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Integrating VR goggles to enhance student involvement and facilitate vocabulary acquisition experiences

In this paper is reported creative use of virtual reality (VR) technology in the learning process for second-year L.N. Gumilyov Eurasian National University students. Acknowledging the possibility for a transformation in education, the study tackles such educational issues as poor motivation among foreign language learners and insufficient exposure to real language environments. The value of the study pertains to the novelty and prospective potential of VR technology in learning the English language. This study aims to apply and show the effectiveness of VR technology as a tool for language learning participation and motivation. We used a mixed-methods research design combining qualitative and quantitative approaches including a literature analysis, a comparative method, secondary data analysis, expert assessments, and a case study approach. One experimental and one control group comprised the study. Every group had twenty students. For two months, the experimental group wore VR glasses. In terms of three main conclusions — availability of VR educational programs, adaptability for language learning, and affordability and accessibility — the results showed the capacity of this equipment for their use in the foreign language classrooms of Kazakhstan's universities. The study also showed that gains in students' language learning performance and motivation increased to 31 %.

Keywords: virtual reality, language learning, virtual reality glasses, goggles, virtual reality programs, motivation.

Introduction

Integrating innovative technologies in education has gained significant momentum, with virtual reality (VR) emerging as a promising tool to enhance learning experiences [1-2]. VR goggles have been spanning international markets for decades, progressing from prototypes to contemporary immersive gadgets.

It started in 1998 when scientists began investigating the potential of virtual reality (VR) headsets in educational settings [3]. A significant breakthrough occurred in 2007, when Google Earth VR provided students with additional possibilities for visually exploring geographical regions, thereby enhancing their understanding of geography and earth science [4]. In 2018, colleges began using VR glasses for the sake of an immersive experience in art, science, and history within the K–12 curriculum [5]. Then, the COVID–19 pandemic occurred, prompting schools to respond by implementing VR glasses to provide learners with simulated experiences, especially considering the increasing prevalence of remote learning in 2020 [4; 5581].

Nowadays, VR glasses have global use in engineering, health, art, and higher education, and the Republic of Kazakhstan is no exception. The Joint Order of the Minister of Internal Affairs of the Republic of Kazakhstan No. 49 as of January 23, 2019, and the Minister of Education and Science of the Republic of Kazakhstan No. 32 as of January 23, 2019 “On the approval of the standards for equipping preschool, secondary education, as well as special education organizations with equipment and furniture” includes sections with the objectives of VR education [6]. Thus, the special interests of the public, government agencies, and teachers in the topic of digital education determine the relevance of the research.

VR's abilities to: (1) offer a sense of presence and engagement; (2) increase students' motivation and enjoyment; (3) enhance students' confidence in language learning and reduce anxiety; (4) cater to the diverse needs of language learners; and (5) attract learners through such gamification features as YouTube, like 360° videos and Google Expedition travel through time simulation have recognized the potential benefits of VR in language education [5], [7-8]. While some acknowledged disadvantages exist, such as (1) the high cost of

equipment; (2) the requirement for technical infrastructure; (3) potential health concerns such as motion sickness or eye strain; and (4) the need for adequate teacher training and pedagogical support [9-10], they do not diminish the significance of VR gadgets in the educational context. In this regard, it seems crucial to define the place and role of these tools as a means of fostering motivation, engagement, and vocabulary acquisition in language learning within the context of Kazakhstan.

This study aims to bridge this research gap by exploring the integration of VR technology into language learning for second-year students at the L.N. Gumilyov Eurasian National University.

Formulating the following research questions advances the study's objective:

RQ1: Was there any possibility for educational institutions to use the technologies of virtual reality? Were there enough applications in the market for different ages and educational purposes?

RQ2: Were students more involved in the lesson when VR was implemented?

RQ3: Was there a positive effect of the use of VR glasses on the lessons?

Methods and materials

This research project used a mixed-methods research design that combined qualitative and quantitative methodologies to fully evaluate the integration of VR technology in language acquisition. A total of 40 second-year students at the L.N. Gumilyov Eurasian National University, who voluntarily participated in the experiment, were split into four groups: two experimental and two control groups. The experimental groups utilized VR glasses for a period of two months, while the control groups followed traditional teaching methods. Two months were set aside in the academic course and instructional program specifically to improve students' vocabulary since each CEFR level has a two-month time limit [11]. Also, the research by Chen Y. L. et al. in 2022 shows that although immersive VR experiences can significantly increase motivation and engagement among learners, these effects are most clear inside a limited timeframe, such a ten-week intervention, implying that structured timeframes can maximize learner engagement and knowledge retention [12].

To answer the first research question (RQ1), we applied the qualitative approach described by Yin in 2018 to investigate certain VR programs and apps pertinent to the research environment as D. Mathysen and I. Glorieux did in 2021 [13].

To answer the second research question (RQ2), we used the components of ethnographic research described by Creswell and Poth (2018), with the help of which we observed and recorded the actual experiences of students interacting with VR devices in the language classroom as it was described in the study by Wang et al. in 2024 [14].

To answer the third research question (RQ3), we used the pretest-posttest design by Shadish, Cook, and Campbell in 2002 to compare how VR affected language learning performance and vocabulary acquisition in the experimental and control groups, following the experience of Hoang et al. [15].

We analyzed and cross-referenced multiple data sources such as questionnaires, observations, assessments, and interviews to corroborate the emerging themes and patterns, adhering to the principles of triangulation as suggested by Denzin in 1978 and Patton in 2015 but recently described by Morgan in 2024 [16].

Results and Discussion

RQ1: Was there any possibility for educational institutions to use the technologies of virtual reality? Were there enough applications in the market for different ages and educational purposes?

When answering the first research question (RQ1) regarding the feasibility of integrating VR technology into educational institutions, we employed qualitative analysis and revealed that there are numerous VR educational applications available on the market that cater to different ages and educational purposes, highlighting three key findings: (1) availability of VR educational programs; (2) adaptability for language learning; and (3) cost and accessibility.

We identified a variety of VR applications designed for educational purposes and offered immersive learning experiences within such subjects as geography, chemistry, physics, and engineering. For instance, Google Expeditions and Labster could provide virtual field trips and science lab simulations, respectively, which can significantly enhance the learning experience, thereby supporting the view of Makransky and Petersen, who, in 2021, argued that VR could enhance experiential learning and provide unique educational opportunities that traditional methods cannot offer [17].

We also found out that there are fewer VR applications specifically designed for language classes, although many existing programs can be adapted for CLIL lessons. For example, Mondly VR offers live com-

munication in 30 languages: English, Spanish, German, French, Italian, Portuguese, Russian, Chinese, and many others, while platforms like Engage allow for the creation of interactive elements such as the ability to draw, create 3D models, project images and videos, and manage virtual objects. The same strategy was described by Lan in 2020, who argued that VR can provide authentic language contexts that enhance vocabulary acquisition and communication skills [18].

Despite the promising applications, our study revealed some challenges regarding the implementation of VR in educational institutions, such as the high costs associated with VR equipment and the need for robust technical infrastructure, as well as the predominance of English language applications that may limit accessibility for non-native speakers, necessitating pre-teaching of vocabulary to ensure comprehension. The disadvantages were echoed by Sun in 2023, who emphasized the importance of selecting age-appropriate and linguistically accessible applications to maximize the effectiveness of VR in diverse educational settings [19].

Nevertheless, the study demonstrated that suitable, cost-effective VR programs are still accessible for educational institutions with limited budgets because many VR applications offer free versions or cost relatively low, making them available. For instance, YouTube boasts a vast collection of 360° videos, including field trips to the zoo, safari, space, and other places, and provides an immersive background to the lessons, thereby approaching our results to the findings of Radianti et al. in 2020, who highlighted the cost-effectiveness and educational benefits of VR technology in their review of immersive learning environments [3].

RQ2: Were students more involved in the lesson, when VR was implemented?

To answer the second research question, we invited our participants to answer a questionnaire that consisted of the following statements: (1) I used VR before; (2) The opportunity to use VR goggles was a motivation for me to participate in this research. According to Fig. 1, 75 % of the participants (n=30) had never used VR previously, while 25 % of the respondents (n=10) were aware of the VR goggles before.

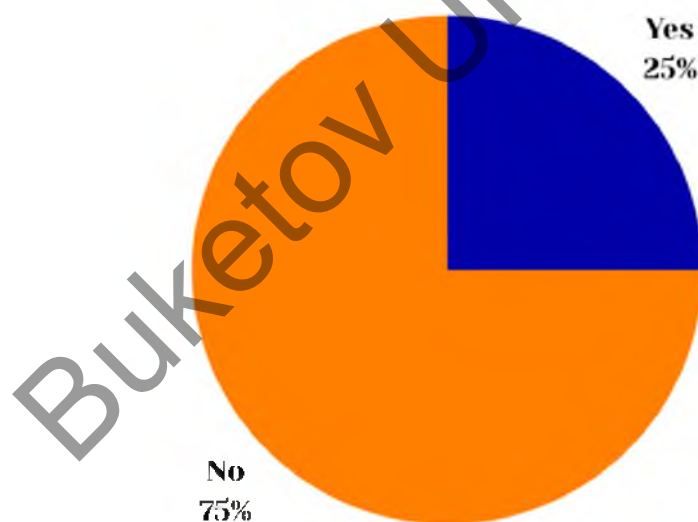


Figure 1. Did you use VR before?

Before donning the VR helmet, the participants answered a questionnaire asking whether the possibility of utilizing a VR helmet motivated their involvement in the research. As illustrated in Figure 2, 91 % of participants (n=36) expressed agreement, with half of them indicating strong agreement. This suggests that the opportunity to use a VR headset and immerse themselves in virtual reality served as a motivating factor for participation in the study. Conversely, students with differing opinions did not view VR as a significant incentive, as they were already familiar with virtual reality, primarily through playing video games.

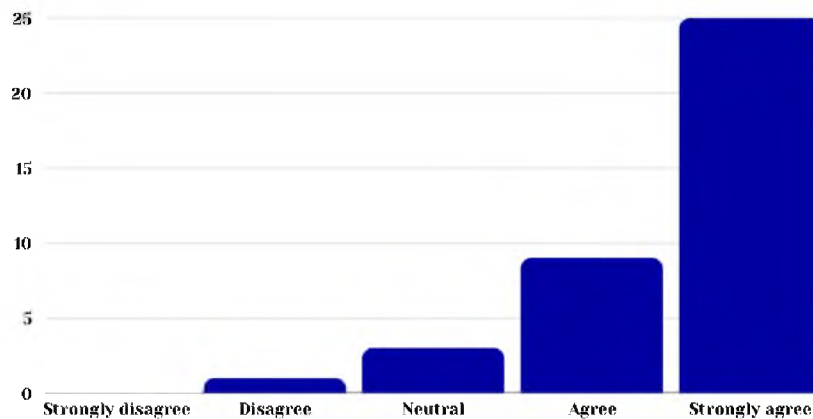


Figure 2. Motivation

The VR goggles were integrated into every phase of the Learning Sequence, including the lead-in, introduction, main part, and feedback, for the students from the experimental group compared to the control groups where VR was not used. The student involvement in the lessons varied widely since it was depending on the activity: some students were more active in physical activities, while others preferred artistic tasks, and it was challenging to find activities that engaged the entire group.

However, the implementation of VR glasses changed this dynamic, increasing students' primary motivation to use the VR headsets from the very first lesson regardless of their interests, gender, or other characteristics, thereby heightening students' involvement and excitement. Even after the experiment ended, students expressed a desire to continue using VR glasses in future lessons. This fact makes our findings consistent with the findings of Mikropoulos and Natsis, who, in 2011, noted that VR environments can significantly enhance student engagement by providing immersive experiences that capture learners' attention [20].

Despite the increased involvement, there were some drawbacks, particularly, some students' strong desire to use VR glasses occasionally, which led to disciplinary issues, such as noisiness and overexcitement that sometimes disrupted the learning environment; thereby aligning our study results with research by Merchant et al. in 2014, which highlights that while VR can enhance motivation, it may also lead to distractions if not effectively managed [21]. Educators must therefore balance the motivational benefits of VR with strategies to maintain classroom discipline and focus as Huang et al. suggested in 2021 [22].

RQ3: Was there a positive effect of the use of VR glasses on the lessons?

The first significant attempt to introduce VR technology into Eurasian National University happened in September 2023. This experimental work reached two groups (with 40 second-year students) using a fiber optic network. This project created a VR classroom where students, accompanied by an instructor (teacher), could use VR glasses. While the software has received excellent feedback from students and administrators, it still has some drawbacks. Sometimes the internet signal strength was a problem, in particular, the university's internet connection overloaded when a group of 18 to 20 learners attempted to download the application at the same time, resulting in severely slowed or non-functional download speeds. Some students reported that most old-model phones were unable to download the VR programs, while others reported issues with the quality of the VR experience, including concerns about image resolution and potential health effects such as dizziness and eye strain.

As we already mentioned, before and after the experiment, we asked the participants if they preferred using VR for learning over traditional methods. The results of the initial survey were the following: 96 % of the students ($n = 30$) agreed with this statement; 74 % ($n = 8$) showed strong agreement; and only 4 % of the participants ($n = 2$) disagreed, arguing that it would divert attention and create an environment that was more entertaining than educational. The post-survey results differed from the ones in the beginning, as Figure 3 demonstrates: 31 % of the participants ($n = 12$) showed strong agreement, 25 % of students ($n = 10$) agreed, 28 % of the respondents ($n = 11$) preferred to stay neutral and 16 % ($n = 6$) disagreed.

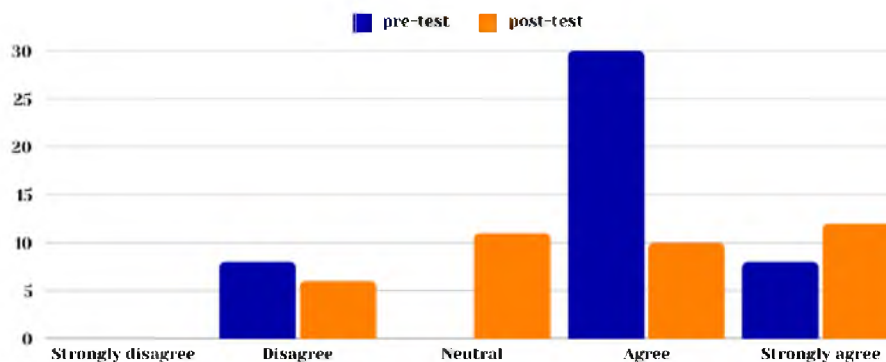


Figure 3. The positive effect of the use of VR on the lessons

The results show that VR has a positive effect on learning. Students in the experimental groups memorized an average of 75 new words, while students in the control groups only memorized 50. As we mentioned previously, the academic course ran one semester, with two months set out for improving the students' vocabulary. This was a time to maximize the number of words students could remember and apply effectively. This shows that VR is an effective way to improve vocabulary acquisition and supports the research by Chen et al. in 2022, who said that immersive learning environments can lead to deeper cognitive processing and better retention of information [23].

Alternatively, the drawbacks reported by our participants, such as the inability to view a professional VR learning environment or the lack of high-quality images provided by the VR goggles, align with findings from other studies. These studies caution that while VR can enhance learning, it is crucial to address technical limitations and ensure that students are adequately prepared for the immersive experience. For instance, Baxter and Hainey recently asserted that many people strongly support immersive learning over face-to-face teaching, despite the potential drawbacks of equipment cost and motion sickness [24].

Furthermore, most students expressed a preference for using VR over traditional methods, indicating a shift in educational paradigms where technology plays a central role in motivating learners and enhancing their educational experiences, thereby supporting 2018's Bacca et al.'s research, which found that students who engaged with VR reported higher levels of interest and enjoyment in their learning activities [25].

For now, the experiment's VR goggles are provided, leading to this conclusion. However, some sponsorship from city or school authorities could solve this problem.

Conclusion

This study demonstrated that VR technology is a valuable tool for enhancing language learning since it significantly increases student engagement, motivation, and learning outcomes. The evaluation of the experiment's outcomes yielded the following conclusion:

When allowed to use VR, participants express a preference for this method over traditional study techniques, which motivates them to study more frequently; therefore, we recommend educators consider the use of VR as a motivating factor for students' engagement.

Because VR provided a "new approach" to learning, participants claimed they were more interested in and engaged in the exercises. However, participants voiced fears that the novelty would wear off, proposing a "balanced approach" to its use. This led to the suggestion of incorporating VR into a blended learning approach to enhance traditional teaching techniques.

Overall, the immersive effect and how VR shuts out extraneous distractions so participants can focus more on the activity received excellent feedback.

However, because the subjects were wearing a headset, they were unaware of what was going on in their immediate surroundings, resulting in emotions of vulnerability. We suggested reassuring VR users of their surroundings while wearing the headset to prevent detracting from the immersive effect's benefits.

Because of the limited funding, the VR headset employed in this study did not appear to be very professional. The participants agreed that the design was simplistic.

Some applications were also basic and could not provide a genuine sense of immersion; therefore, we advise teachers to select headsets with superior parameters and characteristics and to test the applications before use.

Because the headset used in this study was of a simple design, it did not cause cybersickness. There were some negative impacts on health, such as eye strain and dizziness. One participant expressed discomfort due to the inability to use his glasses while wearing the VR gear. This research recommends purchasing headsets specifically designed for users with glasses.

Finally, it is still early for VR, and the market for educational applications of good quality is still small. Despite the lack of research on VR's effectiveness in education, the VR space is witnessing many exciting developments. Educators need to learn about these developments, their risks, and, most importantly, their potential benefits for learning. Teachers can provide valuable insights by connecting formal and informal learning environments.

Acknowledgments

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А.З. Кусаинова, Р.Ф. Жусупова, А.Н. Калижанова, Р.Н. Шадиев

Студенттердің қатысушылығын арттыру және сөздік қорын көбейту процесін жеңілдету үшін виртуалды шындық көзілдіріктерінің интеграциясы

Мақалада Л.Н. Гумилев атындағы Еуразия ұлттық университеті шет тілдері факультетінің екінші курс студенттерінің оқу үдерісінде виртуалды шындық (VR) технологиясын инновациялық қолдану тәжірибесі сипатталған. Авторлар білім беруді трансформациялаудың жалпыға бірдей табылған мүмкіндіктері тұрғысынан білім алушылардың ағылшын тілін үйренуге деген ынтасының төмен екендігін және табиғи тілдік ортаға ену мүмкіндіктерінің болмауы сияқты өзекті білім беру мәселелерін зерделеген. Зерттеудің құндылығы виртуалды шындық технологиясының ағылшын тілін үйренудегі жаңалығы мен перспективалық әлеуетінде, ал зерттеудің өзі VR-технологиясын шет тілдерін үйрену және мотивацияны тиісті деңгейде ұстау құралы ретінде қолдануға және көрсетуге бағытталған. Мақалада зерттеудің сапалық және сандық әдістерін қамтитын кейс–стади тәсілі: зерттеу тақырыбындағы әдебиеттерді талдау, салыстырмалы әдіс, қайталама деректерді талдау, сараптамалық бағалау және эксперимент және т.б. тәсілдері қолданылған. Зерттеуге екі топ қатысты: эксперименттік және бақылау, әр топ 20 адамнан тұрады. Екі ай ішінде эксперименттік топ мүшелері ағылшын тілін үйрену кезінде VR-көзілдірігін қолданды. Зерттеу көрсеткендей, VR-технологиясын қолдану қазақстандық жоғары оқу орындарында шет тілдері факультеттерінде үш критерий бойынша пайдалану тұрғысынан әлеуеті бар, атап айтқанда: VR-бағдарламалық қамтамасыз етілуі, осы бағдарламалардың тілдерді үйренуге бейімделуі және бағаның қолжетімділігі. Зерттеу нәтижелері студенттердің ынтасы мен сөздік қорын игеру тиімділігі орта есеппен 31%-ға артқанын көрсетеді.

Кілт сөздер: виртуалды шындық, тіл үйрену, виртуалды шындық көзілдірігі, виртуалды шындық бағдарламалары.

А.З. Кусаинова, Р.Ф. Жусупова, А.Н. Калижанова, Р.Н. Шадиев

Внедрение очков виртуальной реальности в процесс эффективного освоения обучающимися активного словарного запаса

В данной статье представлен опыт инновационного использования технологии виртуальной реальности (VR) в процессе обучения студентов второго курса факультета иностранных языков

Евразийского национального университета имени Л.Н. Гумилева. Авторы статьи рассматривают актуальные в свете общепризнанных возможностей трансформации образовательных вопросов, таких как низкая мотивация обучающихся к изучению английского языка и недостаток возможностей погружения в естественную языковую среду. Ценность исследования заключается в новизне и перспективном потенциале технологии виртуальной реальности в изучении английского языка. Исследование направлено на применение и демонстрацию эффективности VR-технологии в качестве инструмента для изучения иностранных языков и поддержания мотивации на должном уровне. Авторы используют кейс-стади подход, включающий как качественные, так и количественные методы исследования: анализ литературы, сравнительный метод, анализ вторичных данных, экспертные оценки и эксперимент. В исследовании приняли участие две группы: экспериментальная и контрольная, по 20 человек в каждой. В течение двух месяцев участники экспериментальной группы использовали VR-очки при изучении английского языка. Результаты исследования показали, что применение VR-технологий имеет потенциал в плане использования в казахстанских вузах на факультетах иностранных языков по трем критериям, а именно: наличие программного VR-обеспечения, его адаптивность к изучению языков и ценовая доступность. Кроме того, мотивация студентов и эффективность усвоения словарного запаса увеличились в среднем на 31 %.

Ключевые слова: виртуальная реальность (VR), изучение языка, очки виртуальной реальности, программы виртуальной реальности.

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