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VIRTUAL REALITY TECHNOLOGIES IN THE TRAINING OF THERMAL POWER SPECIALISTS

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The current stage of development of society is characterized by rapid digitalization and the emergence of new technologies, which requires corresponding changes in the vocational education system. Training of specialists in thermal power engineering requires the introduction of innovative teaching methods that will ensure the formation of practical skills and digital competencies at a high level. Traditional teaching methods are often limited in creating realistic experience for students, especially when it comes to mastering complex technical operations or working with equipment. This raises the problem of finding effective means of modeling production situations in a safe educational environment. Virtual reality (VR) and augmented reality (AR) technologies are considered promising tools that can reproduce real conditions and provide a high level of interactivity in learning [5]. The question arises: what opportunities does VR provide for the training of specialists in thermal power engineering in vocational education and how can these technologies be effectively integrated into the educational process.

Virtual reality is used in various areas of professional education, allowing to simulate real working conditions and provide the acquisition of practical skills. Among the key areas:

1. Thermal power engineering and technical specialties – with the help of VR, virtual laboratories are created where students can experiment with mechanisms and devices without the risk of damaging them. For example, future engineering teachers virtually assemble and configure equipment, which expands their practical competencies. AR technologies in thermal power engineering make it possible to visualize the internal structure of devices or the course of technological processes – by superimposing digital models on real machines, students better understand the principles of operation of equipment.

2. Medicine and healthcare – VR are actively used to practice clinical skills, medical students perform virtual operations and manipulations on simulators that realistically simulate human anatomy. This allows them to repeatedly practice complex procedures (for example, surgical interventions) without risk to the patient. Augmented reality in medicine is used to teach anatomy – AR applications can project three-dimensional images of organs onto the human body or mannequins, which helps to visualize the location of internal structures.

3. Training drivers and pilots – immersive simulators have long proven themselves in the training of transport specialists. Modern VR simulators for drivers, machinists, and pilots allow you to simulate driving vehicles in various situations – from difficult weather conditions to emergency situations. This increases the readiness of graduates to act correctly in critical situations.

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 [2].

The use of virtual and augmented reality technologies in the training of heat and power engineering specialists gives a number of positive effects:

– the motivation and involvement of students increases significantly. An immersive environment stimulates interest, turning learning into an active experience, rather than a passive perception of information [1];

– understanding of complex concepts improves - three-dimensional visualization and the ability to "see" abstract processes or objects makes the assimilation of the material deeper;

– VR provides a safe environment for errors - students can experiment, make mistakes and immediately see the consequences without suffering losses. This is especially valuable in learning technical operations, where a mistake in real life would be costly or dangerous [4].

Experience is acquired through repeated repetition of actions with immediate feedback, which contributes to the consolidation of practical skills. Finally, VR and AR support the personalization of learning - content can be adapted to the level and needs of each learner, as well as create scenarios that are as close as possible to the future workplace of a particular specialist.

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