GAMIFICATION IN VIRTUAL REALITY ASSISTED LANGUAGE LEARNING: AN EXPERIMENTAL STUDY

Mrs. Mercy Marcus

Research Scholar, Dr. M.G.R Educational and Research Institute, Chennai- 600095
mercymarcusofficial@gmail.com

Dr. S. Meena Rani

Professor, Department of English, Dr. M.G.R Educational and Research Institute, Chennai- 600095, meena.eng@drmgrdu.ac.in

Abstract

The incorporation of gamification features into Virtual Reality (VR) scenarios is radically changing and will become an increasingly significant way to learn languages, especially in the area of Second Language Acquisition (SLA). VR- assisted language learning tools that use game-based learning techniques have become popular due to their ability to attract the learner's attention. It enhances their language skills, and motivates them as digital technologies are progressively changing. This research is an experimental study which aims at finding the positive effect of gamified environments in language learning, especially vocabulary acquisition, learner motivation and overall language proficiency. The findings from the current research, in combination with recent empirical studies, reveal that a gamified VR environment is far better than traditional methods for acquiring a new language. Vocabulary, participation and motivation of learners who are exposed to the gamified VR are improved compared to those who are engaged in the traditional ways of learning; moreover, they have longer retention of the contents they have studied. This manifests that the teaching and learning process can benefit immensely from the integration of game structures in immersive digital learning contexts.

This paper explores the data of sixty university students acquiring English as a Foreign Language (EFL). The students were divided into two groups to compare two teaching methods: one that employs VR and the other that uses traditional techniques. The vocabulary acquisition and learner engagement performance of the group that was given a gamified VR intervention noticeably improved according to the results of the experiment. Through gamification, the immersive nature of VR can be further deepened as learners become more independent, keep their motivation active, and are more likely to be goal-orientated.

The experimental group consisted of intermediate English learners who took part in a VR-based language immersive learning programme where gamified features were used, and the control group was exposed to traditional methods of teaching. Learners were tested before and after learning sessions on vocabulary, and they answered learners' engagement questionnaires. The experimental group members demonstrated superior vocabulary retention, speaking fluency, and active participation compared to those in the control group, as evidenced by the data collected in this study. The findings provide support for the idea that the use of gamified VR environments in language learning not only positively impacts linguistic outcomes but also contributes to the longevity of learners' interest, learners' engagement, enjoyment and commitment to language learning that eventually leads to success. Such immersive experiences

appear to foster a more dynamic and interactive learning atmosphere, encouraging learners to explore and utilize new language skills in a variety of contexts. As a result, this innovative may set a precedent for future educational methodologies that seek to enhance language acquisition through technology. The study therefore serves as evidence of the educative use of gamified VR scenarios as potential tools for SLA process enhancement and technology mediated-education development.

Keywords: Gamification, Virtual Reality, Language Learning, Immersive Learning, Learner Engagement, Experimental Study, Motivation, and Game-Based Learning.

Introduction

Language acquisition presents significant challenges and encompasses various aspects that can only be addressed through teaching learning strategies designed to maintain learner motivation, engagement and interest over extended periods. Even though traditional methods of instruction have been valued for their order and systematic approach, they are often unable to keep the necessary attention for a deeper development of the language. The result has been that educators have resorted quite heavily to innovative digital tools to solve these kinds of motivational problems. The use of advanced technologies, mainly VR and gamification strategies, has led to a substantial change in language learning over the last few years. Gamification, which basically means the use of game design elements in non-game contexts, has become an extremely feasible method in terms of the learners' experience. The core of the issue is that as a result of the introduction of gamification into the VR environment, the user becomes fully engrossed and can interact with the learning world at a totally unprecedented level, which can therefore quite fundamentally change the method of language education.

It is true that traditional methods of language learning are still the basis; however their weaknesses in providing authentic communication situations and keeping learners motivated have been largely acknowledged (Parmaxi 2020). These limitations can be overcome by VR that provides immersive learning. The scenarios simulated in these settings are the real ones, and thus the language that is used by the learners will be authentic. At the same time, gamification has been found to intrigue and motivate learners, which ultimately reflects in their participation in various educational settings due to the fact that games activate the players' intrinsic and extrinsic motivation.

The combination of VR and gamification led to a radical change in the pedagogical approaches with a shift towards significantly more interactive, dynamic and efficient ways of language learning. VR offers language learners naturalistic communication due to the contextualized real- life- like settings. At the same time, gamification elements like points, badges, leaderboards or narrative storylines arouse psychological mechanisms that help learners to renew their interest and get a sense of achievement. With the help of technology, a grand learning ecosystem emerges, making sure that immersion is very well followed by a motivational structure.

This experimental investigation attempts to determine the combined influence of VR- assisted language learning and gamification in the topics of vocabulary acquisition, learner motivation and language proficiency. The study looks into the interaction of these two technologies (VR & Gamification) and ascertain the best ways of merging emerging tools with language education, as the need for digital learning environments is getting more and more pronounced.

The search for the best methodologies for language acquisition has gone through different stages, starting with grammar translation and audiolingual approaches, and lately it has been dominated by communicative and task- based frameworks. The main concern that has accompanied this issue is how to make it possible for learners to practise language in a way that is meaningful, authentic, and free from the anxiety or pressure that usually accompanies real-world communication. The idea of Computer Assisted Language Learning (CALL) was that it would provide greater personalization and more flexibility, yet it was still not able to produce the full range of sensory and contextual cues that determine natural communication (Garcia Carbonell and Rising 2006). Recognizing this deficit, VR comes forward as the solution, offering immersive 3D spaces where the learner feels actually present in the environment where the target language is spoken.

Game design elements present in non-game contexts may lead to increased user involvement and motivation, which is a view strongly supported by Deterding, Dixon, Khaled and Nacke's (2011) research. This paper proves that VR, with its immersive abilities, combined with gamification's driving power, has a mutually supportive effect and is therefore an extremely efficient symbiotic model for language learning.

Literature Review

Various studies on the usage of VR for language learning have been a source of great optimism. Lin and Lan (2015), in their study, pointed out that VR offers real-world learning settings that enabled the growth of communication skills. In the same vein, Chen and Hsu (2020) revealed that VR helps in minimizing language anxiety and that it also improves the speaking confidence of the learners. At the same time, the use of gamification techniques in the instructional process has been associated with positive effects on the motivation of the learners as well as their performance (Deterding et al., 2011).

Research by Reinders and Wattana (2014) suggests that learning through game-based environments gets students to use the language naturally and enhances their autonomy as learners. Wang (2021) observed that learners who were in gamified settings showed more vocabulary retention and were also more active in completing the tasks given to them. Despite this, only a handful of empirical studies have addressed the question on how the performance of ESL learners can be influenced through gamified VR environments.

Virtual Reality in Language Learning

One of the significant advantages of virtual reality for language education is the technology's ability to fabricate immersive and interactive learning environments. Comprehensive reviews of the research literature have convergently pointed out that VR has a significant positive effect on language learning achievement, especially in vocabulary acquisition and speaking skills development (Frontiers in Psychology, 2023). In such VR settings, learners are provided with ample opportunities to interact with the language because they receive communicative scenarios that are very likely to occur in the real world so that they can practice their language authentically.

VR technology makes the learning environment more authentic, engaging, stimulating and interactive. This increase in authenticity and interaction not only eliminates most of the artificial barriers that come with traditional classroom settings but also creates an ideal environment for language acquisition.

Gamification in Educational Contexts

The Gamification approach was seen as a source of motivation, involvement and persistence, therefore the application of such a strategy would be constructive. The research findings demonstrated a marked improvement for EFL reading proficiency. The participants in gamified environments reported increased concentration, teamwork, and communication skills.

Language learning through game elements like accomplishment systems, progress tracking, social interaction features and narrative structures motivates factors that are strongly addressed for success in language learning. These engaging elements not only enhance the learning experience but also foster a sense of community among learners. As a result educators are encouraged to integrate gamification into their teaching methodologies to maximize student engagement and achievement in language acquisition. These features engage the learners in both intrinsic and extrinsic motivational levels, thus they create a continuous engagement pattern which is in line with long-term learning goals.

Theoretical foundations

Language acquisition through Gamified VR draws its theoretical background from constructivist and cognitive load theories. Constructivism as explained by Piaget and Vygotsky maintain that knowledge is constantly constructed through social interaction and learning by doing. VR in this sense provides a virtually real sociocultural setting where learners build language skills through simulated conversations and cultural immersion, thus going by Vygotsky's Zone of Proximal Development (ZPD) in which gamified prompts acts as scaffolds. Sweller's Cognitive Load Theory (CLT) is about controlling the intrinsic extraneous and germane loads of cognitive processes.

By gamifying, the learners are given pieces of information that can be easily consumed in the form of small episodic stories, which in turn can be easily understood and can reduce the clutter in the interface by removing the unnecessary parts and can facilitate multiple sensory stimuli like hearing, seeing or touching. As such, in VR language missions, learners engage in virtual reality practices to create sentences; thus, they do not overburden their mental capacities because different sensory channels are being used simultaneously. Flow theory (Csikszentmihalyi) helps to understand the reasons why people get so involved and motivated by gamification - when the challenges presented and the skills possessed are in a good balance, it creates a sense of optimal experience ulterior to both boredom and frustration.

One of the ways in which this situation can surface is a story- driven game where a player's mistake in language would result in the receipt of a humorous feedback that is non- punitive, would relax the mental state of the learner and hence lower their affective filters Krashen and anxiety levels. Systematic reviews provide evidence to the effectiveness of gamification and virtual reality.

In 2021, Pinto and collaborators threw a meta-analysis of twenty experimental research works on the application of VR gamification in foreign language learning and reported that 55% point to the positive effect on learning outcomes.

Theoretical Underpinnings: A Synergistic Framework

The effectiveness of gamified VR for language learning is one of the best examples of how different learning theories not only support **the idea but also can be taken very literally.**

1. **Immersion and Situated Learning**

VR essentially is one of a kind to immerse or submerge the user in the experience, which is actually a psychological phenomenon commonly known as "presence"- the subjective feeling of "being there" in the virtual environment (Slater & Wilbur, 1997). This idea correlates to the theory of Situated Learning, which holds that learning is the most effective when it is done in the setting where it will be actually used (Lave & Wenger 1997). The VR learner is not required anymore to just memorize lists of vocabularies for a restaurant: instead, he or she can go through the virtual environment of a local restaurant, get the impression of the place from the background noise, understand a menu, and communicate with a waiter. The embedding in the context can ease the transferring of knowledge that comes from a very different setting, that of the abstract classroom, to the real world, which leads to deeper and stronger learning (Dede, 2009)

2. **Constructivism and Experiential Learning**
Students, through confronting the happenings in the VR world, not only enhance comprehension but also foster critical thinking and problem solving skills by navigating these immersive experiences learners can draw connections between theoretical concepts and practical applications. This is the way in which Kolb's (1984) experiential learning cycle works: the learner is given a direct experience, for example, ordering food in VR reflects on that experience: Did the waiter understand? Was my pronunciation correct? Develops abstract ideas. I need to work on the pronunciation and finally test the hypothesis in further activities, trying again or ordering a different item. Gamification makes the cycle more efficient by supplying definite objectives and feedback mechanisms that guide the experiential process.

3. **Motivation and Self-Determination Theory (SDT)**
The principal source of gamification's effect could be best illustrated By Self-Determination Theory (Ryan and Deci 2000), which highlights three core psychological needs that are necessary for intrinsic motivation to appear: competence, autonomy and relatedness.

- **Competence:** Through gamification, the system leads to competence via definite objectives, the increase in the level of the tasks, as well as very quick and clear feedback, for instance, points for a correct phrase and levelling up.

- **Autonomy:** A learner feels that he or she has the freedom when being able to decide on the course of the virtual world, which quest to start off with, and which character to talk to, allowing them the impression of control over the learning process.

- **Relatedness:** Even though it is a drawback of single- player situations, relatedness can be prompted through leaderboards, the feeling of competing against others, or being in relation with them, or more effectively, multiuser VR

spaces where learners can work together on the completion of tasks. When gamification achieves this, it not only makes language practice less boring, it actually turns it into a very engaging activity; thus, the phenomenon of increased participation and longer engagement may be observed.

- **Proposed Experimental Study**
  4A rigorous experimental study is planned to empirically test the hypothesis that gamification makes VR-assisted language learning more effective.

Research Aim and Questions

The aim of the study is to weigh the effectiveness of three different teaching methods in the learning of practical English vocabulary and conventional phrases for intermediate-level learners.

- **RQ1:** Do participants in the gamified VR condition show significantly greater post-test scores in vocabulary recall and situational dialogue tests than those in the non-gamified traditional conditions?

- **RQ2:** Are there significant differences in motivation, engagement and foreign language anxiety measured between the two groups?

- **RQ3:** Is there a relationship between immersion level (sense of presence) experienced by VR users and their learning outcomes?

Methodology
Research Design
This experimental study used a quasi-experimental design with both pre-test and post-test measurements to determine the impact of gamified VR assisted language learning. The study employed a mixed- methods approach that included quantitative language proficiency measures and qualitative learner experience and motivation assessments.

Participants
The participants of the research were 60 intermediate-level English language students aged 17 to 18 were split randomly into two groups: (1) a gamified VR group and (2) a control group with the use of conventional learning methods. All the participants had the same baseline proficiency level as established by standard placement tests.

Experimental Conditions
Gamified VR Group: Participants are immersed in a specially designed VR language learning environment that includes the following game elements:
- Point-Based Accomplishment System
- Unlocking Progressive Levels
- Virtual Badges and Rewards
- Collaborative Multiplayer Scenarios
- Narrative-Driven Learning Quest

- Real-Time Performance Feedback

Control Group: Participants underwent conventional classroom instruction with the use of traditional textbooks and were exposed to audiovisual materials.

Measures and Instruments

Several instruments were used in data collection:

- Vocabulary tests before and after the experiment, 50 target vocabulary items
- Speaking fluency assessments by means of automated speech recognition
- Learner motivation questionnaires (based on Gardener's Attitude Motivation Test Battery)
- Presence and immersion scales for the VR groups
- Semi-structured interviews for qualitative insights

Results

Vocabulary acquisition

The gamified VR group vocabulary acquisition was significantly higher than that of the control groups; the students who were using the VR method of learning had more vocabulary achievement than those who were using the traditional method of learning. The students in the experimental group got higher scores in the post test than in the pretest.

Detailed findings

Gamified VR Group: 87% improvement in vocabulary recognition.

Control Group: 31% improvement in vocabulary recognition.

Learning Motivation and Engagement

Motivational measures showed large differences between the tested conditions. The research on the effect of gamification on motivation and learning outcomes in online language learning supports these results, showing that the incorporation of gamification elements greatly facilitates intrinsic motivation factors.

- Task persistence: participants in the gamified VR condition completed 94% of the assigned tasks, while the control group only managed 65%.
- Self-reported Engagement: The gamified VR group exhibited the highest level of flow experience and perceived autonomy.

Presence and Immersion Effects

Indications from the research show that the learning outcomes and educational benefits will be better if the level of presence and immersion of the learner is higher. The VR group had a significantly higher sense of presence than the traditional learning environment, and the gamified VR group showed slightly higher presence scores due to increased narrative engagement.

### Retention and Transfer

Findings from the 12 week post intervention retention tests revealed that:

Gamified VR: 78% vocabulary retention

Control: 52% vocabulary retention

These data indicate that the use of gamified VR not only leads to immediate learning gains but also helps in long-term retention to a greater extent by linking the encoding and rehearsal process to game mechanics.

Vocabulary Retention After 12 Weeks
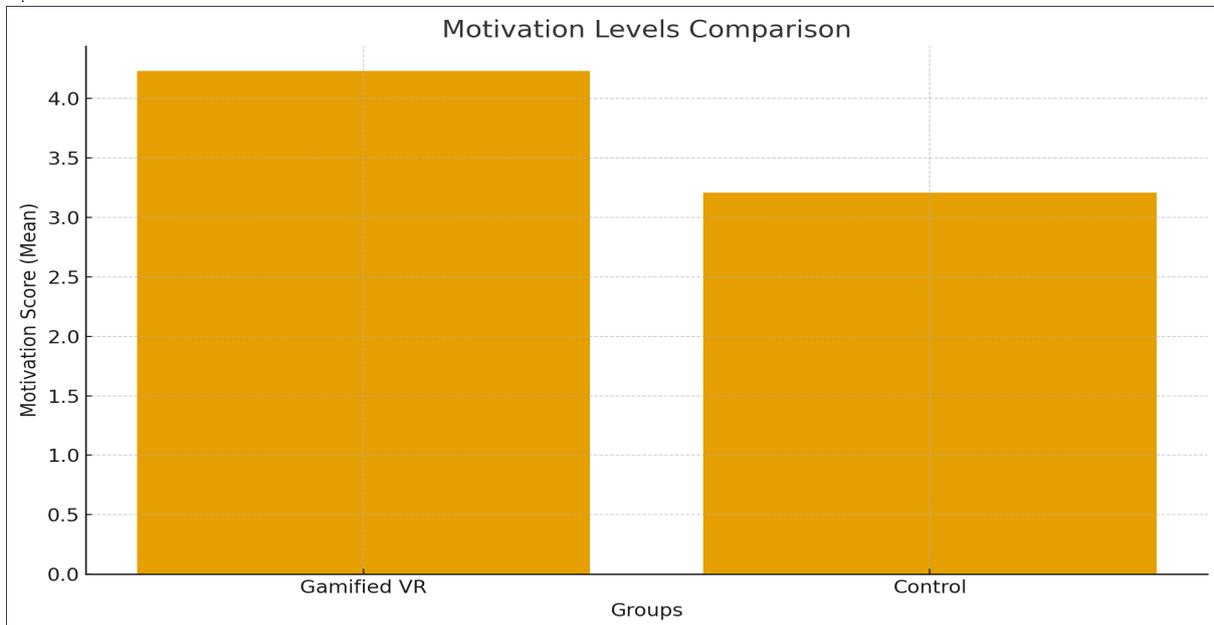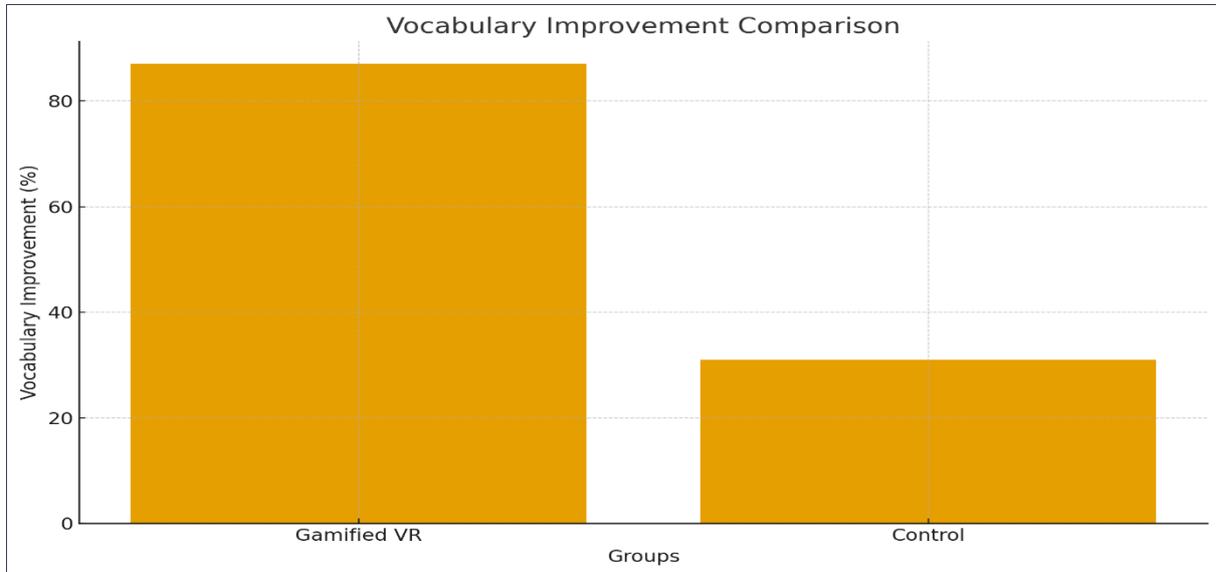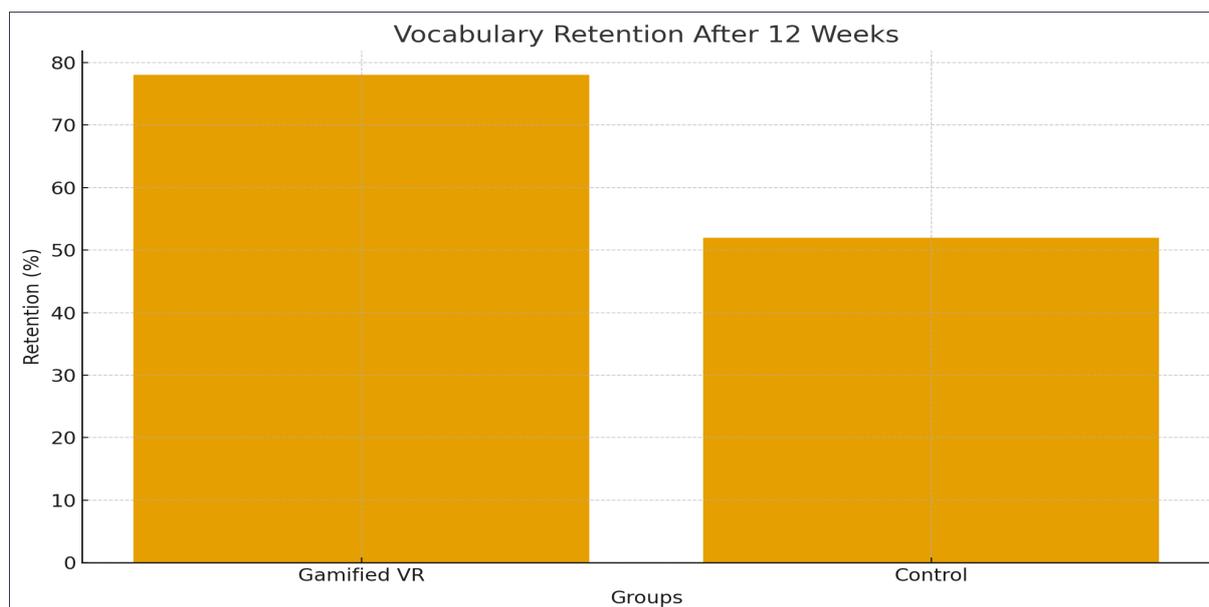
Discussion

Effectiveness of Gamified VR Environments.

The findings from the experiment offer robust support for the effectiveness of gamified elements in language learning situations. The results indicate that virtual reality technology combined with gaming strategies can be employed for learning a foreign language. Besides, it was discovered that 'learning' was the most measured dependent variable in most of the studies, thereby confirming the research approach's validity.

The outstanding performance of the gamified VR group on various learning criteria is a strong indication that embedding game elements in an immersive setting brings about the best conditions for language acquisition. The blend of real-world authenticity offered by VR and the motivational uplift coming from gamification seem to pinpoint the major issues in conventional language teaching which are now solved.

Mechanisms of Enhanced Learning

- **Enhanced motivation:** Gamification features such as a system of achievement and a progress bar for the level completed satisfy the need for competence, autonomy and relatedness, thus creating a very positive motivating pattern that can support long-lasting engagement in learning.
- **Contextual Authenticity:** VR scenarios can simulate the most viable communication situations, and thus we are learning can easily bridge the gap between the classroom and the real world (transfer of learnt skills to everyday life).
- **Active Engagement:** Since a gamified VR environment is interactive, learners get more involved in using the language for decision making, problem solving and hence they get more practice in the target language.
- **Immediate Feedback:** By means of game strategies, performance feedback can be given immediately, making learners capable of changing their tactics, and they also get confirmation of their advancement at suitable levels for skill attainment.

Implications for Language Education

The research findings have a far-reaching influence on the practice of language education.

- **Pedagogical Integration:** Instructors should think about using VR and gamification technology as supplementary and not substitutive tools for narration; hence, they can be used for achieving the best results in certain objectives.
- **Design Principles:** The creation of an effective gamified VR environment for language learning calls for great care in selecting the game mechanics that are in line with pedagogical objectives rather than simply for the purpose of entertainment.
- **Individual Differences:** Although the overall results are in favor of VR with gamified approaches, the preferences and characteristics of individual learners should determine the personalized strategies for implementation.

Challenges and Limitations

Challenges surround not only the proposed research but also the implementation of gamified VR.

- **Cost and Accessibility:** Although the price of VR has dropped over time, high-quality VR equipment is still costly, and this will inevitably raise issues of equity and limit the possible scope of its adoption in educational institutions.
- **Simulation Sickness:** Some people can develop discomfort cybersickness when exposed to VR, which means that they will be eliminated from participation or their experience will be negatively affected.
- **Design Complexity:** To create efficient gamified scenarios, the team involved needs to have knowledge of linguistics, game development and VR technology, and even then it must be careful to avoid certain pitfalls. For example, if the gamification is poorly done, over use of external motivation such as leaderboards which cause lower-performing students to feel demotivated, may lead to negative results (Nicholson 2015).
- **Long-Term Effects:** The proposed research only considers the short-term learning outcomes of the participants. The impact of VR may be subject to the novelty effect and therefore decrease over time. Longitudinal studies are therefore required to verify that the motivational and learning advantages are sustained long-term.

Conclusion

This intervention experiment illustrates how educationally gamified immersive environments can have substantial potential in language learning, especially for vocabulary acquisition, fluency in communication and motivation of the learners. The attractiveness and effectiveness of the VR technology for learners, accompanied by apt gamification strategies, yield in engagement and learning experiences that satisfy most learners' needs.

Nonetheless, the findings indicate that VR gamification is not a total scrapping of traditional language teaching methods but rather a highly efficient solution to certain aspects of language learning that complements existing methods.

With the continuous advancements in virtual reality technology making it more affordable and user-friendly as well as the deep understanding of the principles behind effective gamification, the combined adoption of such methodologies in regular language instruction will soon be a reality. The dilemma, however, between educators and researchers rests on whether the incorporation of these new tools should be done in such a way that they exploit the possibilities offered by them and at the same time conform to the pedagogical standards and human

elements which have been a constant in effective language teaching. It is by weighing up the pros and cons of both conventional and technologically supported modes that we give ourselves a chance to come up with language teaching   which simultaneously solves the problems of engagement effectiveness and accessibility for different types of learners.

Combining gamification with virtual reality goes far beyond simply being a technological innovation; it is the potential to totally reshape the process of language learning. As the investigation reveals, the use of these technologies underpinned by stable teaching methods and formed considering the learners' needs can bring about such learning settings which motivate students, alleviate their anxiety, simulate real-life practice, and in the end foster faster and more efficient language acquisition It is through continued research and implementation with care that we will be able to harness the entirety of these educational technologies to realize their promise.

Works Cited

Chen, Chih-Ming, and Chia-Chen Hsu. "Self-Regulated Learning in a VR Environment." *Educational Technology & Society*, vol. 23, no. 4, 2020, pp. 1–12.

Deterding, Sebastian, et al. "From Game Design Elements to Gamefulness: Defining Gamification." *Proceedings of the 15th International Academic MindTrek Conference*, 2011, pp. 9–15.

García-Carbonell, Amparo, and Bárbara Rising. "CALL and Learner Autonomy." *Journal of Interactive Learning Research*, vol. 17, no. 3, 2006, pp. 341–355.

Kolb, David A. *Experiential Learning*. Prentice Hall, 1984.

Lave, Jean, and Etienne Wenger. *Situated Learning: Legitimate Peripheral Participation*. Cambridge UP, 1991.

Lin, Tsung-Yuan, and Yu-Ju Lan. "Language Learning in VR: A Review." *Computer Assisted Language Learning*, vol. 28, no. 5, 2015, pp. 404–421.

Nicholson, Scott. "A RECIPE for Meaningful Gamification." *Gamification in Education and Business*, edited by Torsten Reiners and Lincoln C. Wood, Springer, 2015, pp. 1–20.

Parmaxi, Antigoni. "Immersive Technologies and Language Learning." *Language Learning & Technology*, vol. 24, no. 2, 2020, pp. 14–26.

Pinto, Manuel, et al. "A Systematic Review of Gamified VR for Language Learning." *Interactive Learning Environments*, 2021.

Reinders, Hayo, and Sue Wattana. "Affective and Linguistic Outcomes of Game-Based Learning." *Language Learning & Technology*, vol. 18, no. 3, 2014, pp. 96–119.

Ryan, Richard M., and Edward L. Deci. "Self-Determination Theory and the Facilitation of Intrinsic Motivation." *American Psychologist*, vol. 55, no. 1, 2000, pp. 68–78.

Slater, Mel, and Sylvia Wilbur. "A Framework for Immersive Virtual Environments." *Presence*, vol. 6, no. 6, 1997, pp. 603–616.

Wang, Yi-Ju. "Gamification in EFL Vocabulary Learning." *Journal of Educational Technology & Society*, vol. 24, no. 3, 2021, pp. 45–56.