

Reviews on the paper ‘The effects of a self-developed virtual reality environment on college EFL learners’ vocabulary learning’

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1. Introduction

In a digitalized society, technology, which brings convenience and efficiency, has become an integral part of people’s daily lives. In language education, researchers believe technology e.g. virtual reality (VR) has great potential to transform traditional classroom settings (Lee, Yang and Wu, 2024; Weng et al., 2024).

However, for some teachers, integrating technology into the classroom remains contentious. Some teachers think they can stick to their traditional teaching methods, ignoring the rapid development of technology and expressing scepticism about the effectiveness of technology. Others may hesitate to take the initiative, choosing to wait for clear directives or endorsements from school administrators before embracing new technological tools. Additionally, there is a growing societal movement towards digital minimalism for people to deliberately avoid or reduce using mobile phones or social media, opting to step back from its pervasive influence. This could also teachers’ reluctance to incorporate technology into their pedagogy.

Nonetheless, among all emerging technologies, VR has drawn many researchers’ attention (Hua and Wang, 2023; Zheng *et al.*, 2023). There is no doubt that VR can offer possible solutions to several significant problems in English as a foreign language (EFL) education. For example, EFL learners often face the problem of lacking an authentic learning environment to apply what they have learned in the classroom to practice (Song et al., 2023; Qiu et al., 2024). With immersive tools i.e. VR, students can have chances to explore and interact with people in a simulated environment which makes language learning joyful and exciting (Dooly, Thrasher and Sadler, 2023). Additionally, compared to non-digital and traditional teaching methods, digital ones can be more effective and efficient in facilitating learning. For example, studies have shown that VR can arouse students’ learning motivation (Chen, Hung and Yeh, 2021).

Besides, exposure to technologies can equip students with essential digital skills that are in increasing demand in the competitive and rapidly changing job market. In some cases, students are quite familiar with VR and already use VR in their daily lives for different purposes e.g. entertainment (Patterson and Han, 2019). More importantly, the practical effectiveness

of VR in help learning for learners with autism spectrum disorder (ASD) have gain increasing attention (Zhang *et al.*, 2024).

Therefore, the present research paper (Luan *et al.*, 2024) which offers valuable insights into the application of virtual reality in language education is of significance for discussion.

2. Authors and the journal

The article is cited as Luan, L. et al. (2024) 'The effects of a self-developed virtual reality environment on college EFL learners' vocabulary learning', *Interactive Learning Environments*, pp. 1–12. Available at: <https://doi.org/10.1080/10494820.2024.2344056>.

It was published in the *Interactive Learning Environment (ILE)* which is a prestigious journal in the field of technology-enhance education. The journal is a Q1 journal in the Social Sciences Citation Index (SSCI), which indicates that it is among the top 25% of journals in its category. This journal promotes innovative teaching methods that integrate technologies and shape the future of education.

The authors of this paper are Lin Luan, Gwo-Jen Hwang, Yanqing Yi, Zhihong Lu and Bowen Jing. Most of these authors, Luan, Yi, Lu and Jing, are affiliated with the Beijing University of Posts and Telecommunications, a leading institution in utilizing emerging technologies to enhance language education in China. Hwang is a scholar from Taiwan, China, where scholars are actively involved in exploring the potential of cutting-edge technologies in education

3. Discussion on the research

In this paper, the authors explored the potential of VR to assist EFL students in vocabulary acquisition. The research employed a mixed-method approach to provide a comprehensive understanding of the impact of VR. To critique this article, I will analyse it from three key perspectives. First, I will investigate the type of VR implemented in this study. Second, I will evaluate the research method used, focusing on how the research was conducted. Finally, I will review the research findings, considering their significance and implications.

3.1 Type of VR

The authors in this study did not mention the working definition of VR. But it tells the type of VR platform that the study employed. In this study, the author employed desktop VR rather

than immersive VR. Following Kaplan-Rakowski and Gruber (2019), there are two types of VR, ranging from low immersive VR (LiVR) or desktop VR to highly immersive VR (HiVR). LiVR can be defined as “a computer-generated three-dimensional virtual space experienced through standard audio-visual equipment, such as a desktop computer with a two-dimensional monitor” while HiVR refers to “a computer-generated 360° virtual space that can be perceived as being spatially realistic, due to the high immersion afforded by a head-mounted device” (p.552).

Some researchers think highly immersive VR is more effective since it can help users completely envelop themselves in a virtual world and block the surrounding physical environment and distractions. More recently, due to the cost reduction and development of technology, highly immersive VR has drawn more researchers’ attention (Ding, 2024). However, it is reported that highly immersive VR could lead to some problems such as discomfort and motion sickness when wearing a VR headset (Lee and Wu, 2023; Lee, Yang and Wu, 2024). Therefore, some researchers would like to explore the use of low-immersive or desktop VR in their studies (Song et al., 2023). The authors have justified why a desktop VR was employed in this study. It is believed that desktop VR still can provide a less intense but still engaging experience.

3.2 Applications of VR

To explore the use of VR in language education, practitioners can seek help from different applications. For example, most researchers would like to utilize commercial VR platforms such as Immerse, ImmerseMe and Mondly. These platforms are well-designed and offer abundant chances for students to engage in immersive learning experiences (Lee, Yang and Wu, 2024). However, a significant limitation is that teachers cannot modify the content on these platforms to cater to specific educational needs. Additionally, these platforms require paid subscriptions, making them not available to all students.

In the current research, the VR platform, called Situational English in Virtual Reality (SEVR) is a self-developed one. Custom-made VR platforms offer the advantage of providing individualized teaching content tailored to specific teaching and learning objectives. The platform simulates the relevant procedures and environment for international entry and exit at Beijing International Airport for passengers heading to the United States. Using the platform, students can familiarize themselves with check-in, security screening and check-in procedures when taking a flight. Specifically, this platform covers eight communicative knowledge points and theme-related vocabulary. The construct of 10 training modules for language skills was

demonstrated through seven task modes: Practicing (ABCD), On-site Experiencing, Testing and Customization (Luan et al., 2024, p.5).

However, the development of such platforms presents challenges, as most teachers lack the technological expertise required. Moreover, creating a self-developed VR platform necessitates substantial financial resources and collaboration with technical professionals (Coleman and Derry, 2023). More recently, the use of 360-degree of video, a relatively low-costs technology, has also drawn researchers' attention (Joo and Jin, 2024).

3.3 Mixed-method methodology

To assess the effectiveness of VR in vocabulary acquisition, most researchers who are influenced by the paradigm of positivism and post-positivism which believe that there is a single truth in the world (Cohen, Manion and Morrison, 2007), would like to use a quasi-experiment method. This method involves two groups of participants: an experimental group and a control group. The experimental group utilizes VR as a learning tool, while the control group employs non-VR learning methods. By comparing the post-test performance of both groups, researchers can determine whether VR-based learning leads to superior vocabulary learning outcomes.

In this study, the research process and data collection instruments are clearly stated. The authors employed a mixed-method approach. At first, a quasi-experimental design was employed to examine the effectiveness of VR in vocabulary acquisition. Participants were divided into two groups. One group consisted of VR players, and the other group consisted of video watchers. Before and after the experiment, vocabulary tests, the measurements for assessing vocabulary in the majority of studies (Lin and Wei, 2024), were conducted to investigate participants' knowledge. The test comprised two parts. One part involved the dictation of core words and expressions, and the other involved translation from Chinese to English. In other studies, the most common tasks also include multiple-choice questions and word-matching (Lin and Wei, 2024). Besides, the VR-assisted vocabulary learning (VRVL) questionnaire adopted from (Tai, Chen and Todd, 2022) was used in the process of experiment. The questionnaire has been tested to be reliable.

Additionally, the study also uses semi-structure interviews to explore students' perceptions of using VR in vocabulary learning. The use of a mixed-method approach in this study offers several benefits. The quantitative part can provide measurable evidence (i.e. vocabulary test scores) of the effectiveness of VR in vocabulary acquisition while the qualitative part (interview transcripts) can give in-depth insights into learners' experiences and perceptions.

The qualitative data in this study also enhance the triangulation of data sources (Chen, Hung and Yeh, 2021).

3.4 Research findings: Effectiveness of VR in vocabulary acquisition

Vocabulary is important for learners of English as a Foreign Language (EFL) since it is the basis of successful language learning (Schmit, 2010). Therefore, numerous studies have been conducted to explore how to effectively improve EFL vocabulary by VR. (Lai and Chen, 2023; Song *et al.*, 2023a; Wu *et al.*, 2023; Lin and Wei, 2024). For EFL learners, vocabulary learning presents a big challenge (Chang, Park and Suh, 2024). On the one hand, there are a vast number of words that learners cannot manage in a short period of time. On the other hand, even though students make great efforts to memorize words, they often complain that it is difficult for them to retain the meanings. One of the possible reasons could be learners do not have a contextualized learning environment for word retention (Song *et al.*, 2023).

To investigate the effectiveness of VR in vocabulary acquisition, an independent-sample t-test was conducted to measure the difference between the mean scores of both the VR group and the video group in the pretest and post-test. The research findings in this study show that VR can positively enhance EFL learners' vocabulary learning. Firstly, the VR platform can create an authentic environment for learners to immerse and interact. In a simulated learning environment, students can receive feedback. Besides, the simulated VR learning experience can expand learners' imagination and visualization which helps learners internalize the words. Secondly, learners were given multisensory stimulus in the VR environment which helped learners have deep engagement in the learning process. This resonates the statement made by Wu *et al.* (2023) that "an important affordance of 3D virtual learning is the stimulation of different sense, which creates better conditions for learning, specifically for learning vocabulary" (p.708). These features of VR can help teachers integrate VR in teaching effectively in the future.

4. Conclusion and future research directions

This paper which explores the effectiveness of VR in EFL vocabulary acquisition contributes to the field of virtual reality assisted language learning (VRALL). The findings indicate the great value of VR in language education, especially for vocabulary acquisition. Therefore, the authors consider the VR-assisted learning approach to be feasible in EFL language education. Besides, the study also advocates teachers, technicians and curricular developers make joint efforts to cope with challenges in integrating VR into the EFL classroom.

However, the study does have its limitations. To further explore the effectiveness of VR in EFL teaching, Pegrum and Lan (2023) emphasize the need for more well-designed and methodologically rigorous research. As technology continues to advance, the findings of quantitative studies are likely to become increasingly robust and credible. In this study, the authors recommend using eye-tracking technology, which can reveal patterns of engagement and focus to provide a comprehensive understanding of students' learning performance. If available, future research could also employ Magnetic Resonance Imaging (MRI) which can be used to visualize the brain's structure and activity to measure students' learning outcomes. Additionally, the authors also believe that an extended intervention time for a longitudinal study may be preferable which may cope with a related problem of novelty effect (Tai, Chen and Todd, 2022). Finally, more insight into learners' individual differences in the VR learning environment should be addressed.

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