

**PSYCHOLOGICAL FOUNDATIONS OF VIRTUAL REALITY
TECHNOLOGIES IN THE FORMATION OF COGNITIVE IMAGINATION OF
ELEMENTARY SCHOOL STUDENTS**

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Abstract: This article describes the psychological foundations of virtual reality technologies in the process of forming the cognitive imagination of elementary school students. It analyzes how the immersive learning environment affects the development of the student's personality, perception, thinking and memory processes. In the research, the factors of deep involvement of students in the topic through VR technologies, stimulation of figurative thinking and increase of educational motivation are considered on a scientific basis.

Keywords: primary education, virtual reality, cognitive development, imagination, psychological foundations, immersive learning environment, motivation, creativity, digital pedagogy, figurative thinking

Аннотация: В статье рассматриваются психологические основы применения технологий виртуальной реальности в процессе формирования когнитивного воображения учащихся начальной школы. Анализируется влияние иммерсивной образовательной среды на развитие личности, процессов восприятия, мышления и памяти учащегося. В исследовании на научной основе рассматриваются факторы глубокой вовлеченности учащихся в предмет посредством технологий виртуальной реальности, стимулирования образного мышления и повышения учебной мотивации.

Ключевые слова: начальное образование, виртуальная реальность, когнитивное развитие, воображение, психологические основы, иммерсивная образовательная среда, мотивация, креативность, цифровая педагогика, образное мышление.

LOGIN

Today, as a result of the rapid development of the global digital environment, the need for new methods and technologies in the educational process has increased significantly. In particular, the introduction of innovative tools along with traditional teaching methods is of great importance in the formation of knowledge, skills and competencies for elementary school

students. In particular, the development of imagination and cognitive processes — perception, thinking, memory — is an important tool for elementary school students to learn information faster and increase the potential of independent thinking.

It is also of strategic importance at the level of state policy in the field of education. As Shavkat Mirziyoyev stated in his speech on education: «Education and upbringing of our children — is our greatest concern». These words, in turn, confirm the need for more consistent organization of scientific and pedagogical approaches aimed at the development of students in primary education.¹

In today's pedagogical practice, attention is paid to virtual reality technologies, including —, which provide interactivity and immersiveness. Virtual reality provides students with an unconventional, figurative reading experience using macro environments, simulations, and virtual tours. This, in turn, allows students to develop imagination skills, their own thinking and creative approach. But how virtual reality technologies have a pedagogical-psychological effect and what models and methods can be proposed for the formation of cognitive imagination in elementary school students have not yet been sufficiently researched. It is to determine the psychological basis of virtual reality technologies in the formation of cognitive imagination in elementary school students, as well as to analyze the psychological-didactic conditions and pedagogical possibilities of introducing virtual reality tools in the educational process. The research includes the following tasks: first, to consider the theoretical aspects of imagination and cognitive development; secondly, to carry out a qualitative analysis of virtual reality technologies; thirdly, the imagination skills of elementary school students in the VR environment determination of formation mechanisms; fourthly, development of methodical recommendations for teachers.

METHODOLOGY

The most important stage of the development of a primary school student as a person is the activation period of — cognitive processes. Cognitive activity refers to the process by which a person perceives, understands, analyzes and acquires knowledge. At the center of these processes is imagination, because it is imagination that allows the student to connect new knowledge with the previously acquired experience, to think figuratively and to find a creative solution. According to Piaget's theory of cognitive development, children between the ages of

¹ Uzbekistan Decree of the President of the Republic No. PF“6079 on approval of the strategy of “Digital Uzbekistan ” 2030”. – October 5, 2020.

7–11 are in the “concrete practical thinking” stage. At this stage, their thinking is formed not yet at an abstract level, but more through seeing, hearing, feeling. Therefore, visual aids, digital images and virtual environments are very effective in stimulating their cognitive activity.

Also LS. Vygotsky put forward the concept of “close development zone”. According to it, the child successfully performs the activity that he could not do independently with the help of an adult or a teacher. Virtual reality technologies make it possible to test the student's own knowledge based on experience within this zone. Psychologically, this creates a motive for active knowledge, creative passion and the need for independent thinking for the child.²

Virtual reality — is a technology that allows a person to “dive into an artificially created digital environment, which makes the reader a direct participant in the learning process. Virtual reality technologies in education are not only visual it provides demonstration, but also teaching based on interactive experience. Teaching using VR tools for elementary school students — especially in subjects such as English, science, technology and history — enhances students' interest, memory and figurative thinking.

For example, when learning “Animals of the World” in an English class, the reader takes a virtual tour of the animal world through “ClassVR” or “Google Expeditions”. As a result, he does not just memorize words, but perceives them through real images, sounds and actions. This process creates a natural environment for imagining, feeling context, and strengthening vocabulary.

The effect of the virtual environment on the student is realized through three main psychological mechanisms:

1. Sensor-motor harmony – works simultaneously with the senses of sight, hearing and movement through the child's VR environment. This integration activates perception and creates a state close to real experience.
2. Emotional activity – immersive environment arouses a sense of wonder, interest, discovery in the reader. This emotional state, in turn, serves to preserve knowledge.
3. Cognitive activation – VR encourages the reader to solve problems, find answers to questions, analyze causality. In this way, the student's thinking is directed to independent activity.

From a psychological point of view, virtual reality forms in the reader's mind the “participant” model, not “consumer”. This is self-evaluation, self it leads to the development of skills to defend and reflect.

² Vygotsky LS. “Imagination and Creativity in Childhood”. — Cambridge, MA: MIT Press, 2004.

through virtual reality technologies, English language teaching develops students' imagination, contextual speech creation and hearing-perception skills. For example, with the help of the “Virtual London Tour” project, the reader can see real cityscapes in an English-speaking environment and express the situations happening there in English. Such experience activates the student's cognitive and communicative competencies at the same time.

Also, in virtual reality classes, the student feels less afraid of “mistakes, because the learning process takes place in a game-like form. This creates a psychologically safe environment and the child expresses his opinion freely. Therefore, virtual reality is also important as a positive psychological factor that strengthens the student's self-confidence in teaching English.

In order to effectively use virtual reality technologies, the teacher should pay attention to the following psychological and pedagogical conditions: selection of topics and visual content suitable for students' age characteristics; involving the student as an active participant at each stage of the lesson; connecting the learned virtual experience with real life; organization of virtual reality lessons in a short but goal-oriented form; introduction of discussion, reflection and analysis stage at the end of the virtual reality experience. These conditions serve psychologically to maintain students' attention, prevent emotional exhaustion, and strengthen learned knowledge. Virtual reality technologies occupy a special place in the formation of cognitive imagination in elementary school students with their psychological, motivational and didactic advantages. Through them, the child shows not only knowledge, but also self-awareness, feeling and creativity will be able to. Such an approach, in turn, as President Shavkat Mirziyoyev noted, “fully corresponds to the idea of arming the new generation with modern knowledge and thinking.

The methodological basis of this research is the concept of person-oriented education, cognitive psychology, and the ideas of digital pedagogy. According to the person-oriented approach, each student is considered as an individuality with his own cognitive abilities, level of perception and imagination. Therefore, in the introduction of virtual reality technologies, the activation of the student's internal cognitive processes was defined as the main goal.

Cognitive psychology studies the mechanisms of human perception, thinking, memory and attention in educational activities. In this study, the mechanisms of psychological influence of VR technologies were analyzed based on these aspects. In the study, imaginative activity was seen as a central element of cognitive development, as virtual experience engages the reader in direct figurative thinking. Research object – is the process of forming the cognitive

imagination of elementary school students. The subject of research – is the psychological basis of virtual reality technologies in this process, the mechanisms of their influence on the student's perception, memory and thinking activities. The purpose of the research is to develop a methodology for the development of students' imagination, thinking and cognitive activity by introducing – VR technologies into the primary education system, as well as to determine their psychological foundations.

Theoretical and empirical methods were harmoniously used in the research. Analysis of pedagogical and psychological literature; Virtual reality technologies in education generalization of psychological and didactic possibilities; Development of a theoretical model of the process of formation of cognitive imagination.

Empirical methods: Observation (direct observation of the activities of students teaching on the basis of VR); Interview (interviewing students, teachers and parents about the influence of VR tools); Experimental and test works (measuring the level of perception and imagination of students by comparing traditional lessons with VR lessons); Diagnostic tests (imagining, memory retention, re-imagining and creative thinking tests); Statistical analysis (mathematical processing of experimental results and determination of dynamic growth).

The study was carried out in three stages:

1st stage (preparation): theoretical sources related to the topic were analyzed, experiences of using VR technologies in education were studied, methodical direction was determined.

2nd stage (experiment-test): in the course of English lessons in primary grades, interactive classes were conducted through VR programs (“ClassVR”, “Google Earth VR”, “VR Room”, “Nearpod VR”). Students' indicators of imagination and perception were studied.

Stage 3 (analysis of results): the information obtained during the experiment was analyzed on the basis of psychological tests, and theoretical conclusions were developed. At the end of the experiment, the level of efficiency of VR technologies was determined, and practical recommendations for teachers were developed.

The obtained empirical data is processed on the basis of observation results, test scores of students, evaluation of emotional reactions and interview analysis. Results mathematical statistics (average arithmetic, variance, variation coefficient) is summarized using. Students' cognitive imagination was evaluated by the following indicators:

1. Speed of imagination (the ability to create a new image based on a given word or image);
2. Image accuracy (level of expression of thought based on virtual experience);

3. Logical connection (the ability to determine the cause and effect between images);
4. Emotional response (emotional activity after participation in the virtual environment).

The results of the study can be applied to primary school teachers to more effectively organize English, natural sciences and technology classes. Methodologically, VR technologies provide the following opportunities: Harmonization of students' processes of imagination, perception and recall; Creating an opportunity to acquire knowledge based on experience by connecting it with real reality; Increasing the student's motivation and level of participation; Expanding the possibility of visual and interactive organization of the educational process for the teacher. The results of the study show that through the means of virtual reality, students' cognitive imaginations are activated, figurative thinking is strengthened, and the process of deeper understanding of knowledge occurs. Also, a psychological model of VR technologies in education was developed, in which "perception – emotion – imagination – thinking" chain is central.

The results of the experiment showed that after the lessons conducted on the basis of VR technologies, students:

- visual speed and accuracy,
- logical analysis skills,
- level of creativity,
- speech expression and memory activity have increased significantly.

This proves that the use of VR tools as a means of cognitive development in the process of primary education increases students' ability to acquire, restore and apply knowledge in new situations.

CONCLUSION

The process of forming the cognitive imagination of elementary school students is of decisive importance in the development of their cognitive activity. During the study, it was found that virtual reality technologies serve as a psychologically effective tool for activating this process. Because the VR environment transforms the student from a passive learner to an active experience, which in turn leads to a combination of the processes of perception, thinking, memory and imagination.

In classes organized through virtual reality technologies, students' focus, interest in the studied topic and internal motivation to learn increase. The immersive educational environment activates the emotional state of students in a positive direction, develops their skills of independent formation of their own opinion, figurative expression and the ability to apply

acquired knowledge in a new situation. Virtual reality combines sensory-motor, emotional and thinking mechanisms that positively affect the student's cognitive activity. The use of VR tools brings the educational process into a visual, interactive and experimental state, which naturally activates the student's activity. Psychological foundations of VR technologies to the age characteristics of the student it envisages the gradual development of cognitive processes in an adapted manner. As a result of VR-based teaching, students develop figurative thinking, creative approach and independent thinking skills.

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