VIRTUAL TECHNOLOGY –AS A PHENOMENON OF 21st CENTURY EDUCATION

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Abstract

The article explores the role of virtual technologies in modernizing education and preparing future teachers for innovative practice. It highlights the effectiveness of applying VR-based approaches such as learner-centered learning, constructivism, interactive methods, gamification, and AI integration. Virtual education is shown to enhance learning outcomes, increase motivation, and connect national education with global experience.

Keywords: virtual education, VR technology, innovative pedagogy, international experience, distance learning.

VIRTUAL TEXNOLOGIYA – XXI ASR TA'LIM FENOMENI SIFATIDA

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Annotatsiya

Maqolada ta’limni modernizatsiya qilishda virtual texnologiyalarning roli va bo‘lajak pedagoglarni innovatsion faoliyatga tayyorlash masalalari yoritilgan. Unda shaxsga yo‘naltirilgan ta’lim, konstruktivizm, interfaol metodlar, gamifikatsiya va sun’iy intellekt integratsiyasi kabi VR asosidagi yondashuvlarning samaradorligi ta’kidlangan. Virtual ta’lim o‘quv natijalarini yaxshilashi, motivatsiyani oshirishi va milliy ta’limni global tajriba bilan bog‘lashi ko‘rsatib berilgan.

Tayanch so‘zlar: virtual ta’lim, VR texnologiya, innovatsion pedagogika, xalqaro tajriba, masofaviy ta’lim.

ВИРТУАЛЬНЫЕ ТЕХНОЛОГИИ – КАК ФЕНОМЕН ОБРАЗОВАНИЯ XXI ВЕКА

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Аннотация

В статье рассматривается роль виртуальных технологий в модернизации образования и подготовке будущих педагогов к инновационной деятельности. Подчеркивается эффективность VR-ориентированных подходов, таких как личностно-ориентированное обучение, конструктивизм, интерактивные методы, геймификация и интеграция искусственного интеллекта. Показано, что виртуальное образование способствует повышению качества обучения, росту мотивации и интеграции национальной системы образования в международный опыт.

Ключевые слова: виртуальное обучение, VR-технологии, инновационная педагогика, международный опыт, дистанционное образование.

The 21st century, shaped by digital transformation, has made education inseparable from information and communication technologies. Virtual education, which combines distance, interactive, and personalized approaches, is increasingly integrated into the global learning system. UNESCO[1] and OECD[2] highlight the virtual technologies not only secured continuity during the pandemic but will also remain central to sustainable educational development. Today, they enhance teaching efficiency, support teacher innovation, increase student motivation, and expand access to the global knowledge space. Virtual education is no longer a vision of the future but a present-day paradigm of modern education. The integration of digital technologies into education has emerged as a global priority. Innovative online initiatives are not only enhancing the quality of learning but also removing geographical, social, and economic barriers to access. In recent years, virtual reality (VR) has become a leading direction in advancing this process. VR-based learning environments go beyond delivering theoretical content and enable learners to engage with practical experiences. For instance, pedagogical scenario modeling, interactive activities, VR laboratory experiments, and virtual explorations of ancient cities are now feasible. Consequently, innovative online projects have evolved into an essential element of modern education and are contributing to the sustainable growth of the global knowledge ecosystem.

[1] UNESCO. (2022). *Education: From COVID-19 school closures to recovery.* Paris: UNESCO. Retrieved from https://www.unesco.org/en/covid-19/education-response

[2] OECD. (2023). *Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem.* Paris: OECD Publishing. Retrieved from https://www.oecd.org/en/publications/2023/12/oecd-digital-education-outlook-2023_c827b81a.html.

Among the innovative initiatives in Japan's higher education system is the Japan Virtual Campus (JV-Campus)[3]. Developed in partnership with the nation's top universities, the portal is open to international learners, which increases its accessibility and relevance. Built on the concept of "learning without borders," JV-Campus offers online courses and video lectures across various fields, along with internships, practice-oriented training, and opportunities for global collaboration and academic exchange. Its motto, "From Virtual to Real: A Gateway to Japanese Higher Education", highlights its purpose of bridging digital learning with real academic engagement. The JV-Campus model is viewed as a forward-looking framework for the international education system and is anticipated to serve as a benchmark for other countries. This is Ьecause the education model formed on the Ьasis of digital transformation and VR technologies:

Enhancing the innovative potential of the national education system. Through the combination of virtual reality, artificial intelligence, and online platforms, the learning process is enriched with new methods and enhanced overall efficiency.

Virtual technologies also Ьring teachers closer to gloЬal experience. Virtual technologies bring educators closer to international practices by expanding opportunities for collaboration, webinars, and global conferences through the metaverse and online platforms.

They boost creativity and independence among students. With virtual experiences, learners go beyond acquiring theoretical knowledge, gaining the chance to design personal projects and apply them in practice.

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[3] The Japan Times. (2024, March 28). *Japan Virtual Campus: Learning without borders.* Retrieved from https://www.japantimes.co.jp/2024/03/28/special-supplements/japan-virtual-campus-learning-without-borders-jv-campus/.

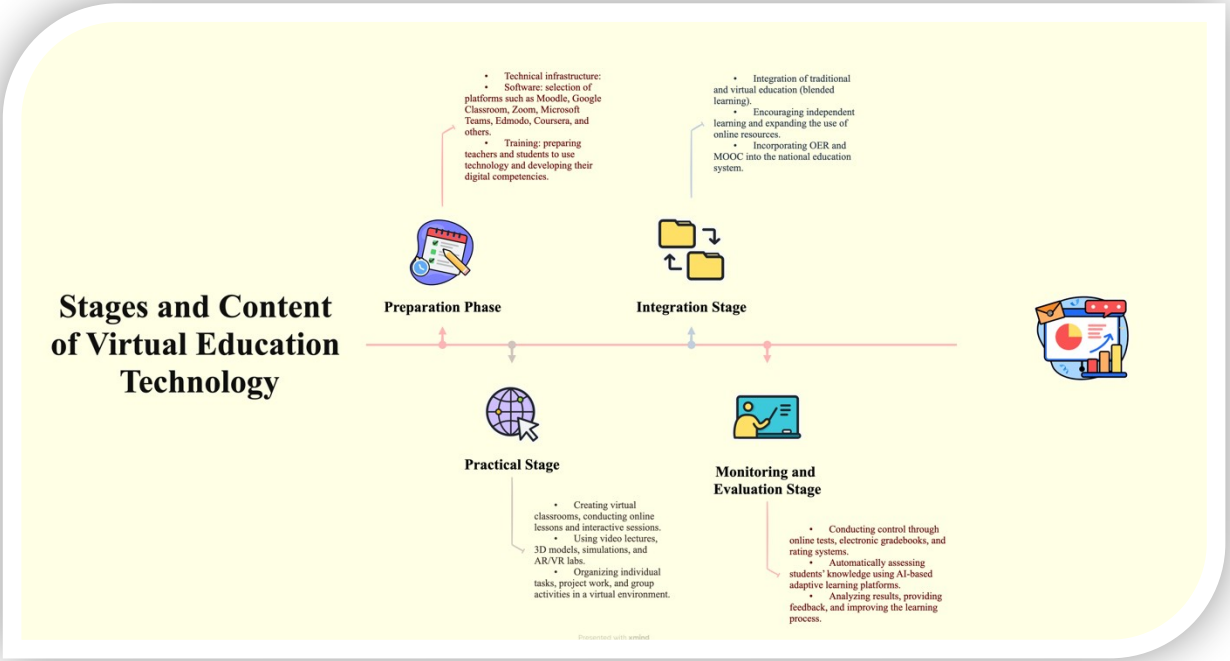
Virtual technologies ensure inclusivity in education. Children unable to attend conventional schools due to geographical or social limitations can still access learning through VR schools and online portals. In this way, the adoption of virtual technologies not only modernizes the educational process but also directs the nation toward becoming a competitive knowledge-based economy on the global stage.

In recent years, the United States has witnessed the emergence of projects aimed at fully transferring the educational process into virtual reality. A prominent example is the Optima Classical Academy[4], established in Florida in 2022, which has been recognized as the world's first entirely VR-based school. This model provides students with a deeply immersive learning experience, supports the design of individualized learning trajectories, and ensures equal access for learners unable to attend conventional schools. However, its implementation requires high-speed internet, advanced technological equipment, and considerable financial investment, distinguishing it from traditional schooling. Similarly, in China, collaborative initiatives with UNESCO have introduced VR-based teaching practices, enabling remote volunteer teachers to participate in lessons. The establishment of VR laboratories allows learners to conduct experiments in a safe digital environment. UNESCO reports indicate that in regions where these laboratories have been implemented, students' interest in science has increased by 30–40 percent. These outcomes confirm that VR technologies are vital not only for urban education but also play a decisive role in ensuring effective learning opportunities in rural and remote areas[5].

[4] RedboxVR. (2022, August 17). World's first fully online VR school launches in Florida. Retrieved from https://redboxvr.co.uk/first-fully-online-vr-school

[5] UNESCO Courier. (2021). China: Online tools level learning in remote areas. Retrieved from https://courier.unesco.org/en/articles/china-online-tools-level-learning-remote-areas

The following section outlines an educational model that facilitates interactive collaboration between teachers and learners through modern information and communication technologies, demonstrating that the efficient integration of virtual technologies requires a step-by-step approach (Figure 1).



In contemporary education, the application of VR technologies represents one of the most impactful forms of pedagogical innovation. VR-based learning environments enable students to integrate theoretical knowledge with practical application, independently experiment with their experiences, and engage in interactive study.

1. **Learner-centered VR education**

VR technologies provide opportunities to design individualized learning pathways for each student. For instance, by creating specialized "virtual classrooms" for pedagogy majors, learners can practice assuming the role of a teacher in various instructional scenarios. Such experiences strengthen

professional readiness and foster the development of independent decision-making skills.

2. **Constructivist approach in VR**

VR-based education does not transmit ready-made knowledge but encourages learners to construct understanding through active engagement. For example, analyzing a “pedagogical conflict” within a VR setting and experimenting with possible solutions equips students with practical skills and better prepares them for real-world situations.

3. **Interactive methods through VR**

Interactive methods gain greater effectiveness within a VR environment. Learners are able to collaborate in groups, participate in virtual meetings, and implement joint projects. For instance, multiple students can take part in role-play scenarios such as “teacher–student” interactions in a VR-based school setting.

4. **Gamification and VR**

The integration of game-based elements into VR technologies substantially enhances learner motivation. For instance, in a “virtual pedagogical quest,” students progress through different stages by completing assigned tasks, thereby making the learning process more engaging and effective

5. **Artificial intelligence and VR integration**

The integration of artificial intelligence (AI) into VR environments enables the rapid detection and correction of learner errors. For instance, when a student addresses a pedagogical scenario incorrectly, the AI system can redirect the

process and propose alternative, more appropriate solutions within the virtual setting.

6. **GloЬal VR integration**

A further strength of VR-based education lies in its potential for global integration. Learners are able to engage in international VR schools—such as Japan's **Yushi International High School** or the **Optima Classical Academy** in the United States—thereby gaining direct exposure to global educational practices.

Pedagogical processes Ьased on innovative approaches (VR-Ьased):

1	**Learner-centered**	Creating customized virtual courses and activities for each learner.	A student is given a "virtual classroom" in VR and performs the role of a teacher.
2	**Constructivist**	Acquiring knowledge through active experience and oЬservation.	Modeling and resolving an "educational conflict" situation in VR.
3	**Interactive methods**	Group work and collaЬorative tasks carried out in a virtual environment.	Several students conduct a "teacher-student" role-play in a VR school.
4	**Gamification**	Increasing motivation through game elements.	A "virtual pedagogical quest": completing tasks step Ьy step.
5	**AI integration**	Providing adaptive tasks in VR with the help of AI.	After an incorrect solution, AI enaЬles additional practice in the VR setting.
6	**GloЬal integration**	Creating opportunities to participate in international VR schools and courses.	Online participation in Japan's Yushi International High School or the USA's Optima Classical Academy.

In contemporary education, the teacher's role extends beyond transmitting knowledge and increasingly reflects leadership in introducing

innovative methods and ideas. Virtual technologies create new opportunities for pedagogy by enabling the learning process to be conducted more effectively, interactively, and creatively.

Firstly, these technologies broaden pedagogical competencies. Using platforms such as Moodle, Google Classroom, and Zoom, educators can deliver interactive lessons, design multimedia resources, and establish virtual laboratories. This approach modernizes traditional teaching and simplifies the learning process for students.

Secondly, virtual platforms enhance collaboration and knowledge exchange on both local and global levels. Teachers can engage in international webinars, online conferences, and seminars, thereby accelerating the spread of pedagogical innovations. At the same time, virtual tools facilitate effective management of student performance: electronic gradebooks, online monitoring systems, rating mechanisms, and AI-based applications allow accurate tracking of academic outcomes and the creation of personalized learning pathways.

Thirdly, virtual environments contribute to teachers' professional growth. Through global platforms such as Coursera[6], edX[7], and FutureLearn[8], educators can upgrade their qualifications, master new teaching strategies, and align themselves with international educational standards.

In conclusion, the effectiveness of education in the 21st century is fundamentally dependent on the integration of innovative technologies. Virtual learning tools not only provide learners with boundless opportunities for acquiring knowledge but also elevate traditional instruction to a higher level. Research indicates that the gradual implementation of virtual education technologies — including the preparatory, practical, integration, and monitoring

[6] Coursera. (2024). *About Coursera.* Retrieved from https://about.coursera.org
[7] edX. (2024). *About us.* Retrieved from https://www.edx.org/about-us
[8] FutureLearn. (2024). *About FutureLearn.* Retrieved from https://www.futurelearn.com/about

stages — enables the learning process to be structured in a systematic, interactive, and student-centered way. Furthermore, innovative pedagogical strategies such as constructivism, gamification, interactive methods, the incorporation of artificial intelligence, and collaboration within the global educational environment strengthen the impact of virtual education.

International practice confirms the importance of VR-based schools and online portal projects as models of future-oriented education, extending beyond temporary solutions during crises. Notable examples include Japan's metaverse high school and the JV-Campus portal, the Optima Classical Academy in the United States, and UNESCO-led initiatives in China. These cases demonstrate that virtual technologies are essential not only for advancing teachers' innovative practices but also for enhancing the global competitiveness of national education systems. In turn, this creates the groundwork for countries to align with developed educational standards and consolidate their place in the international knowledge space.

REFERENCES

1. Ishmuhammedov R.J., Yuldashev "Ta`lim va tarƄiyada innovatsion pedagogik texnologiyalar" o`quv qo`llanma.-T., "Fan va texnologiya", 2009y. 87
2. AkƄar Xalikov1, Sultonjon EGAMOV2, Jahongir NORMATOV3 Virtual learning technologies in computer science Jizzakh State Pedagogical Institute, – Society and innovations Special Issue – 04 (2022) / ISSN 2181-1415
3. OECD. (2023). *Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem.* Paris: OECD PuƄlishing. Retrieved from https://www.oecd.org/en/puƄlications/2023/12/oecd-digital-education-outlook-2023_c827Ƅ81a.html

4. UNESCO. (2022). *Education: From COVID-19 school closures to recovery.* Paris: UNESCO
5. RedЬoxVR. (2022, August 17). *World's first fully online VR school launches in Florida.* Retrieved from https://redЬoxvr.co.uk/first-fully-online-vr-school
6. The Japan Times. (2024, March 28). *Japan Virtual Campus: Learning without Ьorders.* Retrieved from https://www.japantimes.co.jp/2024/03/28/special-supplements/japan-virtual-campus-learning-without-Ьorders-jv-campus/