THE IMPACT OF VIRTUAL REALITY ENVIRONMENTS ON LISTENING AND SPEAKING SKILLS DEVELOPMENT
EL IMPACTO DE LOS ENTORNOS DE REALIDAD VIRTUAL EN EL DESARROLLO DE LAS HABILIDADES DE ESCUCHA Y HABLA

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Resumen

Hoy en día, la tecnología influye en el proceso de enseñanza y aprendizaje de idiomas, lo que ha abierto nuevas vías para mejorar la experiencia de aprendizaje. Entre estos avances, la realidad virtual (RV) proporciona entornos inmersivos que replican entornos reales, ofreciendo a los estudiantes de idiomas una experiencia rica en contexto que puede ser esencial para desarrollar las habilidades de escucha y habla. El objetivo general de este estudio es evaluar el impacto de las EVR en las habilidades de escucha y habla de los estudiantes de ESL en la educación superior. La investigación utilizó un diseño de métodos mixtos que involucra métodos cuantitativos y cualitativos para el análisis. Los participantes del estudio incluyeron 60 estudiantes universitarios de EFL (inglés como lengua extranjera) que trabajaban en diferentes niveles de competencia. Estos estudiantes fueron asignados aleatoriamente a un grupo experimental que aprendió a través de entornos de EVR o a un grupo de control que recibió la misma formación en entornos de aula tradicionales. Se administraron pruebas previas y posteriores para evaluar los cambios en las habilidades de escucha y habla. Además, se utilizaron entrevistas semiestructuradas y cuestionarios para obtener datos cualitativos de los relatos de los participantes sobre sus experiencias con los entornos virtuales de aprendizaje (ERV) como tecnología de aprendizaje. Los resultados destacan la fuerte influencia de la RV en el aprendizaje de idiomas, demostrando que los entornos de RV pueden contribuir a mejorar la competencia de los estudiantes al ofrecer experiencias inmersivas que los métodos de aula convencionales no pueden proporcionar. Esto no solo mejora los resultados del aprendizaje, sino también la satisfacción y la motivación del estudiante.

Palabras clave: Realidad virtual, Tecnología, Entornos inmersivos, Innovación, Niveles de competencia, Herramientas digitales.

Abstract

Today, technology influences the language teaching and learning process, opening new avenues for enhancing the learning experience. Among these advancements, virtual reality (VR) provides immersive environments that replicate real-world settings, offering language

learners a context-rich experience that can be essential for developing listening and speaking skills. The overall objective of this study is to evaluate the impact of virtual reality (VRR) on the listening and speaking skills of English as a Foreign Language (ESL) students in higher education. The research employed a mixed-methods design, incorporating both quantitative and qualitative methods for analysis. Study participants included 60 undergraduate EFL students at varying proficiency levels. These students were randomly assigned to either an experimental group, which learned through VRR environments, or a control group, which received the same training in traditional classroom settings. Pre- and post-tests were administered to assess changes in listening and speaking skills. In addition, semi-structured interviews and questionnaires were used to obtain qualitative data from participants' accounts of their experiences with virtual learning environments (VLEs) as a learning technology. The results highlight the strong influence of VR on language learning, demonstrating that VR environments can contribute to improving students' proficiency by offering immersive experiences that conventional classroom methods cannot provide. This not only improves learning outcomes but also student satisfaction and motivation.

Keywords: Virtual reality, Technology, Immersive environments, Innovation, Proficiency levels, Digital tools.

habilidades de compreensão oral e expressão oral de estudantes de inglês como língua estrangeira (ESL) no ensino superior. A pesquisa empregou uma metodologia mista, incorporando métodos quantitativos e qualitativos para análise. Os participantes do estudo incluíram 60 estudantes de graduação de inglês como língua estrangeira com diferentes níveis de proficiência. Esses estudantes foram aleatoriamente alocados a um grupo experimental, que aprendeu por meio de ambientes de RV, ou a um grupo de controle, que recebeu o mesmo treinamento em salas de aula tradicionais. Testes pré e pós-intervenção foram aplicados para avaliar as mudanças nas habilidades de compreensão oral e expressão oral. Além disso, entrevistas semiestruturadas e questionários foram utilizados para obter dados qualitativos a partir dos relatos dos participantes sobre suas experiências com ambientes virtuais de aprendizagem (AVA) como tecnologia de aprendizagem. Os resultados destacam a forte influência da realidade virtual (RV) na aprendizagem de línguas, demonstrando que os ambientes de RV podem contribuir para a melhoria da proficiência dos alunos, oferecendo experiências imersivas que os métodos convencionais de sala de aula não conseguem proporcionar. Isso não só melhora os resultados da aprendizagem, como também a satisfação e a motivação dos alunos.

Palavras-chave: Realidade virtual, Tecnologia, Ambientes imersivos, Inovação, Níveis de proficiência, Ferramentas digitais.

Sumário

Atualmente, a tecnologia influencia o processo de ensino e aprendizagem de línguas, abrindo novas possibilidades para aprimorar a experiência de aprendizagem. Entre esses avanços, a realidade virtual (RV) proporciona ambientes imersivos que replicam situações do mundo real, oferecendo aos aprendizes de línguas uma experiência rica em contexto, essencial para o desenvolvimento das habilidades de compreensão oral e expressão oral. O objetivo geral deste estudo é avaliar o impacto da realidade virtual (RV) nas

Introduction

There is an influence of technology nowadays in the language teaching and learning process, which opened new ways for improving the learning experience (İlter, 2015). Among these advancements, virtual reality (VR) provides immersive environments that replicate real-world settings, giving language learners a context-rich experience that can be essential for developing listening and speaking skills. This paper examines if VR environments can

facilitate this SLA skills development and their integrations on ELT context. With VR technology came the possibility of overcoming some of the limitations of classroom instruction, including the lack of authentic language situations and the rarified opportunities for interactive speaking practice. Presentation of life like conversational situation can enhance listening and speaking ability through higher level of immersion and engagement in VR environment, as it provides a rich vivid realistic experience (Yang et al., 2020). The purpose of the study is to explore the potential of VR environments for cultivating the listening and speaking skills of constructive ELLs. The aims are to assess the gains in these skills and to examine learners' views on the practicality of VR and its usefulness as an L2 learning resource.

A never-ending exchange through the continuing progress in technology that opens new avenues for teaching and language learning. Among these innovative technologies, virtual reality (VR) as an effective method has also recently become a popular tool that promises to deliver immersive environments reminiscent of real-world scenarios (Rubio-Tamayo et al., 2017). And in addition to their natural looking experiences, this is the kind of world building that makes VR an optimal way of supplementing language acquisition – especially the struggle for aural and verbal competency you can forget about once your school days are over. Conventional methods in language teaching are often so constrained by a lack of authentic conversation practice and the absence of relevant real-life situations that proficiency for communication is not promoted. VR will allow students to interact in more natural ways to develop their listening and speaking skills in real life situations, using the same social cues and dialogue that occur in

every day conversation. In addition, with VR, the opportunity exists for the repetition and customization of the learning environment so that the student can learn and practice at their own pace, and tailor the learning experience to meet their individual needs.

In addition to the technical possibilities offered by VR, there are also theoretical possibilities. The constructivist model of education suggests that the learner constructs knowledge through interaction with meaningful tasks and that VR offers an ideal vehicle for such engagement (Zhou et al., 2018). Situated learning theory (Khan et al., 1998) further supports this by suggesting that the best way to teach is in the context in which one wants the student to apply what he or she has learned and that VR can provide that. The general objective is assess the impact of VREs on Listening and Speaking skills for ESL students at the higher education. The foundation to this research is based on three fundamental educational theories, constructivist learning theory, situated learning theory and cognitive load theory. Taken together, these theories "suggest the various ways in which virtual reality (VR) can make a contribution to the process of learning a language" - for listening and speaking skills.

According to constructivist learning theory introduced by theorists such as Piaget and Vygotsky, a support for learners in actively constructing their own understandings and knowledge from experience is paramount (Fosnot, 2016). VR converges with constructivism as it offers learners interactive and immersive settings in which they can practice language tasks being actively immersed. In a virtual world, students are not passive knowledge hearers but can interact in dynamic situations where they have to listen, respond and adjust: the learner is constructing

knowledge while doing (Jonassen & Rohrer, 1999). Situated learning theory was developed by (Lave & Wenger, 1991) who argued that meaningful learning takes place in contexts that reflect real world situations. This theory suggests that we best obtain and retain information when it is associated with an important local or cultural event. Virtual reality gives students the unique ability to simulate realistic scenarios that reflect the nuances of real-world language use. Their interaction with these online environments that mimic realworld occurrences and are thus encountered linguistically in context (Brown et al., 1989) render the construction of knowledge more salient and consequential to the students.

Developed by Sweller et al. (1998), the cognitive load theory addresses the amount of mental effort that is required to learn new information. According to the theory, cognitive load can be divided into intrinsic load, which refers to the difficulty of the material to learn, extraneous load, which refers to how the material is presented, and germane load, which is the effort to process, construct, and automate schemas. Therefore, VR holds the potential to decrease extraneous cognitive overload but the amount of learners with a visually rich and coherent situational context that might facilitate comprehension. By combining visual, auditory, and interactive features, the VR environments allow for the faster and more efficient processing of language intake, thereby ensuring language input will be remembered and understood. Nonetheless, VR as a pedagogical instrument has the power to revolutionize language instruction, addressing limitations of conventional instructors. Such as, VR can give instant feedback and adaptive interactions which adapt to individual learners' characteristics (Álvarez et al., 2026). Combining theory with practice, VR adds a set

of theoretical principles to an actual implementation that leads the way for a holistic language learning paradigm. This engagement and motivation is supported within the immersive nature of VR (required for language acquisition) (Dalgarno y Lee, 2010).

Indeed, the technological capacities of VR must be evident. VR allows for multimodal learning, which is symbolic of the importance of multiple sensory inputs for language reinforcement. There is evidence that multimodal interactions facilitate comprehension and retention (Moreno y Mayer, 2007). Moreover, because of the adaptivity that comes with VR learning environments, learners can attempt language scenarios repeatedly at their own pace; thus catering for different learning styles and paces (Makransky y Lilleholt, 2018). In short, the coupling between VR and language is built on solid theoretical ground that underscores its capacity to offer learners with in-depth, contextually rich and self-direc ted learning experiences. These experiences are not only consistent with existing pedagogical theories, but also provide new directions to tackle common problems in language instruction.

Materials and Methods

The investigation used a Mixed-Methods design involving both quantitate and qualitative methods for analysis. The study included 60 EFL (English as a foreign language) university learners working at different proficiency levels. These students were then randomly assigned to either an experimental group that learned through VR environments or a control group that received the same training in traditional classroom environments. Pre- and post-tests were administered to evaluate changes in listening and speaking abilities. Moreover, the semi-structured interviews and questionnaires were used to acquire qualitative data of

accounts made by participants in relation to their experiences with VR as a learning technology. The experimental group underwent an 8-week intervention with weekly sessions on VR based activities, where active listening and speaking scenes appeared. The comparison group was taught a similar curriculum using traditional instructional procedures. Quantitative data and qualitative feedback from the tests were analyzed to evaluate VR.

Results and Discussion

The experimental group had higher yield in both listening and speaking tests than the control. The experimental group, on average, generated a 25% growth in listening comprehension and a 30% gain in speaking fluency.

Figure 1. Growth - listening comprehension and speaking fluency
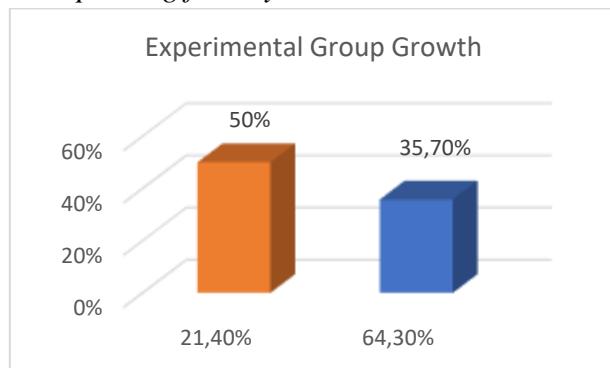
Qualitative Results: The VR group participants described experiencing enhanced perceived confidence and motivation through the use of VR, with the potential for multiple practice trials in a low stress environment. Naturalism of situations and immediate feedback were identified as positive features. The research tested the potential of VR environment on listening and speaking skills in English language learning by analyzing quantitative and qualitative data. The results suggest that the performance of the ERTS participants in these

skills is significantly better than that of their peers taught by traditional methods.

Quantitative results

Pres tests and Post tests assessing listening comprehension and speaking proficiency were applied in order to gather the quantitative data. All the results are shown in table 1.

Table 1. Pre test and Post test listening and speaking mean

Group	Listening Pre-test (Mean ± SD)	Listening Post-test (Mean ± SD)	Speaking Pre-test (Mean ± SD)	Speaking Post-test (Mean ± SD)
Experimental (VR)	68.2 ± 5.4	85.5 ± 4.2	66.8 ± 6.0	87.1 ± 5.0
Control	69.0 ± 5.6	75.3 ± 5.1	67.3 ± 5.8	74.8 ± 5.7

Source: Own elaboration

The experimental group's listening scores improved by an average of 17.3 points, compared to a 6.3-point increase in the control group. For speaking skills, the experimental group improved by 20.3 points, whereas the control group's improvement was limited to 7.5 points. Another tool that was applied to the results was an analysis of variance (ANOVA) to explore the differences in post-test scores between the experimental and control groups at a significant level $p < 0.01$, which demonstrates that virtual reality was effective in improving listening and speaking skills.

Qualitative results

Interviews and open-ended surveys were used to gather qualitative data about users' experiences in learning languages using VR. Results showed that students in the VR group were more immersed and motivated according to their responses, key themes included increased self-confidence, a focus on language practice and the realism of VR scenarios to facilitate real-world learning.

Thematic feedback from VR group Participants:

➢ Engagement was higher: 90% of the students were more focused and interested as they participated in VR compared to sitting through a lesson at their desks.

➢ Realism and Task-Based Learning: 85% found realistic situations were helpful with language use in real life simulation.

➢ Self-esteem: 75% of respondents reported boosted self-confidence when they speak, with many citing VR as a no-pressure place to practice speaking skills.

Figure 2. *Thematic feedback from VR group Participants*
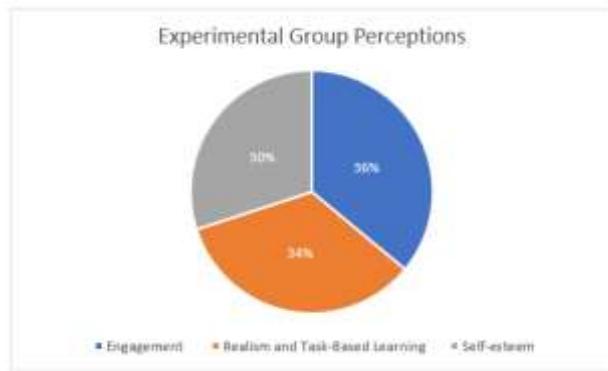
The figure shows a high percentage of students' perceptions of virtual reality; 90% of participants agree that today, thanks to technology, virtual environments can be used more effectively. In the case of learning English, interaction through digital media helps students feel more interested and focused on the subject. Another key factor is the type of activities implemented for teaching English, where 85% of participants considered activities based on real-life situations and examples from everyday life to be more effective. Finally, 75%

of students perceive the virtual environment as a safer place to practice speaking. One of the limitations of not knowing or mastering a language is a lack of confidence, which prevents students from practicing and developing the skill. By opting for a virtual environment, participants highlighted that they feel much more confident speaking and more self-assured.

Comparative analysis of participants' feedback (VR vs. Traditional)

Table 2 below provides a comparative analysis of the feedback from students in the experimental and control groups.

Table 2. *Comparative analysis of VR and Traditional Learning Feedback*

Category	VR Group (% Agreement)	Control Group (% Agreement)
Engagement	90%	65%
Realism and Task-Based Learning	85%	50%
Speaking Self-esteem	75%	60%

Source: Own elaboration

As can be seen from the table, VR group participants exhibited a higher level of engagement and appreciation for the contextual learning as well as greater confidence in speaking skill than those in control group.

Figure 3. *VR vs Control*
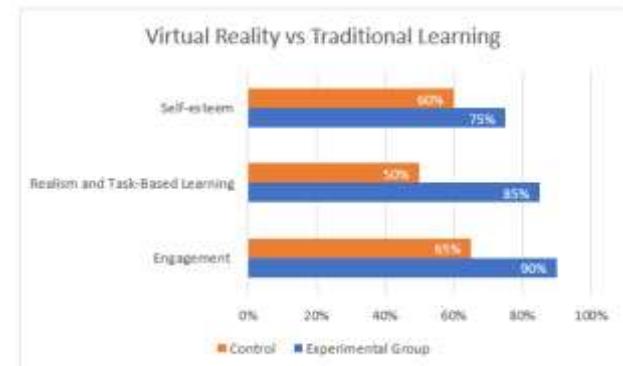
The image shows that when applying the traditional learning method in the control group, the highest percentage is attributed to commitment at 65%, followed by self-confidence and security at 60%, and finally, activities based on real-life examples within the classroom at 50%. However, when applying virtual reality, the percentage increases significantly, with commitment being the highest at 90%, followed by realism and simulation of everyday situations at 85%, and finally, self-confidence in the development and practice of speech at 75%. These results emphasize the strong influence of VR on language learning, demonstrating that VR environments can contribute to improving the proficiency of learners by offering immersive experiences which conventional classroom methods cannot provide. This not only enhances the learning outcomes but also learner satisfaction and motivation.

The results of this study provide strong support for the proposition that virtual reality (VR) environments facilitate the development of listening and speaking skills for learners of the English language. This section discusses the results in relation to the existing literature, the impact of the results on language teaching, and potential future research directions. According to the research's quantitative results, students with VR experience/VR learning presented significant achievements in listening and speaking compared those who had traditional taught. These findings also bolster (Kang, 1995) constructivist-based principles of learning underlined by activity and interaction. VR's immersive nature allows learners to feel the language and learn it according to contextual real life scenarios, thereby reducing the gap between learning a language conceptually in theory as compared to an application in practice (Barrett et al., 2023).

The qualitative results showed the importance of realism and contextual learning found in VR. It can be argued that it seems more authentic, as VR is interactive and engaging. This is in line with the work of (Cheng & Tsai, 2013), who reported that VR immersion has the potential to increase motivation and participation of learners. One of the most important influences on language learning is motivation, because it motivates learners to invest time and effort in practice and thus results into better outcomes (Gardner et al., 2011). Using VR in language education provides unique benefits: it is capable of real-time feedback and can generate personalized learning experiences customized for a learner's own requirements (Bailenson, 2018). But all that is not well with the technology; "there are" still some issues related to VR technology, which has inhibited or slowed down the widespread use of virtual reality for retail and whatnot. Although institutions may encounter obstacles in terms of infrastructure and resources, the ultimate advantages of including VR in language programs may outweigh these initial difficulties (Xie et al., 2023).

The findings of the present study also provide evidence in favor of cognitive load theory, VRs multimodal interface can reduce extraneous cognitive load through combined visual and auditory signals which help learning to understand (and retain information) (Sweller, 2010). A decrease in cognitive load enables students to allocate their cognitive resources more effectively, and this is consistent with research carried out by Mayer (2024) on the use of multimedia learning environments. Despite the contributions of this study, more investigation is needed about the long-term effects of VR in enhancing language development and learning among learners of different demographic backgrounds and

proficiency levels. Furthermore, an analysis of how VR can be combined with other types of educational technologies to develop full language learning ecosystems might provide directions to further pedagogical innovation (Vu & Shah, 2016).

Conclusions

The results show that listening and speaking can be significantly improved by using VR-based environment itself, which includes immersive, interactive language experience. The higher degree of contextual immersion helps learners better process linguistic input, which aligns with constructivist and situated learning (Yao et al., 2024). However, some difficulties were mentioned including the time needed to learn how to use VR and possible technical problems. These factors indicate a need for adequate training and technical support to optimize VR implementation in language curricula. The study emphasizes the strong influence of VR on language learning, demonstrating that VR environments can contribute to improving the proficiency of learners by offering immersive experiences which conventional classroom methods cannot provide. This not only enhances the learning outcomes but also learner satisfaction and motivation. In summary, inclusion of VR environments in language education could revolutionize the way languages are taught providing fully immersive, authentic and engaging learning experiences. These results point out the importance of educational decision makers and practitioners to plan a strategic approach of VR technology in order to exploit its pedagogical potentials.

La sección de Conclusiones en un artículo constituye una parte esencial para cerrar un artículo. En esta sección se debe concluir en forma directa y simple sobre lo encontrado en la investigación descrita; no se debe discutir nada (eso va en la sección de Discusión), no se debe recapitular el trabajo en forma condensada (eso va en la sección Resumen), ni se debe presentar resultados (eso va en la sección Resultados). Una forma clásica y adecuada, y que muchos autores(as) prefieren, es escribir una frase de presentación y luego mostrar las conclusiones numeradas, como en el siguiente ejemplo. "De los resultados mostrados, de su análisis y de su discusión, se pueden obtener las siguientes conclusiones, sobre la nueva técnica de análisis de hidrocarburos combustibles: 1) la característica principal de la metodología empleada, radica en una reducción significativa del tiempo de análisis; 2) la técnica propuesta es fácil de utilizar, ya que basta con seleccionar las señales adecuadas del espectro infrarrojo e introducirlas en el modelo presentado; 3) los resultados del nuevo método y los obtenidos por la técnica estándar ASTM D1 319 son comparables dentro de intervalos estadísticamente aceptables; y 4) la metodología empleada en las muestras analizadas puede ser ampliada a otras mezclas de hidrocarburos".

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