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APPROACHES TO THE USING OF VIRTUAL REALITY LEARNING ENVIRONMENT FOR GENERAL SCHOOL

Introduction

Formulation of the problem. Globalization processes in education are traced in global convergence trends in approaches and principles in this area, due to the search for more effective educational policies and the transition to flexible educational systems based on modern technologies such as ICT, cloud technology, virtual and augmented reality. According to these processes, from the end of the XX century to the beginning of the XXI century there are such concepts as «information educational environment», «interactive learning environment», «virtual reality learning environment», «open educational environment».

All these concepts are interrelated and among them the concept of «virtual educational environment» acquires special significance for education [1]. G. Makransky and G.B. Petersen (2021) analysed publications on Scopus that refer to VR in combination with either learning, education, or training and find out that they are quickly growing (Fig. 1).

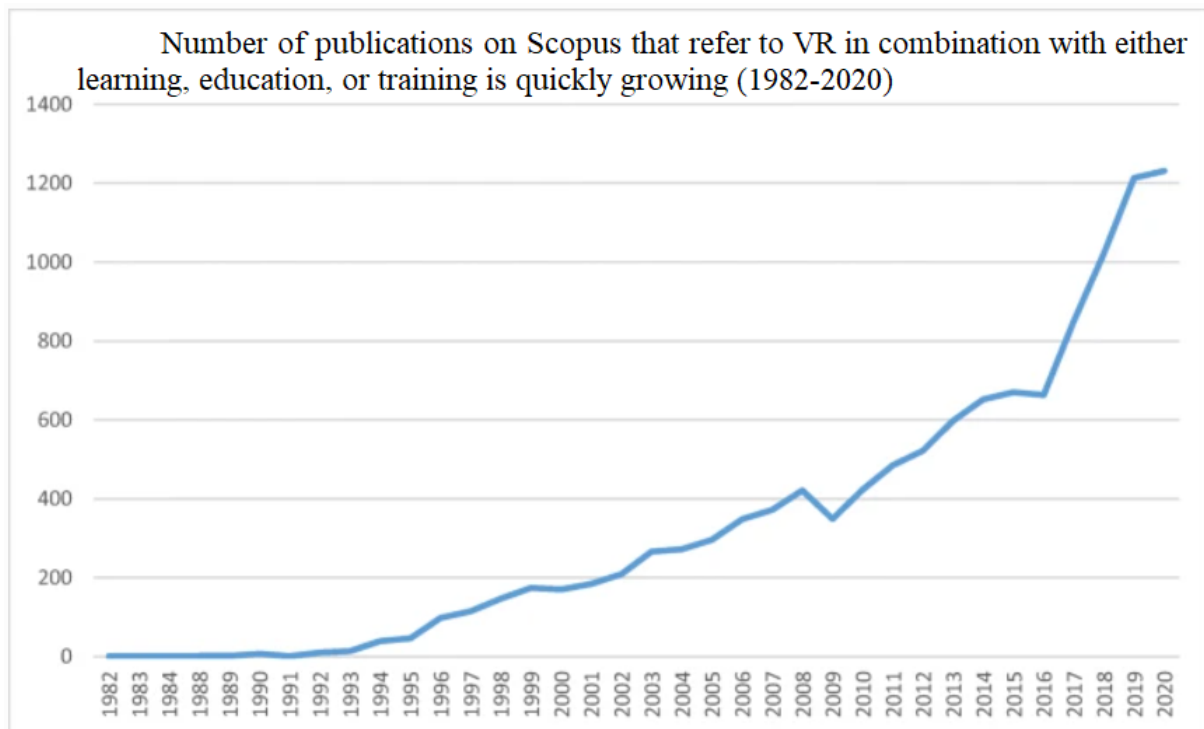


Fig. 1. Number of publications on Scopus that refer to VR in combination with either learning, education, or training is quickly growing (1982-2020) by G. Makransky and G.B. Petersen (2021)

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Researchers have found that the topic of articles on the use of virtual reality in the educational process appears in 1993. Among the articles of the 90s of the twentieth century, the most cited is a study by P. Milgram, H. Takemura, A. Utsumi, and F. Kishino «Augmented reality: A class of displays on the reality-virtuality continuum» (Cited by 3688) [2]. In their Mixed Reality model (MR) represents all simulated environments in which the real world and virtual world are juxtaposed. MR applications can be provide users with immersive experiences that have both real and virtual content. Its include Virtual reality, Augmented reality, Augmented virtuality [3]. The number of articles on the use of virtual reality in the educational process has reached more than 1,200 in 2020 (compared to 2016 – 600 articles, 2017 – 1,000 articles), which indicates the growing popularity of this technology in education.

This is not a new technology in the field of education but that requires research in such areas as methods and approaches for its use at different levels of education and in different disciplines, impact on the quality of education, understanding and appropriate use of students in their acquisition of knowledge and skills and teachers to manage the education process.

An analysis of recent research. The following works are devoted to the study of the problems of the use of virtual reality in education: Bykov V. (2009), Lytvynova S. (2022), Soroko N., Soroko V., Mukasheva M., Montes M^a, Tkachenko V. (2021), Buttussi, F. and L. Chittaro (2018), Makransky G., Petersen G.B. (2019), etc.

In most studies on the VR use in education this technology is seen as a learning environment that encompasses such important concepts as «Information educational environment», «Interactive learning environment», «Open educational environment».

«Information educational environment» is a pedagogical system, which combines tools, electronic educational resources, interaction protocols, hardware-software and organizational-methodological support, focused on meeting the educational needs of users [4].

«Interactive learning environment» is an environment that provides conditions for effective learning interaction between student and teacher, which is indirectly possible through software and hardware, educational computer programs and other ICT; prompt adjustment of the educational content and management of the educational process in accordance with the analysis of student learning outcomes [5];.

VR has been defined as a complex media system that encompasses a specific technological setup for sensory immersion as well as a means of sophisticated content representation, which is capable of simulating or imitating real and imagined worlds [6]. VR can be accessed through various displays such as a desktop computer, a head-mounted display (HMD), or a cave automatic

virtual environment (CAVE; Buttussi and Chittaro 2018 [7]). The main factor that distinguishes the VR learning process, which is accessed via HMD and CAVE, from the VR session, which is accessed via a desktop computer, is the degree of immersion. Immersion is an objective measure of the brightness offered by the system and the extent to which the system is able to hide and obscure the outside world.

«Virtual learning environment» is an open system in which the use of virtual reality systems, which are information technology systems and are created to artificially reproduce in the minds of a person ideas about quasi-real presence in a pre-designed target virtual reality environment, provides effective interactive self-learning of the individual in the educational process.

The first practical attempts to understand the virtual educational environment as educational were identified at the stage of formation of virtual reality as a technology. Thus, in 1999 a general model of learning based on an immersive virtual environment was proposed, where the joint influence of the studied concept, quality of learning, interaction and experience of learning the learning process was formed (Salzman M. et al., 1999). [8]). Scientists have developed a theoretical model of learning in a virtual environment, which they used as a basis for the study of educational VR content. Parameters such as interactivity, learning experience, the relationship between the characteristics of virtual reality and learning, and the relationship between learning and interactivity were studied. In the course of work those components of design of the program which influenced the studied parameters were revealed and changed (Fig. 2).

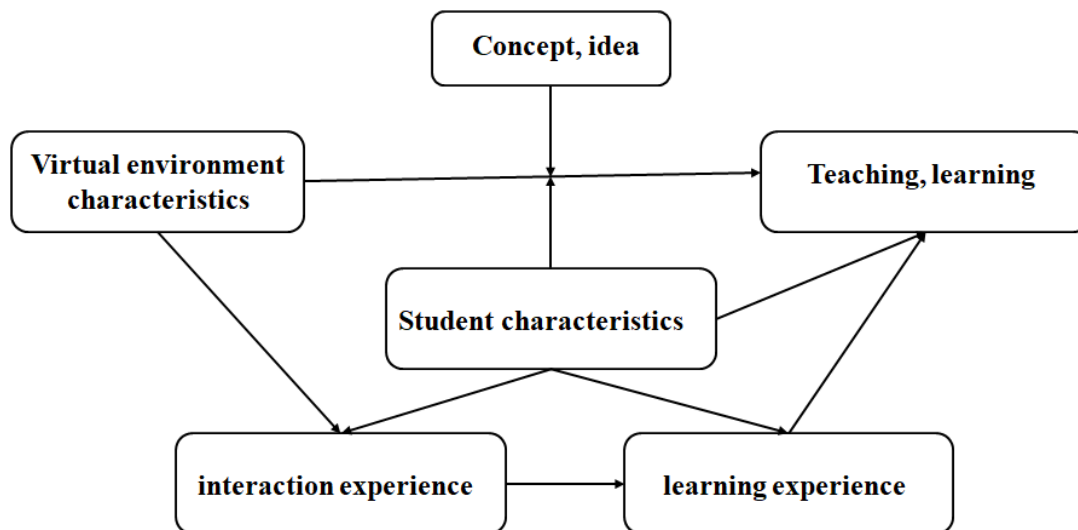


Fig. 2. Theoretical model of learning in a virtual environment (Salzman et al., 1999)

Scientists point out that virtual reality has important components for learning [9]:

- immersion: the user has a real feeling of being inside the virtual world of the computer;
- interaction: the user manipulates virtual objects;
- engagement: the user can move in the virtual environment passively or actively.

The effect of immersion is realized with the help of special devices: goggles or a virtual reality helmet.

The interaction effect is realized with the help of additional devices such as digital gloves or joysticks.

The effect of involvement occurs in the process of exploring the virtual environment when the user can intervene directly in the implementation of the program.

The goal of the article is to substantiate and single out approaches of using virtual reality in the educational process of the general education.

Research result and discussion

Scientists identify the following approaches to the use of virtual

learning environment in the educational process: inquiry-based approach, problem-based learning, blended learning, flipped learning, mobile learning.

The inquiry-based approach in the learning process means that students have the opportunity to discover, discover something new in the learning process, offer explanations of the phenomena studied, develop concepts and build processes, check the progress of the work (assess) and evaluate its results (evaluate) on the basis of the received data [10].

The problem-based learning makes students go through all the steps of scientific research: ask a question, develop a hypothesis, plan how to test this hypothesis, collect data, analyse the results and share it with peers [10].

Blended learning (hybrid learning) is a teaching approach that integrates ICT with traditional classroom activities, giving students more flexibility to customize their learning experiences [10].

The flipped learning is a teaching approach that allows teachers to prioritise active learning tasks during class time by assigning students lecture materials and presentations to be viewed at home or outside of class [11].

To achieve our goals, our study focuses on teachers of secondary schools (Semipolkivska Secondary School I-III degrees (Ukraine), Specialized School № 181 I. Kudry with in-depth study of foreign languages (Kyiv, Ukraine)) to determine their attitude to the use of virtual educational environment and approaches to its use. The study with the participation of 27 secondary school teachers was conducted from September to December 2021.

Teachers tried to use in their pedagogical practice virtual museums that students had to visit or create on their own when solving problems within educational projects.

Teachers reported on which approaches to the use of virtual learning environment in the educational process they would prefer for the using the virtual reality learning environment in general school. The participants evaluated the proposed approaches by using a five Likert scale ranging from very

undesirable (1) to very desirable (5).

The results of the survey showed that teachers give the highest priority to blended learning, where students are given specific explanations and instructions in class before using virtual reality tools for further research, namely, teachers on average gave the following assessments of approaches to virtual learning environment: inquiry-based approach – 4,5, problem-based learning – 4,7, blended learning – 5, flipped learning – 3,8, mobile learning – 3,2.

Conclusions and prospects for further research. A virtual learning environment is a powerful way to improve on-demand education in a secondary school.

The main approaches to the use of virtual learning environment in the educational process are inquiry-based approach, problem-based learning, blended learning, flipped learning, mobile learning.

It is important to choose students' virtual reality tools, write instructions for them, clearly explain the tasks of their use, advising students if they do not understand the use of tools.

Prospects for further research are the creation of guidelines for the implementation of these approaches in the educational process using a virtual educational environment.

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ПІДХОДИ ДО ВИКОРИСТАННЯ НАВЧАЛЬНОГО СЕРЕДОВИЩА ВІРТУАЛЬНОЇ РЕАЛЬНОСТІ ДЛЯ ЗАГАЛЬНОЇ ШКОЛИ

Анотація. Стаття присвячена підходам щодо використання віртуального освітнього середовища у закладах загальної освіти. Метою дослідження є виокремлення основних підходів використання віртуального освітнього середовища в загальноосвітній школі. Зроблені висновки, що Віртуальне навчальне середовище – це потужний спосіб покращити навчання на вимогу в середній школі. Основними підходами до використання віртуального навчального середовища в освітньому процесі є запитальний підхід, проблемне навчання, змішане навчання, перевернуто навчання, мобільне навчання. Важливо вибрати інструменти віртуальної реальності учнів, написати до них інструкції, чітко пояснити завдання їх використання, порадивши учням, якщо вони не розуміють використання інструментів. Перспективами подальших досліджень є створення методичних рекомендацій щодо реалізації цих підходів у навчально-виховному процесі з використанням віртуального освітнього середовища.

Ключові слова: virtual reality, virtual reality tools, education approach, general school.

Abstract. The article is devoted to approaches to the use of virtual educational environment in general education institutions. The aim of the study

is to identify the main approaches to the use of virtual educational environment in secondary school. A virtual learning environment is a powerful way to improve on-demand education in a secondary school. The main approaches to the use of virtual learning environment in the educational process are inquiry-based approach, problem-based learning, blended learning, flipped learning, mobile learning. It is important to choose students' virtual reality tools, write instructions for them, clearly explain the tasks of their use, advising students if they do not understand the use of tools. Prospects for further research are the creation of guidelines for the implementation of these approaches in the educational process using a virtual educational environment.

Keywords: virtual reality, virtual reality tools, education approach, general school.