METHODS OF USING MODERN ADVANCED AND VIRTUAL REAL TOOLS IN THE PROCESS OF TEACHING HIGHER EDUCATION

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Abstract.

Purpose. *The institution of Higher Education provides for the study of modern information technologies and ways of using teaching methods, methods and tools in the process of teaching.*

Methods. *Tools and methods used in the teaching process, i.e. providing students with educational information; managing the processes of understanding, memorizing knowledge and their practical application; monitoring the results of training. The advantages of using technical means in the computer science training workshop are accuracy, safety*

Results. *Thus, the following conclusions can be drawn: education is a purposeful cognitive activity of students under the guidance of a teacher, the purpose of which is the acquisition, knowledge and development of creative abilities by students of knowledge, skills and abilities.*

Educational methods are methods of joint activities of teachers and students aimed at achieving their educational goals.

Conclusion

This article describes the modern technical means of teaching - virtual and augmented reality tools, the possibility of using them in the process of teaching various subjects, as well as the advantages of these tools over the usual means of teaching.

Keywords: technical tutorials, virtual reality, VR, augmented reality, motion parallax, cave, exoskeleton, plus Focus, three-dimensional image, multimedia.

Introduction.

Science in the fields of technical production and technology, the achievements of which are being made are the creation of a new generation of teaching methods and tools for educational institutions operating at all stages of the system of continuing education. The most important of the requirements for the creation of such educational resources is not only the expression of existing scientific knowledge in the content of ulaming, but at the same time the essence of the state policy

carried out in the Republic of Uzbekistan, in the field of education, is considered to be the disclosure. Traditional technical means of teaching in higher schools

It is common to incorporate the devices and equipment used by the teacher into the technical means of training (TCO) to carry out the teaching objectives. As training equipment, vehicles perform the following functions:

** providing students with educational information;*

** control the processes of knowledge comprehension, memorization and their practical application;*

** control of learning outcomes.*

The TCO nomenclature used in higher education institutions of the Republic of Uzbekistan is very wide. Previously used dia and film projectors, video recorders and telecomplexes are now replaced by projectors, electronic boards, personal computers and computer systems adapted for the teaching of technical sciences,their classes, helping to study in-depth educational materials by students.The introduction of personal computers (personal computers) into the practice of training has led to drastic changes in the educational process. Modern computers that can combine text information with animation graphics and soundtrack are no longer used as electronic teachers or strict controllers. They are programmed to detect and analyze errors in calculations and design, and can independently offer certain training exercises, acting as a kind of simulator for practicing practical skills to a professional level (for example, in the study of computers, issues of their maintenance and repair).

- The effectiveness of the use of Tso in the educational process.

To improve the quality of special education and expand the informative foundations of the process of studying technical sciences, the leading higher educational institutions of the uz Republic use various forms of a laboratory workshop aimed at strengthening the theoretical knowledge gained by students. Laboratory experience is fundamentally different from other methods of obtaining knowledge due to the practical nature of the process of obtaining experimental data. Procedures for removing the features of mechanisms and devices, processing readings and analyzing results to confirm or deny the intended functions of the experiment allow any student to "touch" the reality of a complex technique and obtain the first information about its operation and practical application.

The modern laboratory workshop on information technology is built on the basis of human-computer conversation through text and graphic information. The developed methods of computer processing of digital data

and the ability to create visual graphic images in the form of graphs, tables, drawings and animations actively form the professional skills of a future engineer or scientist from the student bench, together with a creative approach to the acquired knowledge, stimulate cognitive activity.

- Features of virtual reality technology for laboratory workshop.

Despite the clarity of graphs, diagrams, drawings and video data used as didactic material in the study of technical sciences, their clarity and perception by students are limited by a two-dimensional framework of reflection of reality. Being visual projections of reality to the horizontal or vertical plane, flat images on posters or on a computer monitor cannot fully convey the spatial outlines of the object in question and the picture of the volumetric location of its constituent elements.Complementing the revolutionary breakthrough in the practice of teaching technical sciences with virtual reality technologies the traditional forms of a laboratory workshop, by immersing the user in the three-dimensional (3D) interactive environment of the process under study, a practical training or laboratory experience can be considered as replenishment using computer simulation. The undoubted advantage of Virtual reality technology over the outdated text-graphic information interaction of a person and a computer is the illusion of direct Real-time presence in the "virtual world", presented stereoscopically.

The student will have the opportunity to become an active participant in actions in an abstract space, in which you can create virtual objects and set the necessary virtual conditions for information communication with these objects. A new method of human-computer interaction is carried out through real sensations (vision, hearing, touch), among which tactile sensations are given a special role. Virtual reality systems provide the ability to control three-dimensional objects on the screen due to the user's attitude to hand movements, allowing students to practice practical skills in maintenance, commissioning, prevention and repair of computer devices and systems without involving real valuable tools and mechanisms.

Modern virtual reality equipment, recommended for use in educational institutions, is more complete than traditional computer systems, capable of imitating the interaction of a person with the virtual environment, affecting all existing sensations. Thus, both the impact on the virtual environment and the environment's response to the impact are emulated. Virtual reality objects act close to the behavior of similar material reality objects. Students can influence these objects in full accordance with the actual laws of physics (liquid fluid, gravity, particle collisions, etc. However, unlike the use of

VR for entertainment purposes, when the user is "allowed "to change these laws as much as possible in real life(for example, lifting huge weights, flying, creating something out of nothing, etc.), new generations of human-computer interfaces are used to create simulators, interactive educational virtual environments, virtual prototypes to develop options for solving various technical problems.

Virtual reality can be successfully used in a laboratory workshop for the study of tools, mechanisms, complex equipment, if work with real devices is associated with a high risk for personal safety (electrical damage with high voltage current, high weight loads, etc.) or is not available due to large costs for the purchase of these devices. Virtual reality technology allows students to divide a monolithic technical device into components in reality to demonstrate the operation of each module or individual part separately and focus on the design features of the selected elements.Currently, there are several main types of systems that provide image formation and output in virtual reality systems:

- Virtual reality helmet

Modern virtual reality helmets (HMD-display) are more eyeglasses than helmets and include one or more displays representing images for the left and right eyes, a lens system for adjusting image geometry, as well as a tracking system that monitors the orientation of the device in space. Typically, virtual reality helmet tracking systems are based on gyroscopes, accelerometers, and magnetometers. For these types of systems, a wide viewing angle, the accuracy of the tracking system when monitoring the tilt and tilt of the user's head, as well as the minimum delay between determining the change in the head position in space and output the corresponding image to the displays are important.-MotionParallax3D displeylari

This type of device includes a variety of devices: from some smartphones to virtual reality rooms (cave). These types of systems generate the illusion of a volumetric object in the user by releasing specially formed projections of virtual objects created on the basis of information about the state of the user's eyes into one or more displays. When the position of the user's eyes changes in relation to the displays, the image in them changes accordingly. All systems of this type use the visual mechanism of three-dimensional image perception parallax motion (motion Parallax). In addition, in most cases they provide Stereo image output using Stereo displays that include stereoscopic vision.

Tracking systems for MotionParallax3D displays track the eye coordinates of users in space. For this, various technologies are used: optical (determination of the coordinates of the user's eyes in the camera image, observation of active or passive markers), less often — ultrasound. Surveillance systems may often include additional devices: gyroscopes, accelerometers, and magnetometers. For these types of systems, the accuracy of monitoring the user's position in space is important, as well as the minimum delay between determining the position of the head in space and output the corresponding image to the displays. Systems of this class can be executed in a variety of shape factors, from fully immersive virtual rooms to three-inch virtual reality screens.

- Virtual retinal monitor

These types of devices form the image directly on the retina of the eye. As a result, the user sees an image "hanging" in the air in front of him. This type of device is closer to augmented reality systems because images of virtual objects seen by the user are embedded in images of real world objects. Nevertheless, under certain conditions (a dark room, a sufficiently wide image of the retina, as well as in combination with a tracking system), this type of device can be used to immerse the user in virtual reality.There are also various hybrid variants: for example, a casting system, in which obtaining the correct projection of a planar image is achieved by placing projectors directly on glasses, and stereoscopic separation is achieved by using a retroreflective coating of the projected surface. But so far, such devices are not widespread and exist only in the form of prototypes.

- Imitation of tactile sensations

Imitation of tactile or tactile sensations has already found its application in virtual reality systems. This is called feedback devices.They are used in virtual Prototyping and ergonomic design problem solving, various simulators, medical simulator creation, remote robot control, including micro and nano - virtual sculpture creation systems.

- Virtual reality gloves

. Virtual reality gloves were created by specialists from the University of California at San Diego using soft robot manufacturing technology. The author of the project is Michael Tolley, professor of Mechanical Engineering at engineering schools. Jacobs (Jacobs School of Engineering) is the university above.The gloves allow you to feel a sensitive response in interaction with virtual reality objects and have been successfully tested on a virtual piano simulator with a virtual keyboard. Unlike similar analogs, these gloves are made from a soft exoskeleton equipped with soft muscles

designed for robots, which will be much easier and more convenient to use.Virtual reality gloves are planned to be used not only in video games and digital entertainment, but also in surgery and, of course, in education.

- Management

To most accurately reconstruct the user's contact with the environment, user interfaces are used that are most suitable for those modeled: pedal computer rollers, device control grips, robotic manipulators, scientific instruments, etc.For contactless control of objects, both virtual reality gloves and monitoring of hand movements using video cameras are used. The latter is usually carried out in a small area and does not require additional equipment from the user.Virtual reality gloves can be an integral part of a VR suit, which monitors changes in the entire body position and also transmits sensations of touch, temperature and vibration.The device that monitors user movements can be a free-rotating ball in which the user is placed, or can only be performed using a virtual reality suit suspended in the air or immersed in liquid. Technical tools are also being developed to model odors.

- Direct connection to the nervous system

The devices described above affect human sensory organs, but data can be transmitted directly to nerve nodes, even directly to the brain via brain interfaces. A similar technology is used in medicine to replace lost sensory abilities, but to date it is very expensive for everyday use and does not achieve the quality of data transmission, which is acceptable for the transmission of virtual reality. Various physiotherapeutic devices and devices that reproduce real-world emotions in a changed state of consciousness are based on the same principle.

Advantages of using technical means in a computer science training workshop

From the advantages of introducing technical means in the process of teaching informatics, the following aspects should be noted:

1. Precision.

Three-dimensional visualization allows students to consider in maximum detail all the nuances in the design of any part or microcircuit of computer devices. Practicing practical skills in working with spare parts and equipment in a Virtual environment allows the student to master the educational material and gain confidence in having valuable practical experience in working with complex technologies.

2. Security.

In reality, when developing skills for working with high-voltage devices in the laboratory, there is no possibility of a threat to the health of the user. On the other hand, it is unlikely that a student's careless handling of visual imitation of expensive equipment will lead to its breakdown or destruction.

3. Focus

The student is fully focused on the educational process, which is very important in the study of the interaction of the structural elements of Information Systems and others.

4. Maximum immersion

Virtual reality equipment allows you to navigate in virtual space, which can be used for practical study of the use of tools and mechanisms. Currently, three levels of immersion in virtual reality can be classified:

* via standard monitor or projector screen (flat picture);

* volumetric image via stereoscopic monitor or projector and special glasses):

* through helmet display, virtual gloves, etc. (full baptism).

5. Ability to combine things in both reality modes

The effectiveness of practical work increases dramatically at any time due to the user's ability to freely exit virtual reality in the conditions of real experience/workshop, their notes, drawings, diagrams.

6. The formation of professional intuition and creative qualities necessary for the successful operation of real products.

Virtual reality TSOLARI gives an undeniable pedagogical effect in the study of computer science, as well as other areas of science that cannot be achieved in the use of other technical means.

Conclusion

Thus, the following conclusions can be drawn: education is a purposeful cognitive activity of students under the guidance of a teacher, the purpose of which is the acquisition, knowledge and development of creative abilities by students of knowledge, skills and abilities.

Educational methods are methods of joint activities of teachers and students aimed at achieving their educational goals.

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