the lack of practice of the direct process of formation and construction of cars, locomotives and other technical components of railway transport.

For the education system, virtual and augmented reality are promising in terms of using these technologies as innovative teaching aids. Today, these are mainly trainers and simulators that allow you to study the system and work with it virtually, which in reality, for example, when teaching students the structure of locomotives, would be expensive, long, unsafe or impossible for some reason. Such teaching aids allow you to gain knowledge and skills regardless of place and time, in comfortable, familiar conditions.

VR (Virtual Reality) tools allow you to expand the boundaries of what is possible for studying theoretical material and practicing it in practice. This method of training is a more modern and practical alternative to traditional methods, which in turn spend too much time and money and do not meet the standards of the new century.

VR makes it possible to explain complex phenomena and objects by radically transforming the principle of clarity. This is demonstrated by the example of the railway transport sector. In Japan, trainee railway specialists, using a 360-degree panoramic view, which is achieved with the help of specially prepared virtual reality glasses, can examine in detail the arrangement of equipment on an electric train. . Both the information embedded in the program and these devices create a presence effect for the user. The program is capable of not only providing detailed information about the mechanisms of an electric train (and not only it), but also clearly demonstrating each screw, each device with the required level of detail. This technique is used in modeling trains, their movement along the track and many other specific aspects of the railway industry, as professional simulators for training drivers, which significantly improve the quality of driving and do not require real locomotives and huge financial costs for practice.

3D technologies are becoming increasingly important for training personnel in the operation of rolling stock, other railway equipment and devices. For example, with the help of 3D, it is possible to demonstrate to workers step by step the entire process of maintenance, repair and dismantling of units. Some foreign industrial companies are preparing such an interactive course for their engineers in order to reduce the cost of teachers. According to some estimates, it can increase by 80%. As a result, we kill two birds with one stone - we reduce training costs and get more qualified personnel. Such interactive 3D trainings are especially useful when studying the features of flow assembly of equipment of various modifications. Transport safety can also be practiced using 3D. This is definitely a better way to explain the procedure than using boring manuals or conducting separate lectures with each group of employees.

One of the decisive directions of scientific and technical progress in this industry is the creation of a new generation of technical means. Within the framework of the proposal to introduce technical means of virtual reality for training new personnel, it is also proposed to introduce them in terms of modeling new trains, designing parts of complex structures (for example, rolling stock) and testing on experimental tracks.

Already at the first stages of development, the use of a 3D solution becomes justified. Three-dimensional technologies help justify investments if we are talking about the preparation of a completely new product or drawing attention to specific methods of developing railway infrastructure. After all, as a rule, there are only two or three minutes to present a business idea to prove its viability. With the help of virtual reality systems, this can be done more simply and effectively.

At the next stage — the actual design of the object — virtual reality solutions allow for quicker detection of errors. A traditional diagram or drawing often simply does not allow for them to be identified at first glance. And with the help of 3D, it will be possible to organize the process of creating a model in such a way that we simultaneously reduce risks and reduce the time it takes to correct errors.

In addition, the creation of three-dimensional interactive models has an economic justification. The development of a virtual model is done only once, then it is cloned by a software method for use in subsidiaries or branches of the organization. This does not require additional costs for the creation of another model, its transportation and storage.

The prospects and pace of implementation of virtual and augmented reality technologies indicate that the teaching aids developed on their basis will become an integral part of training at all levels of education. Understanding this, it is proposed to first familiarize special teaching staff with the technology of working with VR, preparing them for the effective use of this technology for organizing the educational process at all its levels. Determine the following areas of work:

To study virtual reality technologies as a new direction of the information

technology industry, the basis for creating virtual reality applications. To introduce pedagogical design of teaching aids based on virtual reality technologies. To define and conduct an experimental test of the organizational and pedagogical conditions for the effective use of such teaching aids in the educational process.

Within the framework of the specified areas, which, in our opinion, should be implemented at three levels (college, university-bachelor's degree, university-master's degree), it is proposed to introduce a course "Basics of creating and working in virtual reality applications" to prepare students to create applications with virtual reality.

The course will be aimed at familiarizing students with virtual reality technologies; developing students' interest and motivation in this area; teaching the application of these technologies in practice; and creating virtual reality applications. Students will apply VR technology; create images (markers) for work; create their own 3D models; develop and use VR applications; possess: skills in using VR application development tools.

Thus, the development of innovative activities, motivation of innovative processes in railway transport, introduction of innovations in the work of JSC Uzbekistan Railways, as well as in the training and preparation of new young specialists will increase the competitiveness of railway transport in the transport services market, as well as the efficiency of railway transport.