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Issue Article

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THE PERSPECTIVES OF USING VIRTUAL REALITY TECHNOLOGIES IN COMPUTER CLASSROOMS

Abstract: *The paper discusses why virtual reality (VR) technologies should be used in the computer classroom, and considered advantages and examples of VR technologies. In addition, the process of using these technologies in computer classes and its prospects are considered. The relevance of their use in teaching students is substantiated.*

Key words: *computer classes, innovation, educational process, virtual reality, information literacy, ICT.*

Language: *English*

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Introduction

Nowadays, the implementation of innovative technologies into the educational process, including virtual and augmented reality technologies, is used not only in computer classes, but also in other educational areas. However, almost all of these technologies are used first in the computer labs. In general, it is no secret that whether it is virtual reality (VR) technology or other technologies, the possibilities for use in the computer classroom are relatively numerous. To be specific: firstly, computer classes have such advantages as the presence of not one computer, but several computers (for students), the presence of relatively good quality computers (which can run programs). Second, the advantage of subject teachers, that is, the computer literacy of computer science teachers, the ability to learn new technologies is high.

According to statistics, 90% of children by the age of 10 have their own smartphone and/or tablet [1, p. 107]. Every day new technologies are introduced into the daily life of students and become part of it. In addition, there is a digital transformation of education, which means a systematic update of the goals and content of education, tools, methods and organizational forms of educational work in the developing digital environment. Now important requirements have become the development of information systems and the construction of a digital school model for the 21st century [2, pp. 137–147]. The authors of the next research consider the digital transformation of education an inevitable stage of school renewal [3, pp. 235-238].

Despite the expensive equipment and software, VR technologies have a number of obvious advantages over traditional teaching tools, so the prospects for their use are quite justified. The use of VR technologies in the education system is a promising area of development. Nevertheless, their use is associated not only with financial and organizational difficulties. It is also necessary to take into account that, in addition to the technical features of organizing space, the programs themselves must comply with certain ethical and conceptual standards of education and be adapted to the capabilities and needs of different groups of students. That is, VR technologies must be in context, that is, they must fit

the environment of use, the capabilities of teachers and, most importantly, the characteristics of the student group (age, level of preparation). And also VR technologies in education should, first of all, be user-friendly from all points of view - from the size of the helmet and the correct positioning of students for the best viewing angle to the simplicity and convenience of the interface and the absence of side effects (such as motion sickness during virtual movement).

Virtual and augmented reality technology is a technology that can significantly enrich the educational process by visualizing and completing the necessary elements, acting as a constructor and material for creativity and manifestation of creativity. Such technologies make it possible to make the learning process visual, interactive, and interesting, thereby increasing student motivation and engagement, thereby having a positive impact on academic results. The studies also note the benefits that the VR environment is programmable, which makes it flexible and allows you to plastically change the parameters of virtual objects and the events occurring with them. It is possible to present a wide variety of stimuli (both stationary and moving) with controlled parameters (brightness, color, shape, etc.). [4, pp. 64-71]

Main part

In the classical educational process in computer classes, students receive ready-made generalized knowledge from textbooks and then do assignments on computers. Although computer classes already use new technologies such as projectors and various digital platforms, virtual technologies can provide new knowledge from a different angle. First of all, the advantage of VR technologies in general is the ability to display inaccessible objects. Here, it is a great advantage not only to see these objects in simple 3D format, but also to be able to move them and see them in detail with the help of hands (joysticks). As an example, in computer science lessons, students become familiar with many new technologies, although it is not possible in many schools to present them all in real life. In such cases, children can visually see what they are, not only with a video, but also get acquainted with the mechanics of their work and try it out for themselves. VR glasses or other types of head-mounted displays (HMDs), frequently used with headsets, can easily create the realistic feeling of being in a simulated world. To be fully immersed in a virtual world, our five senses must be activated. However, most current VR environments do not really take them all into account and tend to focus on two: vision and hearing [5, pp. 133-141].

An early way to connect VR and computer science education was Alice, which was designed as a rapid prototyping environment to create virtual environments using the Python programming language [6, pp.8-11]. Based on the next research [7, p.214] contents range from initial course levels, such as teaching Algorithms and Introduction to Computer Science, to more advanced levels such as OpenGL Programming, Search Algorithms, Artificial Intelligence and Network Security. Grigoriev, Rodionov, Kochetkova in their work gave an example of a lesson on the topic “Computer structure” with VR, also they suggest adding VR to sections such as “Computer Software”, “Algorithmization and Programming”, “Computer Hardware” [8, pp.43-56]. The connection between virtul reality and computer science education is a promising approach for fostering programming skills. It has to be noted that, as the programs are developed outside the VR, the technology is not used as an instructional medium but rather as a device to evaluate the programming skills obtained outside the VR [9, p. 97]. Educational programs can usually be created on the same platforms on which computer games such as Unity are developed, using various tools for developing virtual and augmented reality programs (Google VR, Steam VR, Oculus, etc.).

Promising directions for continuing research are: studying the influence of a real VR environment on other cognitive processes and personal characteristics of a person; determination of time, age, gender restrictions on working with VR; use of the latest VR headsets in training; development of theoretical foundations and diagnostic procedures for studying various components of the influence of VR on students’ thinking in the process of teaching certain school subjects.

Due to children's enthusiasm for virtual entertainment and the need for a large amount of information, learning material from traditional textbooks is becoming less and less effective every year. Immersion in VR will help them understand the material and approach learning in a creative and playful way.

The promise of this technology is evidenced by the fact that the global market for virtual and augmented reality headsets reached 11.2 million units in 2021, an increase of 92.1% compared to a year ago. Such data was published by IDC analysts (the international research and consulting company International Data Corporation) on March 21, 2022 [3, p. 236]

From a technical point of view, now there are all the prerequisites for the rapid development of this area of computer technology. The computing power of smartphones is steadily growing every year and is approaching that of a personal computer. This way the restrictions will become less strict and it will be possible to create more advanced virtual tutorials [10, pp. 96-98]

In the next paper, authors offer a course in “VR/AR development.” for future computer science teachers. The section “Fundamentals of Virtual and Augmented Reality Technologies” examines the basic

concepts and areas of application of technologies, students become familiar with such technical means as helmets and VR glasses, and analyze trends in the development of the AR/VR market. The second section of the course is devoted to the development of VR applications in the Varwin environment using the Blockly language. In addition, future computer science teachers develop a pedagogical lesson scenario. The third section of the course is devoted to the development of augmented reality applications for a computer science lesson. Discusses how schoolchildren should be taught how to develop augmented reality [11, pp. 193-196].

Conclusion

This article provides a systematic review of the literature aimed at studying the contribution of the use of VR technologies in the learning process of computer science. As well, in this research the use of VR technologies in general education, including examples of their use in computer classes are discussed, and the advantages are highlighted.

There is no doubt that in the next few years, VR technologies will revolutionize human interaction with the real world, and their enormous potential will be used in a wide variety of fields, including computer science. Therefore, for the development and implementation of this unique new technology in the theory and practice of experimental computer science in educational institutions, systematic research is required regarding such important issues as methodology, ethical standards, and technical equipment.

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