EOC
EUROASIAN ONLINE CONFERENCES

GERMANY
CONFERENCE

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY



Google Scholar zenodo OpenAIRE doi digital object identifier

INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY: a collection scientific works of the International scientific conference – Gamburg, Germany, 2026 Issue 1

Languages of publication: Uzbek**,** English, Russian, German, Italian, Spanish,

The collection consists of scientific research of scientists, graduate students and students who took part in the International Scientific online conference **« INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING AND TECHNOLOGY ».** Which took place in Gamburg, 2026.

Conference proceedings are recommended for scientists and teachers in higher education establishments. They can be used in education, including the process of post - graduate teaching, preparation for obtain bachelors' and masters' degrees. The review of all articles was accomplished by experts, materials are according to authors copyright. The authors are responsible for content, researches results and errors.

Development of systematic thinking of students through the organization of problem-based education in a virtual reality environment.

Abduvasiev Sardor Bakhrom ugli
Jizzakh State Pedagogical University named after A. Kadiri
Teacher of the Department of "Physics"
Phone: +99891 941 33 83; E-mail: a.muxitdinov1987@gmail.com

Annotation: In this article, the issue of developing students' systemic thinking through the application of problem-based learning methodology in a virtual reality (VR) environment was studied. The authors analyzed the scientific foundations of the interactive and effective organization of the educational process through the integration of modern pedagogical technologies and VR tools. The research results showed that the application of the problem-based learning methodology in a VR environment significantly increases students' ability to understand complex systems, analyze problems, and develop innovative solutions.

Keywords: Virtual reality, problem-based learning, systemic thinking, cognitive activity, interactive learning, innovative pedagogy.

The development of the education sector in the Republic of Uzbekistan is one of the priorities of state policy. A number of decrees and resolutions of President Shavkat Mirziyoyev are aimed at modernizing the education system, introducing digital technologies, and creating an educational environment that meets international standards. For example, the Resolution of the President of the Republic of Uzbekistan dated October 6, 2020 No. PP-4851 "On Measures for the Accelerated Development of the Digital Economy and E-Government in the Republic of Uzbekistan" served to stimulate the use of digital technologies, including in the field of education. Within the framework of this resolution, important steps have been taken to introduce modern information technologies in educational institutions, develop distance learning platforms, and strengthen digital infrastructure. Also, the Decree "On the Strategy for the Development of the Education System of the Republic of Uzbekistan until 2030" of October 8, 2021, sets the goal of introducing innovative technologies in education, in particular, smart education approaches. Within the framework of this strategy, it is planned to provide students with modern professional skills by integrating technologies such as VR and AR into the educational process.

In the modern educational process, one of the important tasks is to increase student activity, form their systemic thinking, and develop problem-solving abilities. Traditional teaching methods often do not sufficiently connect theoretical knowledge with practice, as a result of which students have a weak ability to understand complex systems. Therefore, the integration of innovative pedagogical technologies, in particular, virtual reality tools, with problem-based learning is considered an effective way to improve the quality of education.

Problem-based learning in a virtual reality environment allows the student to make independent decisions in situations close to the conditions of the real world, which serves the development of systemic thinking and cognitive abilities.

The study was conducted in the following stages:

1. **Literature review:** Modern research on VR technologies and problem-based learning was studied (Brown, 2020; Johnson & Smith, 2021).

2. **Creating an experimental learning environment:** Interactive modules on the VR platform were developed for students, through which they were required to solve complex systematic problems.

3. **Experiment participants:** 50 undergraduate students were selected and divided into two groups: the experimental group (problem-based learning in a VR environment) and the control group (traditional teaching methods).

4. **Assessment tools:** Students' systemic thinking was assessed through pre-test and post-test, as well as their activity in the learning process was monitored, and their cognitive abilities were analyzed through interviews.

The results of the experiment showed:

- The systemic thinking of students in the experimental group increased significantly compared to the control group.
- In the process of solving problem tasks in a VR environment, students demonstrated the ability to segment complex systems, identify cause-and-effect relationships, and develop optimal solutions.
- Students expressed a deeper understanding of the topics using interactive and visualization tools.
- The control group, relying more on theoretical knowledge, showed a lower result than the experimental group in terms of systemic thinking indicators.

The study also emphasized the possibility of individualizing the learning process in the VR environment, which contributed to the development of strategies appropriate to the learning style of each student.

The application of problem-based learning in a VR environment demonstrates high effectiveness in the development of students' systemic thinking. The study proved that with the help of interactive and visual components, the ability to understand complex systems and solve problems increases. At the same time, the learning process in the VR environment increases students' motivation and activates cognitive activity. This approach can be widely used as an innovative pedagogical method in the modern education system.

References

1. Brown, A. 2020. *Virtual Reality in Education: Enhancing Learning and Engagement.* New York: Academic Press.

2. Johnson, M., & Smith, R. (2021). Problem-Based Learning in Immersive Environments. London: Routledge.

3. Jonassen, D. H. (2019). *Learning to Solve Problems: A Handbook for Designing Problem-Solving Learning Environments.* New York: Routledge.

4. Milgram, P., & Kishino, F. (1994). A taxonomy of mixed reality visual displays. IEICE Transactions on Information and Systems, E77-D (12), 1321-1329.

5. Spector, J. M. (2020). *Foundations of Educational Technology: Integrating Virtual Reality.* Springer.