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## **Evaluating the Effectiveness of Virtual Reality in Supporting Individualised Learning: A Research Approach**

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**Abstract:** The relevance of introducing virtual reality technologies into the educational process is determined by modern requirements for education. Currently, individualization of learning is an important tool that contributes to the development of the educational process, focused on each student individually. There are many ways to make learning more diverse and interesting, and virtual reality (VR) technologies are becoming important for achieving these goals. In the classroom, it is important to involve each student in the learning process and to allow them to familiarize themselves with the topic, work through it, and memorize it for a long time. In this paper, we evaluate the effectiveness of VR in the context of an individualized approach to students. The results of this study



indicate that VR technologies contribute to the improvement of knowledge assimilation, academic performance, and motivation to learn.

**Keywords:** VR technologies, innovative technologies, computer technologies, education, immersive technologies.

## Introduction

Nowadays, the use of virtual reality (VR) technologies is gaining great importance in the educational process as an important tool for ensuring the individualization of learning (Bilash, 2023). When the amount of information is constantly growing, it is important to develop and implement new methods that increase the efficiency of students' learning and the development of professional skills. Virtual reality continues to open up new and unique opportunities for creating personalized learning that can adapt to the needs, knowledge, skills, and individual qualities of each person (Marougkas, 2023). VR technologies have a high potential to dramatically change learning by providing an interactive experience. Virtual reality technologies allow you to create a learning environment that adapts to the individual needs of students (Strashko, 2022). But the question of the effectiveness of these methods is still open. And despite such widespread use and popularity, the impact of VR technologies on individualized learning is not sufficiently studied.

## Research Aim and Research Questions

The aim of the study is to investigate the impact of VR technologies on the educational process of students and their role in the development of digital literacy, as well as to determine the prospects for introducing VR into the education system and its contribution to the formation of individualized learning.

Objectives of the study:

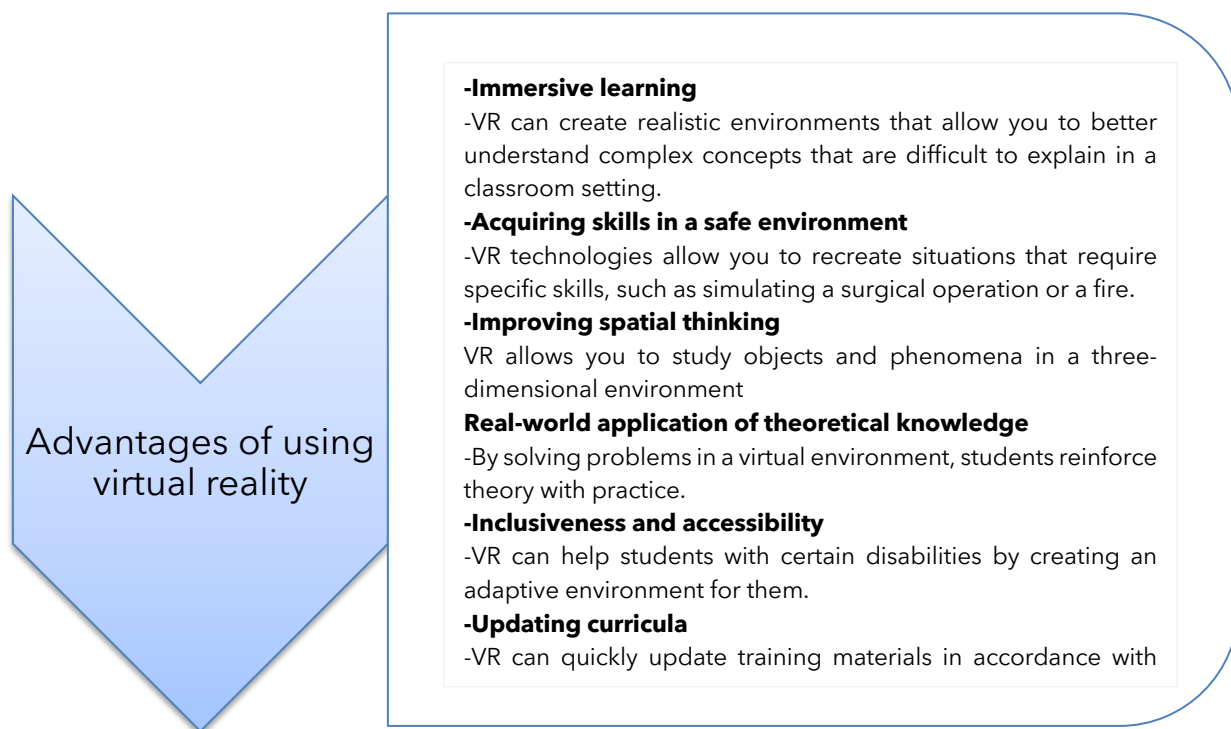
1. To analyze the literature on the PubMed platform on the impact of VR technologies on the educational process of students.
2. To study the role of VR in the development of students' digital literacy.
3. To determine the prospects for introducing VR into the education system and its contribution to the formation of individualized learning.

## Research Results

Virtual reality technologies have all the potential to improve the learning process by providing an engaging interactive experience and have a huge number of advantages (Figure 1).

**Figure 1**

*Advantages of using virtual reality (VR) technologies*



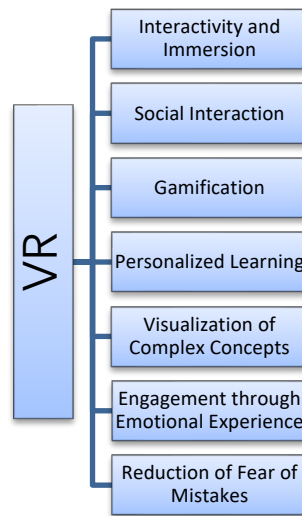
Source : authors' own development

Modern teachers suggest combining theoretical experience with VR, thus optimizing the learning process. It has been proven that students have somewhat limited cognitive resources, so by carefully structuring and presenting information through VR, the teacher can ensure an effective distribution of cognitive resources, which contributes to better assimilation and memorization of new information. VR technologies offer realistic simulations that allow you to actively interact with the environment. Virtual technologies provide a safe and controlled environment and allow you to make serious decisions and learn from their consequences (Boyko, 2022). With the help of VR technologies, it is possible to create an immersive environment for students, where they can acquire the knowledge and skills they need. In this situation, it is important for teachers to be open to the introduction of a digital environment in their classes, to understand that it is a driving force in the development of students and an individualized approach to the student (Yugan, 2022). In addition, virtual environments can provide full remote learning, which is very important in times of war and pandemic. VR technologies also make inaccessible resources accessible to everyone, such as visiting museums anywhere in the world or a dangerous place, conducting complex research in the laboratory, going into space or returning a million years ago (Krasnoshchek, 2023). Virtual reality has an invaluable contribution to make in motivating students to learn, explaining complex topics in simple words or clear pictures (Mystakidis, 2021). Adaptive virtual materials allow learners to complete tasks they like, at their own pace and level of knowledge (Lin, 2022). Personalized or adaptive learning is the construction of models of learners' preferences, knowledge, and goals and their application during interaction with the environment to adapt it to the learner. Adaptation is carried out at the moment with the help of certain algorithms that analyze the actions of students during training (Abbas, 2023). It was found that VR has the potential to increase students' motivation and interest in learning (Figure 2).



**Figure 2**

*Key aspects of VR's impact on the motivation and engagement of applicants*



Source : authors' own development

One of the main advantages of virtual reality is the ability to create a virtual environment, in which case the passive learning format becomes active and everyone is involved in the work [7]. The use of gamification allows you to complete thematic quests for which you can get virtual rewards, which is even more exciting (Baker, 2022).


The intellectualization of the learning environment means that it adapts to each student individually. The learning environment can thus change its behavior based on the conclusions drawn from the individual learner profile. As we already know, each learner has unique needs that are determined by their innate abilities, level of training, and cognitive characteristics. Students who are better at perceiving material visually can use VR to visualize different concepts. The material can be reinforced with audio content for applicants who are better at memorizing by ear. For kinesthetes, VR allows them to interact directly with objects (Sudharson, 2024).

In general, virtual reality technologies look very promising in teaching and approaching each student individually, which is difficult to do in a regular classroom. These technologies are evolving, and the task of the teacher is to follow them and implement them in their practical classes.

## Conclusions

Research in the field of virtual reality technology development involves analyzing constant technological updates and modernizations, as well as the introduction of the latest discoveries into learning processes. The study of the impact of these technologies on various industries opens up more and more opportunities for applying modern practices and creating innovative teaching methods.

When studying the effectiveness of VR technologies in supporting individualized learning, it can be safely stated that VR technologies have a significant impact and potential for adapting the learning process to the needs of each student. Due to the ability to create a personalized learning environment, VR helps to increase students' motivation, involvement in the learning process, and assimilation of the material covered. The results of the literature study show that the use of VR can be



a key tool for the development of modern teaching methods focused on the needs of a particular user, which is especially important in the context of rapid changes in education.

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