ANALYSIS OF THE EFFECTIVENESS OF USING VR TECHNOLOGIES IN THE PROCESS OF LEARNING ENGLISH LANGUAGE

Abstract. This article is dedicated to a deep analysis of the relevance and effectiveness of using virtual reality (VR) in the modern process of learning English. Modern technologies are increasingly integrated into the educational process, and VR technologies are no exception. This direction is gaining popularity due to its ability to create interactive and engaging learning environments.

The first section discusses the importance of integrating VR technologies into modern education and their potential to enhance learning effectiveness. Various aspects of the influence of virtual reality on the learning process are considered, including the ability to create realistic language situations that contribute to deeper understanding and mastery of the material.

The second section is devoted to a detailed overview of existing approaches to using VR in English language learning. This includes using virtual environments for interactive learning and language practice. Specific examples of programs and applications that allow students to immerse themselves in a language environment are discussed, which are much more effective than traditional teaching methods. In particular, aspects such as interaction with virtual characters, participation in simulations of real-life situations, and the use of VR to expand vocabulary and improve pronunciation are analyzed.

Additionally, the research examines the effectiveness of virtual reality technologies in improving language acquisition and proficiency. It evaluates how VR can contribute to improving grammar skills, developing listening comprehension, and enhancing speaking proficiency. An important aspect is also the analysis of the impact of VR on students' motivation to learn English. Comparisons with traditional teaching methods are made to determine whether the use of VR technologies indeed brings significant advantages in language learning.
The third section explores the advantages and disadvantages of using virtual reality technologies in English language learning. Both positive and negative aspects of this approach are considered. Advantages such as personalized learning, access to authentic language resources, flexibility, and convenience of using VR technologies are discussed. At the same time, attention is paid to drawbacks such as high equipment costs, technical difficulties, and potential health issues associated with prolonged use of VR.

The impact of using VR on language acquisition and proficiency among students is also examined. The results of numerous studies show that students who used VR technologies demonstrate better results in learning English compared to those who learned through traditional methods. An important aspect is also the consideration of opportunities for further development and improvement of VR technologies for even more effective use in language education.

Overall, the article provides a comprehensive overview of the current state of using virtual reality in English language learning, analyzes its advantages and disadvantages, and discusses prospects for further development of this innovative approach. This research can be useful for educators, researchers, and educational technology developers who aim to implement cutting-edge technologies in the educational process to enhance its effectiveness.

**Keywords:** Immersive technologies, Virtual reality, Education technology, Interactive learning, English language, Language learning, VR technologies, Language teaching.

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АНАЛІЗ ЕФЕКТИВНОСТІ ВИКОРИСТАННЯ VR-ТЕХНОЛОГІЙ У ПРОЦЕСІ ВИВЧЕННЯ АНГЛІЙСЬКОЇ МОВИ

Анотація. Стаття присвячена глибокому аналізу актуальності та ефективності використання віртуальної реальності (VR) у сучасному процесі вивчення англійської мови. Сучасні технології все більше інтегруються в освітній процес, і VR-технології не є винятком. Цей напрямок набирає широкої популярності завдяки своїй здатності створювати інтерактивні та захоплюючі навчальні середовища. У першому розділі обговорюється
важливість інтеграції VR-технологій у сучасну освіту та їхній потенціал для підвищення ефективності навчання. Розглядаються різноманітні аспекти впливу віртуальної реальності на процес навчання, включаючи можливість створення реалістичних мовних ситуацій, які сприяють більш глибокому розумінню та засвоєнню матеріалу.

Другий розділ присвячений детальному огляду існуючих підходів до використання VR у вивченні англійської мови. Це включає використання віртуальних середовищ для інтерактивного навчання та мовної практики. Розглядаються конкретні приклади програм та додатків, які дозволяють студентам зануритися у мовне середовище, що є набагато більш ефективним, ніж традиційні методи навчання. Зокрема, аналізуються такі аспекти, як можливість взаємодії з віртуальними персонажами, участь у симуляціях реальних життєвих ситуацій, а також використання VR для розширення словникового запасу та покращення вимови.

Крім того, в дослідженні вивчається ефективність технологій віртуальної реальності для покращення засвоєння мови та рівня володіння нею. Оцінюється, наскільки VR може сприяти поліпшенню граматичних навичок, розвитку слухового сприйняття та підвищенню рівня розмовної мови. Важливим аспектом є також аналіз впливу VR на мотивацію студентів до вивчення англійської мови. Проводяться порівняння з традиційними методами навчання, щоб визначити, чи дійсно використання VR-технологій приносить значні переваги у вивченні мови.

У третьому розділі досліджуються переваги та недоліки використання технологій віртуальної реальності у вивченні англійської мови. Розглядаються як позитивні, так і негативні аспекти цього підходу. Зокрема, аналізуються такі переваги, як можливість персоналізованого навчання, доступ до автентичних мовних ресурсів, а також гнучкість і зручність використання VR-технологій. Однак, увага приділяється і недолікам, таким як висока вартість обладнання, технічні складності та можливі проблеми зі здоров'ям, пов’язані з тривалим використанням VR.

Також розглядається вплив використання VR на засвоєння мови та рівень володіння нею учнями. Аналізуються результати численних досліджень, які показують, що студенти, які використовували VR-технології, демонструють кращі результати у вивченні англійської мови порівняно з тими, хто навчався традиційними методами. Важливим аспектом є також розгляд можливостей подальшого розвитку та вдосконалення VR-технологій для ще більш ефективного використання у мовній освіті.

Загалом, стаття надає комплексний огляд поточного стану використання віртуальної реальності у вивченні англійської мови, аналізує її переваги та недоліки, а також перспективи подальшого розвитку цього інноваційного підходу. Це дослідження може бути корисним як для педагогів та дослідників,
Introduction. In recent years, the integration of immersive technologies, particularly virtual reality (VR), into educational settings has gained significant attention. These technologies offer new approaches for enhancing learning experiences across various domains, including language education. This paper explores the burgeoning field of VR applications in the context of English language learning. As the global demand for English proficiency continues to rise, educators seek innovative approaches to engage learners and facilitate language acquisition. VR presents a promising solution, offering immersive and interactive environments that can simulate real-world language scenarios, foster communicative competence, and enhance learner engagement.

Initiating a comprehensive examination of the effectiveness of VR technologies in English language learning, this paper explores existing literature, evaluates current approaches, and analyzes the advantages and disadvantages of VR integration. It aims to offer valuable insights into the potential of immersive technologies to shed light on the role of VR in addressing the challenges faced by language learners and educators in the digital age.

Relevance of using VR technologies in education. Over the past few years, virtual reality (VR) technologies have emerged as powerful tools with the potential to revolutionize various aspects of education. Their immersive nature allows learners to engage with content in ways that traditional methods cannot replicate. Instances where VR proves to be an innovation in learning process [1]:

1. Interactive learning: VR technologies allow learners to experience immersive environments that simulate real-world scenarios, enhancing learning outcomes. For example, language learners can practice conversational skills in a virtual cafe or market, interacting with virtual characters to improve their fluency and confidence.

2. Accessibility and inclusivity: VR makes learning accessible to all students, regardless of location or abilities. Through VR platforms, learners can collaborate, access resources, and participate in virtual classrooms globally. For instance, students in remote areas can join a virtual field trip to a historical site or a scientific laboratory, gaining experiences that would otherwise be out of reach.

3. Engagement and motivation: the immersive nature of VR captivates learners' attention and fosters intrinsic motivation. By offering interactive and engaging experiences, VR can increase students' willingness to participate and deepen their understanding. An example is using VR to gamify language learning,
where students earn points and rewards for completing language challenges in a virtual adventure game [2].

4. Different ways of learning: VR enables educators to create multimodal experiences that cater to diverse learning styles. Combining visual, auditory, and kinesthetic stimuli, VR appeals to learners with different cognitive strengths. For example, visual learners can benefit from virtual tours of art museums, auditory learners can engage in listening exercises with native speakers in virtual environments, and kinesthetic learners can participate in interactive role-playing scenarios.

Review of existing approaches to using VR technologies in English language learning. The integration of VR technologies into English language learning has been explored through various innovative approaches, each utilizing the immersive capabilities of VR to enhance different aspects of language acquisition. The most common methods and applications of VR include:

1. Virtual language labs: virtual language labs replicate the environment of a traditional language lab in a virtual space. These labs provide students with access to a wide range of interactive exercises, pronunciation drills, and real-time feedback from virtual instructors. Programs like Mondly VR use a combination of 3D modeling, speech recognition technology, and artificial intelligence to create responsive virtual environments. These platforms are often built using game engines like Unity or Unreal Engine, which allow for high-quality graphics and realistic interactions [3]. Real-time language processing and feedback are enabled by integrating natural language processing (NLP) algorithms.

2. Immersive storytelling and role-playing: immersive storytelling and role-playing activities use VR to place learners in various narrative-driven scenarios where they must use English to interact and solve problems. Applications like Engage utilize VR headsets such as Oculus Rift or HTC Vive to provide immersive visual and auditory experiences. The scenarios are designed using advanced scripting languages and incorporate AI-driven characters that can respond dynamically to the user’s actions. Motion tracking and spatial audio are used to enhance the realism of the interactions [4].

![Fig. 1 Intelligent dialogue system process between user and AI-driven character](image-url)
3. **Virtual field trips:** Virtual field trips transport students to English-speaking environments or culturally significant sites, providing contextual learning experiences without leaving the classroom. Google Expeditions and similar platforms use 360-degree video and panoramic imagery to create lifelike virtual environments. These experiences are often compatible with various VR headsets, including Google Cardboard and Oculus Go. The content is developed using 3D scanning and photogrammetry techniques to capture real-world locations in high detail.

4. **Simulated real-world interactions:** Simulated real-world interactions involve creating everyday scenarios where learners can practice language skills in context. Platforms like AltspaceVR and vTime XR employ multiplayer VR technology, allowing users to interact in shared virtual spaces. These applications use spatial computing to manage user positioning and interactions, while cloud-based servers handle the synchronization and real-time data exchange between participants [5].

5. **Gamified Language Learning:** Gamification in VR combines language learning with game elements to increase engagement and motivation. VRChat and similar platforms use game development frameworks to create interactive and engaging learning environments. Features such as leaderboards, rewards, and progress tracking are implemented using backend databases and analytics tools. User-generated content and custom scripting capabilities allow for a diverse range of language learning activities.

6. **Pronunciation and accent training:** VR can also be used for targeted pronunciation and accent training by providing immediate, visual feedback on speech patterns. Applications like FluentU VR integrate speech recognition engines such as Google Speech-to-Text or Amazon Transcribe to analyze user speech in real-time [6]. Visual feedback is provided through graphical overlays that show phonetic...
differences and articulation errors. Machine learning algorithms are used to personalize the feedback based on individual learner profiles.

![Principles of speech recognition technology](image)

**Fig. 3** Principles of speech recognition technology

7. **Language Immersion Programs**: language immersion programs in VR provide an environment where only the target language is used, encouraging learners to think and communicate in English. ImmerseMe and similar programs utilize VR environments created with high-fidelity graphics engines. These platforms often include contextual learning tools, such as virtual objects and interactive prompts, to facilitate language immersion. AI-driven dialogue systems and context-aware interactions help maintain the immersion and ensure that the learners are continuously engaged [7].

**Advantages and disadvantages of using VR technologies in English language learning.** Recognizing the wide range of advantages and potential drawbacks is essential to understand an objective impact of VR on language education. However, while the advantages have been thoroughly explored in previous paragraph, it is equally important to delve into the potential drawbacks to gain a comprehensive understanding of the implications of VR integration in language learning.

**Disadvantages:**

1. **Costly hardware and software requirements**: the implementation of VR technology in language learning requires significant investment in hardware, software, and infrastructure, posing financial barriers for educational institutions and learners with limited resources.

2. **Technical limitations and potential glitches**: VR systems are susceptible to technical issues such as latency and software compatibility issues, which may disrupt immersion and detract from the effectiveness of learning activities [8].

3. **Potential for motion sickness**: prolonged exposure to VR environments can induce motion sickness in some users, resulting in discomfort and reduced engagement, particularly in immersive experiences with rapid movement or changes in perspective [9].

4. **Lack of face-to-face interaction**: VR-based learning environments lack the interpersonal interaction and social dynamics inherent in face-to-face classroom
settings, potentially impacting students' development of conversational fluency and interpersonal communication skills [10].

Through a balanced exploration of both the advantages and disadvantages, Table 1 demonstrates insights into the effective integration of VR in English language learning contexts.

Table 1.

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<thead>
<tr>
<th>Pros and cons of using VR technologies in English learning</th>
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<tr>
<td>Advantages</td>
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<td>-----------------------------------------------------------</td>
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<td>Immersive learning experiences</td>
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<td>Real-world simulation</td>
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<td>Engagement and motivation</td>
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<td>Interactive and personalized learning</td>
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<td>Accessibility for remote learners</td>
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<td>Various learning experiences</td>
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<td>Enhanced language practice and fluency</td>
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Analysis shows that despite the challenges and limitations associated with the use of VR technologies in English language learning, the numerous advantages outweigh the drawbacks, making VR an invaluable tool for educators and learners alike. The immersive nature of VR offers unparalleled opportunities for deep engagement, personalized learning, and real-world practice, ultimately leading to enhanced language acquisition and fluency.

**Conclusions.** In conclusion, the analysis conducted in this article underscores the transformative potential of VR technologies in English language learning. Through immersive experiences, real-world simulations, and personalized learning opportunities, VR has demonstrated its ability to enhance engagement, motivation, and language proficiency among learners. While challenges such as cost, technical limitations, and potential for motion sickness exist, the numerous benefits outweigh these drawbacks. As VR continues to evolve and become more accessible, it holds promise as a powerful tool for revolutionizing language education in the digital age. Further research and development in this field are warranted to fully harness the potential of VR in facilitating effective English language learning experiences.

**References:**

Література:


