

EVALUATING VIRTUAL REALITY AS A TOOL FOR IMPROVING SPEAKING SKILLS IN ENGLISH LANGUAGE LEARNING

Zulfiya JUMASHOVA

Abstract: This study explores the efficacy of Virtual Reality (VR) as a tool for enhancing speaking skills in English language education. Conducted over a one-month period at the “English Learning Easily - ELE” school in Almaty, Kazakhstan, the study involved 10 students aged 12-13 years. Utilizing Google Arts & Culture application and VR Box VR 2.0 headsets, students engaged in virtual tours and expeditions, where they described their surroundings, summarized conversations and responded to questions in English. Pre- and post-tests were conducted to assess speaking skills, including fluency, pronunciation, vocabulary, grammatical accuracy and interaction skills. The tests were complemented by a questionnaire evaluating student preferences for VR-based learning. Results showed significant improvement in speaking proficiency, supported by a high preference among students for VR due to its engaging nature. This research contributes to the understanding of VR's potential in language education and indicates possible effects on future teaching methods and research initiatives.

Keywords: Digital learning tools, Artificial Intelligence, Interactive learning, Language learning, Virtual Reality.

Introduction

The integration of technology and Artificial Intelligence in education has paved the way for innovative teaching methodologies. Among these, Virtual Reality (VR) and Augmented Reality (AR) stand out for their immersive potential (Ardiny és Khanmirza, 2018). It may be caused by the novelty effect which can enhance learners' motivation (Slavova és Mu, 2018). This study aims to explore the effectiveness of VR, specifically Google Arts & Culture application, in enhancing the speaking skills of young English learners. AI can provide Virtual Reality experiences, placing learners in virtual environments where they can practice language skills in context. VR is becoming essential in creating interactive and adaptive learning environments and holds much promise for education (Helsel, 1992). Studies have shown that VR can provide realistic contexts for language practice and benefit the learning process in terms of motivation, engagement and knowledge maintenance (Pirker és Dengel, 2021). Possible ways to utilize VR in language education: virtual trips and expeditions for exploring different countries and cultures, accompanied by written and oral navigational information in English; realistic environments, where learners can practice language skills in context, such as visiting a virtual city or a museum; role-play scenarios such as real-life job interviews. VR tools in education can significantly enhance the language learning experience making learning process more motivating and engaging (Yan és Zhang, 2023).

We reviewed several articles on this theme, and some of which provide a thorough analysis of the uses, motivations, and challenges of employing Virtual Reality in educational contexts. For example, Kavanagh et al. (2017) not only explored common applications of VR in education, such as training or providing access to limited resources, but they also emphasized the difficulties encountered when integrating VR into educational environments, including significant financial expenses, software usability issues, and doubts about its effectiveness. Also, to narrow down the topic to our research question, we explored some articles on the use of VR in language education. Most studies come to the

conclusion that immersive VR experiences enhance foreign language learners' performance, fostering positive attitudes and high levels of motivation (Lan, 2020). Solak and Erdem (2015) concentrated on utilizing virtual reality in foreign language education. The paper focused on the effectiveness of virtual reality and game-based learning in foreign language education. The need for additional research in areas such as virtual reality within computer-assisted language learning was emphasized. Zheng et al. (2022) added among the challenges the ability of the educators to utilize effectively VR environments and integrate them successfully into learning process. They stressed the importance of collaboration among researchers, educators, and VR technology specialists to design appropriate learning tasks – a perspective we fully support. Regarding the foreign language performance, VR has been found to be advantageous for vocabulary acquisition (Lan et al., 2015) and speaking skills (Liaw, 2019). Talking particularly about the use of VR for improving speaking skills, some researchers come to the conclusion that using VR in speaking lessons can be effective and beneficial for students, however, employing VR without proper planning may not lead to improvements in students' speaking skills or grades (Ironsi, 2023). Additionally, Zhou et al. (2021) highlight the advantages of VR technology in enhancing public speaking skills, particularly for those with low self-confidence. They mention the significance of individual differences, such as confidence levels and self-perception, in influencing the effectiveness of VR reflection for public speaking training. Also, Zhou et al. (2021) emphasize that there are areas that need enhancement, such as incorporating real-time assessment and quick feedback. Among the assessment methods utilized for VR integrated EFL lessons there is a peer assessment (Chien et al., 2020). According to Chien et al. (2020), peer assessment method in technology-assisted language learning may reduce the learners' anxiety. However, we leveraged standard test assessment method for evaluating our students' performance. According to Heydari and Marefat (2023), the students' attitudes towards the different assessment methods were explored through group discussions, and the results indicated that the test demonstrated an acceptable level of construct and scoring validity. Overall, the findings suggest that designing and developing VR platform tasks specifically tailored for English as a Foreign Language (EFL) contexts can help learners enhance their speaking skills and reduce their anxiety even during the final tests (Heydari és Marefat, 2023). Azir et al. (2024) added Digital Storytelling to the use of Virtual Reality in classroom, and both technologies were found to significantly enhance language proficiency, with participants reporting high levels of engagement and motivation. The research recommends incorporating Digital Storytelling (DS) into language instruction, conducting long-term studies on their effects, offering professional development for educators and exploring effective teaching strategies. Integrating VR and DS technology appears promising for preparing students for success in different multimedia industries (Azir et al., 2024).

Research methods

The study involved 10 students aged 12-13. Talking about the socio-economic and cultural background of the students under research, they were originated from middle class families, studying in different state schools of Almaty, Kazakhstan, and attending “English Learning Easily - ELE” school in Almaty as an extracurricular studies after school. Significant number of the students, 8 out of 10, were ethnic Kazakhs, with Eastern and Central Asian traditional background. 1 student was from ethnic Russian family, and 1 student was originated from Uighur family. All participants' English speaking skills were assessed as Pre-Intermediate level prior to the study. Also, none of the students had prior experience working with VR tools. The materials used in the study involve:

- Smartphones, which students used to access VR content;
- Google Arts & Culture application, formerly known as Google Expeditions, used for virtual tours;
- VR Box VR 2.0 headsets, budget-friendly devices compatible with smartphones, providing an accessible option for experiencing virtual reality without a significant investment.

Over one month, students participated in virtual tours exploring various cities, countries and renowned landmarks using the Google Arts & Culture application.

Preparation to the study:

- Firstly, students installed the Google Arts & Culture application on their smartphones.
- Then the VR headsets were assembled, and the smartphones were placed inside them.
- All devices must be connected to the same Wi-Fi network, which is essential for synchronization. The teacher is able to select an expedition and guide the students through the virtual tour, providing narration.

Strategies recommended for using Google Arts & Culture VR in foreign language learning:

- Vocabulary introduction: Before starting a VR expedition, the educator introduces relevant vocabulary and phrases that students might encounter during the activity.
- Guided exploration: The educator guides students by asking questions, and encouraging them to describe what they see and hear in the virtual environment.
- Interactive storytelling: Teachers can prompt students to narrate stories based on their VR experiences, fostering creativity and improving language fluency.
- Discussion: After the VR experience, a class discussion allows students to share their opinions, thoughts and insights promoting critical thinking and collaborative learning.
- VR cultural immersion days: Allocate specific days or weeks for VR-based cultural immersion activities. Each session focuses on a distinct country or theme, enabling students to explore language acquisition and cultural understanding through immersive experiences.
- Project-Based Learning: Assign students to create multimedia projects based on their VR experiences. These projects could include digital presentations, videos, or role-play scenarios, integrating language learning objectives and cultural insights gained during their virtual journeys.

Assessment tools and criteria:

Fluency: Ability to speak without unnecessary pauses or hesitation.

Pronunciation: Clarity and correctness of spoken English sounds and intonation.

Vocabulary Use: Appropriateness and variety of vocabulary.

Grammatical Accuracy: Correct use of English grammar structures.

Interaction skills: Ability to respond appropriately to questions, maintain a conversation, and demonstrate active listening through relevant follow-up responses and questions.

The scoring rubric used a 5-point scale, where:

1 = Very Poor

2 = Poor

3 = Fair

4 = Good

5 = Excellent

Data collection and analysis: Data were gathered through individual pre- and post-test sessions and a questionnaire evaluating students' preferences for VR-based learning. Descriptive statistical methods were employed to interpret the data. Pre-test and post-test scores were analyzed to calculate mean scores and deviations, while questionnaire responses were summarized using percentages.

Ethical Considerations:

- Permission was obtained from the school administration and parents of the students.
- Students were informed about the study's purpose, and participation was voluntary.
- Anonymity was ensured by coding the participants' data and avoiding the use of any identifying information in reports or publications.

The results

Table 1 presents the pre- and post-test results, which demonstrate a significant improvement in speaking skills after the use of VR. We scheduled individual sessions with each student before and after implementing VR in the learning process. The assessment was conducted on a scale of 1 to 5, with 5 representing the highest level.

Table 1. Test results before and after the VR-based intervention in English classes

Student	Fluency	Pronunciation	Vocabulary	Grammatical accuracy	Interaction skills	Total score
	Pre-test/Post-test	Pre-test/Post-test	Pre-test/Post-test	Pre-test/Post-test	Pre-test/Post-test	Pre-test/Post-test
1	3/5	4/5	2/4	1/3	2/4	12/21
2	4/5	5/5	4/5	4/5	5/5	22/25
3	3/4	2/4	1/3	1/3	2/3	9/17
4	1/2	2/4	1/3	1/2	1/3	6/14
5	2/3	2/4	2/5	2/4	2/4	10/20
6	4/5	5/5	4/5	5/5	4/5	22/25
7	3/5	3/5	4/4	3/4	3/5	16/23
8	3/4	2/4	3/4	3/4	4/5	15/21
9	3/5	4/5	5/5	4/5	4/5	20/25
10	2/3	2/4	2/4	2/3	3/4	11/18

Calculating the averages for each criteria:

We added up all the pre-test scores and divided the result by the number of students. We did the same for the post-test scores.

Fluency pre-test average: $28/10=2.8$

Fluency post-test average: $41/10=4.1$

Pronunciation pre-test average: $31/10=3.1$

Pronunciation post-test average: $45/10=4.5$

Vocabulary pre-test average: $28/10=2.8$

Vocabulary post-test average: $42/10=4.2$

Grammatical accuracy pre-test average: $26/10=2.6$

Grammatical accuracy post-test average: $38/10=3.8$

Interaction skills pre-test average: $30/10=3$

Interaction skills post-test average: $43/10=4.3$

Calculating the percentage improvement for each criteria:

We used Percentage Change Formula: Percentage Improvement = $(\text{Post-test score} - \text{Pre-test score}) / \text{Pre-test score} * 100$

Percentage Improvement for fluency = $(4.1 - 2.8) / 2.8 * 100 = 46.4\%$

So, the performance has increased by 46.4% from the pre-test to the post-test.

Percentage Improvement for pronunciation = $(4.5 - 3.1) / 3.1 * 100 = 45.1\%$

Percentage Improvement for vocabulary = $(4.2 - 2.8) / 2.8 * 100 = 50\%$

Percentage Improvement for grammatical accuracy = $(3.8-2.6)/2.6*100=46.1\%$

Percentage Improvement for interaction skills = $(4.3-3)/3*100=43.3\%$

The additional questionnaire results indicated a strong preference for VR-based learning. Most students found the virtual tours engaging and helpful in improving their language skills. The questionnaire results were represented as pie charts to illustrate student preferences for VR-based learning. Figure 1 outlines the reasons for students' preference for VR applications.

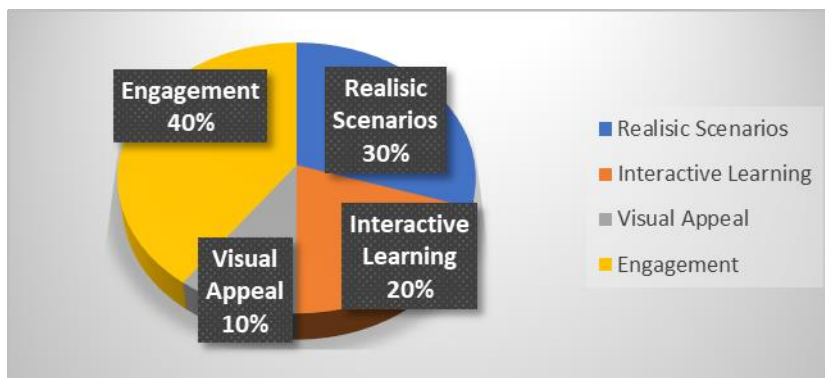


Figure 1. The results of the questionnaire demonstrating the reasons cited by students for their preference of VR

Discussion

The results of our study demonstrated a significant improvement in the speaking skills of young English learners following the integration of VR-based activities using the Google Arts & Culture application. This section provides a detailed analysis of these findings and their implications, comparing our results with existing literature and discussing potential reasons for the observed outcomes.

Table 1 presents the pre- and post-test results, showing substantial gains across all evaluated speaking skill components: fluency, pronunciation, vocabulary, grammatical accuracy, and interaction skills. The improvements in total scores for each student highlight the overall effectiveness of VR integration in enhancing language proficiency.

Fluency: The average increase in fluency scores from pre-test to post-test was 1.5 points. This improvement can be attributed to the immersive nature of VR, which encourages students to engage actively and continuously with the language. The realistic and context-rich scenarios presented in VR offer ample opportunities for students to practice speaking without the pressure of a traditional classroom setting, supporting Liaw's (2019) findings on the benefits of VR for speaking skills.

Pronunciation: Pronunciation scores showed an average increase of 1.8 points. The VR environment, which often includes interactions with native speakers and authentic language use, likely contributed to this improvement. Students were able to listen to and mimic native pronunciations, enhancing their phonetic skills. This finding is consistent with the work of Lan et al. (2015), who found VR to be beneficial for pronunciation practice due to its immersive audio-visual elements.

Vocabulary: Vocabulary scores increased by an average of 2 points. The exposure to diverse and context-specific vocabulary during VR experiences, such as virtual tours and role-playing, enriched students' lexical resources. This finding supports the assertion by Pirker and Dengel (2021) that VR can enhance vocabulary acquisition through engaging and contextually relevant interactions.

Grammatical Accuracy: The increase in grammatical accuracy scores, averaging 1.9 points, suggests that VR-based learning can reinforce grammatical structures through repeated and contextualized practice. The interactive and often spontaneous nature of VR scenarios may help students internalize grammatical rules more effectively than through rote learning methods.

Interaction Skills: The most significant improvement was observed in interaction skills, with an average increase of 2.3 points. VR environments often require students to navigate conversations, ask questions, and respond appropriately, thereby honing their interactive capabilities. This supports Zhou et al.'s (2021) research on the positive impact of VR on interaction and public speaking skills, particularly for students with lower self-confidence.

The questionnaire results, illustrated in Figure 1, reveal a strong preference towards VR-based learning among students. The reasons provided include increased motivation, enhanced engagement, and the realistic context offered by VR experiences. These outcomes align with the novelty effect discussed by Slavova and Mu (2018), which suggests that innovative and immersive technologies can boost learner motivation. Throughout the study, the students' enthusiasm and positive feedback were clearly evident. During discussions, they demonstrated high levels of motivation and engagement, often highlighting the immersive nature of VR experiences as a key factor. Many students eagerly anticipated each lesson, displaying a strong desire to participate actively. They appreciated the realistic contexts provided by VR, which made learning more enjoyable and relevant. The novelty of exploring virtual environments and interacting in English with peers further amplified their enthusiasm. This feedback highlights VR's potential to transform traditional language learning into an engaging and highly motivating experience, fostering a deeper connection to the material.

Our findings of our study align with the positive outcomes of VR in language learning documented in existing literature. Kavanagh et al. (2017) identified VR's potential to provide access to limited resources and boost engagement, despite challenges of integration. Our results support these observations, demonstrating that even cost-effective tools like the VR Box VR 2.0 headsets can significantly improve language learning outcomes. Furthermore, our findings on the effectiveness of VR in improving speaking skills are consistent with those of Lan (2020) and Solak and Erdem (2015), who highlighted the advantages of immersive VR experiences in language education. The improvements observed in vocabulary and pronunciation also corroborate with the findings of Pirker and Dengel (2021) and Liaw (2019).

While our study demonstrated the benefits of VR for language learning, it also highlighted several challenges. For instance, the effectiveness of VR is significantly influenced by the educator's ability to integrate these technologies seamlessly into the curriculum. Zheng et al. (2022) stressed the importance of collaboration among researchers, educators, and VR technology specialists – a factor we also found crucial in our study. Proper planning and comprehensive training for educators are essential to fully realize the benefits of VR. Moreover, the financial aspect of VR integration, while mitigated by the use of budget-friendly options, remains a consideration for widespread adoption. Both Kavanagh et al. (2017) and Ironsi (2023) pointed out the substantial costs associated with VR and the need for cost-effective solutions. Our study suggests that VR holds considerable promise for enhancing language learning, particularly in developing speaking skills. Future research could focus on examining the long-term effects of VR on language acquisition and exploring its application across diverse linguistic contexts. Investigating the integration of VR with other emerging technologies, such as Digital Storytelling (DS) as proposed by Azir et al. (2024), may offer further insights into creating engaging and effective language learning environments. Additionally, future studies should consider incorporating real-time assessment and feedback mechanisms, as recommended by Zhou et al. (2021), to enhance the learning experience. Peer assessment, highlighted by Chien et al. (2020), also warrants exploration as a method to reduce learner anxiety and foster collaborative learning.

The study's findings indicate that VR, through immersive and interactive experiences, can significantly enhance speaking skills in English lessons. The use of the Google Arts & Culture application enabled students to practice speaking in realistic contexts, leading to improvements in fluency, grammatical accuracy, vocabulary, pronunciation, and interaction skills. Key benefits of using Google Arts & Culture VR for English language learning include: increased motivation and engagement, contextual learning, an immersive learning environment, and exposure to authentic language use. VR experiences expose students to native speakers and authentic language use, aiding their understanding of various accents, intonations, and colloquial expressions.

Conclusion

The limitation of the current study is the relatively small sample size, with only 10 participants involved in the experiment. While the results demonstrate notable improvements in English speaking skills, it is important to acknowledge that the sample size may not be sufficient to draw definitive conclusions about the broader applicability of the findings. Larger sample sizes would be needed to confirm whether the observed improvements are consistent across a more diverse group of learners. The integration of VR in language education, particularly through the Google Arts & Culture application, has shown significant improvements in students' speaking skills. The immersive and interactive features of VR offer an engaging and effective method to enhance language learning. By addressing existing challenges and leveraging the strengths of VR, educators can create contextually rich learning environments that promote both language proficiency and engagement. Future research should continue to explore and refine these approaches, ensuring that VR becomes an integral part of modern language education. This research highlights the potential of VR in language education, especially in improving speaking skills. The positive feedback from students further supports the integration of VR into English classes. Future research should explore the long-term effects of VR on language acquisition and its application across diverse linguistic contexts. The findings suggest that VR applications can significantly benefit students' speaking and other language skills. By leveraging the immersive nature of VR, educators have the opportunity to design compelling, contextually relevant learning experiences that enhance language comprehension.

Bibliography

- Ardiny, H., & Khanmirza, E. (2018): The role of AR and VR technologies in education developments: Opportunities and challenges. In *2018 6th RSI International Conference on Robotics and Mechatronics (ICRoM)* (pp. 482-487). Tehran, Iran. <https://doi.org/10.1109/ICRoM.2018.8657615>
- Azir, D. A. I., Sriyanto, W., Sitorus, N., & Anggria, F. (2024): Virtual reality (VR) and digital storytelling (DS) technology to improve English speaking skills of vocational students. *KnE Engineering*, 6(1), 295-305. <https://doi.org/10.18502/keg.v6i1.15380>
- Chien, S.-Y., Hwang, G.-J., & Jong, M. S.-Y. (2020): Effects of peer assessment within the context of spherical video-based virtual reality on EFL students' English-speaking performance and learning perceptions. *Computers & Education*, 146, 103751. <https://doi.org/10.1016/j.compedu.2019.103751>
- Helsel, S. (1992): Virtual reality and education. *Educational Technology*, 32(5), 38-42. Retrieved July 3, 2024, from <http://www.jstor.org/stable/44425644>
- Heydari, M., & Marefat, F. (2023): Application of virtual reality speaking assessment tasks in an EFL context. In S. Hidri (Ed.), *Innovation in Learning-Oriented Language Assessment* (pp. 201-217). Cham: Springer International Publishing.
- Ironsi, C. S. (2023): Investigating the use of virtual reality to improve speaking skills: Insights from students and teachers. *Smart Learning Environments*, 10(1), 53. <https://doi.org/10.1186/s40561-023-00173-1>
- Kavanagh, S., Luxton-Reilly, A., Wuensche, B., & Plimmer, B. (2017): A systematic review of virtual reality in education. *Themes in Science and Technology Education*, 10(2), 85-119. Retrieved June 30, 2024, from <https://www.learntechlib.org/p/182115/>
- Lan, Y. J., Fang, S. Y., Legault, J., & Li, P. (2015): Second language acquisition of Mandarin Chinese vocabulary: Context of learning effects. *Educational Technology Research and Development*, 63, 671-690. <https://doi.org/10.1007/s11423-015-9380-z>
- Lan, Y.-J. (2020): Immersion into virtual reality for language learning. In D. F. Halpern & S. P. F. Kole (Eds.), *Psychology of Learning and Motivation* (Vol. 72, pp. 1-26). Academic Press. <https://doi.org/10.1016/bs.plm.2020.01.001>
- Liaw, M.-L. (2019): EFL learners' intercultural communication in an open social virtual environment. *Journal of Educational Technology & Society*, 22(2), 38-55. Retrieved from https://www.j-ets.net/collection/published-issues/22_2

Pirker, J., & Dengel, A. (2021): The potential of 360° virtual reality videos and real VR for education—A literature review. *IEEE Computer Graphics and Applications*, 41(4), 76-89. <https://doi.org/10.1109/MCG.2021.3067999>

Slavova, Y., & Mu, M. (2018): A comparative study of the learning outcomes and experience of VR in education. In *2018 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (pp. 685-686). Tuebingen/Reutlingen, Germany. <https://doi.org/10.1109/VR.2018.8446486>

Solak, E., & Erdem, G. (2015): A content analysis of virtual reality studies in foreign language education. *Participatory Educational Research*, 2(5), 21-26. <https://doi.org/10.17275/per.15.spi.2.3>

Yan, S., & Zhang, L. (2023): Trends and hot topics in linguistics studies from 2011 to 2021: A bibliometric analysis of highly cited papers. *Frontiers in Psychology*, 13, 1052586. <https://doi.org/10.3389/fpsyg.2022.1052586>

Zheng, C., Yu, M., Guo, Z., Liu, H., Gao, M., & Chai, C. S. (2022): Review of the application of virtual reality in language education from 2010 to 2020. *Journal of China Computer-Assisted Language Learning*, 2(2), 299-335. <https://doi.org/10.1515/jccall-2022-0014>

Zhou, H., Fujimoto, Y., Kanbara, M., & Kato, H. (2021): Virtual reality as a reflection technique for public speaking training. *Applied Sciences*, 11(9), 3988. <https://doi.org/10.3390/app11093988>

Author

Zulfiya Jumashova, Al-Farabi Kazakh National University, Almaty (Kazakhstan). e-mail: zulfiyaj21@gmail.com