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APPLICATION OF AUGMENTED AND VIRTUAL REALITY IN THE TRAINING OF VOCATIONAL EDUCATION SPECIALISTS

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Augmented reality (AR) and virtual reality (VR) are technologies that are actively integrated into various areas of human activity, including education. AR allows you to overlay digital information on the real world, while VR creates a completely virtual environment in which the user can interact.

Vocational education is focused on training highly qualified specialists, and the use of the latest technologies, such as AR and VR, has enormous potential for the development of educational processes. These technologies allow you to create effective and innovative teaching methods, increasing motivation and the level of knowledge acquisition.

Traditional teaching methods can be limited, especially when it comes to acquiring practical skills. AR and VR open up new opportunities for recreating real-world situations and creating interactive learning environments.

The application of AR and VR technologies in the educational process is as follows:

1. Virtual simulators and simulations:
   - production simulators – allow students to practice skills in working with technical equipment;
   - medical simulators – students can perform complex operations or diagnose patients in conditions close to real-life;
   - emergency simulators – provide an opportunity to practice actions in critical conditions.

2. Interactive learning materials – AR technologies are used to create interactive maps, models, instructions, which allows students to learn complex subjects through visualization.

3. Virtual learning environments – VR makes it possible to create holistic learning worlds where students can move, interact with objects and receive feedback in real time [5].

VR and AR technologies are also used in various areas of human professional activity, such as:

1. Education:
   - the use of VR allows you to create virtual laboratories - students can experiment with mechanisms and electronic circuits without the risk of damaging

the equipment; allow students to perform chemical and physical experiments without the threat of danger;

– AR technologies help visualize structures, construction processes, disassemble and analyze parts of machines and mechanisms in 3D format;

– AR can demonstrate molecular structures, biological processes, geographical objects in 3D format.

– teachers can use AR applications to interactively explain complex topics, for example, historical events or physical phenomena;

– VR creates opportunities for modeling real learning situations, including classroom management, organizing interactive classes, etc. [1].

2. Medicine:

– using VR to train surgeons – medical students can perform surgeries virtually, practicing complex manipulations before applying them to real patients;

– AR to train medical staff using virtual anatomical models that can be superimposed on the patient's real body, which allows for improved understanding of human physiology; using AR applications, you can view human internal organs on a real scale [2].

3. Engineering and technical specialties:

– students can study the operation of various machines and mechanisms through simulations, without the need for access to expensive or dangerous real objects;

– AR enables the demonstration of complex technical diagrams and designs, adding annotations and explanations in real time [3].

4. Transport and aviation:

– pilots and drivers can undergo training using VR in conditions that simulate various weather conditions, accidents or equipment malfunctions;

– studying the operation of vehicles without physically being in them, which allows saving resources and ensuring safety [4].

5. Trade and service – using AR to train employees in retail or service areas, where they can practice interacting with customers or working with products in a virtual environment.

Devices used to enable AR and VR in education:

– VR devices – headsets, controllers, motion sensors that allow you to create virtual worlds and interact with them;

– AR devices – smartphones, tablets, AR glasses (e.g. Microsoft HoloLens), that allow you to overlay virtual objects on the real world;

– software – platforms for creating VR and AR content, such as Unity, Unreal Engine, that allow you to develop simulations and educational environments.

Despite the significant potential of VR and AR technologies in training vocational education specialists, there are certain challenges, in particular:

– high cost of equipment and software;

– technical limitations associated with the need for powerful computers and a stable Internet connection;

– the need to train teachers to work with VR and AR technologies.

However, in the future, the development of VR and AR will be aimed at simplifying access to these technologies, reducing their cost and integrating them into standard curricula. In particular, it is expected that the number of educational platforms with VR and AR support will increase, as well as the development of new training simulators for various industries [7].

Therefore, the use of AR and VR has enormous potential in improving vocational education, particularly in industries where practical skills are important. These technologies allow creating new learning opportunities, increasing the efficiency and accessibility of educational processes. The integration of these technologies into the training of vocational education specialists will contribute to improving the quality of education, developing practical skills and preparing students for work in a modern digital environment.

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