The Effects of VR Integration in Teaching English as a Foreign Language: Academic Achievement, Motivation, and Engagement among Middle School Learners

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.908000153

Received: 31 July 2025; Accepted: 05 August 2025; Published: 01 September 2025

ABSTRACT

Virtual Reality (VR) technology is rapidly emerging as a powerful tool for transforming language education by providing immersive and interactive learning experiences. This research investigates the impact of VR integration in English as a Foreign Language (EFL) instruction on students' academic achievement, motivation, and classroom engagement. Employing a mixed-methods, quasi-experimental design, the study compares the outcomes of middle school students who received VR-enhanced EFL instruction with those taught using traditional methods. Data were collected through pre- and post-tests, questionnaires, classroom observations, and interviews with both students and teachers. The findings reveal that VR-based instruction leads to significant improvements in students' listening, speaking, and vocabulary retention, as well as higher levels of motivation and engagement in language learning activities. Despite some practical challenges related to technology access and teacher training, VR was found to create culturally rich and authentic learning contexts that traditional classrooms often lack. These results suggest that incorporating VR into EFL teaching can enhance language proficiency and learner engagement, highlighting the potential for immersive technologies to drive innovation in language education.

Keywords: Virtual Reality, EFL, academic achievement, motivation, engagement, immersive learning

INTRODUCTION

1.1 Background and Significance

In an era marked by rapid technological advancement, Virtual Reality (VR) offers transformative potential in education, particularly in English as a Foreign Language (EFL) instruction. By creating immersive, interactive environments that simulate authentic real-world contexts, VR can enrich language learning experiences significantly (Jeong et al., 2022). Recent meta-analytic evidence reveals that immersive VR environments produce a moderate positive effect (effect size ≈ 0.526) on students' academic achievement across disciplines, including language learning (Akgün & Atıcı, 2022). Furthermore, a dedicated meta-analysis of EFL contexts found that VR-based EFL instruction outperforms traditional methods with a small but statistically significant effect size ($g = 0.445$) (Qiu et al., 2023) .

1.2 Rationale for the Study

EFL teaching frequently relies on textbook-based methodologies that offer limited opportunities for

contextualized interaction and real-life practice. VR technology addresses this gap by enabling learners to engage in virtual scenarios—such as virtual city exploration or simulated conversations—with more authentic engagement (Jeong et al., 2022) . While motivation, attitude, and engagement gains are well documented in VR-supported environments, evidence about actual improvements in long-term academic achievement—especially in EFL classrooms—is less conclusive (Jeong et al., 2022; Qiu et al., 2023) .

1.3 Purpose and Contribution

This study investigates whether VR integration in EFL instruction enhances students' academic achievement in core language domains—listening, speaking, vocabulary, and grammar—compared to traditional teaching methods. Drawing on a mixed-method quasi-experimental design, the research also explores how VR affects learner motivation and engagement. The findings aim to bridge empirical gaps in VR-enhanced EFL research and offer evidence-based guidance for educators considering immersive technologies.

1.4 Research Questions

1. What is the effect of VR-integrated EFL instruction on students' academic achievement in listening, speaking, vocabulary, and grammar?

2. How does VR-supported instruction influence students' motivation and engagement in EFL learning?

1.5 Structure of the Thesis

Chapter 2 presents a comprehensive literature review, including prior EFL VR interventions and theoretical frameworks. Chapter 3 outlines the mixed-methods research design, sampling, instruments, and analytical procedures. Chapter 4 reports quantitative and qualitative findings, while Chapter 5 discusses implications, limitations, and recommendations for practice. Finally, Chapter 6 offers concluding insights and future research directions.

LITERATURE REVIEW

2.1 Introduction

Virtual Reality (VR) integration in Teaching English as a Foreign Language (TEFL) represents a significant leap in language education, providing learners with immersive, interactive environments that traditional classroom methods cannot offer. By simulating authentic social and communicative contexts, VR allows for personalized, engaging, and contextually rich language learning experiences (Qiu et al., 2023; Akgün & Atıcı, 2022).

2.2 Definitions and Scope of VR Integration in Language Teaching

VR technology is defined as the use of computer-generated, three-dimensional environments where learners interact through headsets and sensors. In TEFL, VR enables activities such as virtual field trips, role-playing with avatars, and simulations of real-world scenarios (Jeong et al., 2022). These approaches have been shown to increase learner motivation, participation, and retention of vocabulary and grammatical knowledge (Huang, 2020; Wang & Chen, 2019).

2.3 Theoretical Foundations

2.3.1 Social Constructivism

Rooted in Vygotsky's (1978) work, social constructivism posits that knowledge is constructed through social

interaction. VR provides new opportunities for collaborative language learning, allowing learners to interact with peers and native speakers in a virtual environment, promoting authentic communication and knowledge building (Wang & Chen, 2018).

2.3.2 Experiential Learning

Kolb's (1984) theory emphasizes the value of learning through experience. VR simulations allow language learners to experience real-life situations and cultural immersion, strengthening their communicative and pragmatic competence (Ploetzner et al., 2004).

2.3.3 Cognitive Load Theory

Sweller's (1988) Cognitive Load Theory suggests learning is optimized when cognitive demands are managed effectively. VR's multimodal, interactive environment supports comprehension and memory by balancing visual, auditory, and kinesthetic information (Mayer, 2009; Chen et al., 2018).

2.3.4 Situated Cognition

Lave and Wenger's (1991) theory argues that knowledge is tied to authentic contexts. VR immerses learners in lifelike scenarios, fostering situated language use and enhancing cultural competence (Gorini & Riva, 2008).

2.3.5 Input and Interaction Hypotheses

Krashen's (1982) Input Hypothesis and Long's (1996) Interaction Hypothesis both support VR as a platform for receiving rich, comprehensible input and meaningful interaction, both of which are essential for language acquisition.

2.3.6 Motivation Theory

Motivation is recognized as a key driver of language learning success. VR's engaging and novel environment has been shown to increase learner motivation, satisfaction, and sustained participation (Dörnyei, 1994; Qiu et al., 2023).

2.4 Review of Empirical Research

2.4.1 Impact on Language Skills

Empirical studies demonstrate that VR integration can significantly improve learners' speaking, listening, and vocabulary retention. For instance, Jeong et al. (2022) and Qiu et al. (2023) found small to moderate positive effects of VR on EFL learning outcomes across diverse contexts. Similar findings are echoed in meta-analyses showing enhanced performance compared to traditional teaching methods (Akgün & Atıcı, 2022; Zhang, Li & Wang, 2020).

2.4.2 Motivation and Engagement

Multiple studies confirm that VR environments boost learners' motivation and engagement (Wang & Chen, 2019; Qiu et al., 2023). The immersive, game-like features of VR reduce learner anxiety and create opportunities for autonomous practice, which are difficult to replicate in a standard classroom.

2.4.3 Challenges and Limitations

Despite these benefits, challenges such as high equipment costs, technical difficulties, and the need for teacher

training limit the widespread adoption of VR in TEFL. Concerns over potential over-reliance on virtual communication and reduced face-to-face practice have also been noted (Kizilcec et al., 2014; Ramamurthy & Sinha, 2018).

2.5 Comparison with Traditional Methods

VR integration offers unique advantages over traditional language instruction, including greater interactivity, personalized feedback, and exposure to authentic contexts. However, accessibility issues and potential decreases in interpersonal teacher-student relationships are noted disadvantages (Akgün & Atıcı, 2022).

2.6 Summary

Overall, the literature suggests that while VR integration in TEFL has considerable potential to enhance language proficiency, motivation, and engagement, careful attention must be paid to resource allocation, teacher training, and the balance between virtual and real-world language use.

METHODOLOGY

3.1 Introduction

This chapter outlines the methodological framework for investigating the impact of Virtual Reality (VR) technology integration on English language teaching and learning outcomes. To ensure a comprehensive and scientific approach, the research adopts a mixed-methods design—combining quantitative and qualitative research—to provide a multi-faceted understanding of VR's educational effectiveness. Data collection involves questionnaires, classroom observation, and interviews, with data analysis conducted using appropriate statistical and thematic techniques. The following sections detail the research paradigm, research design, research procedures, participants and tools, pre-research validation, reliability and validity, data collection and analysis, and ethical considerations.

3.2 Research Paradigm: Pragmatism

This research is grounded in the pragmatic research paradigm, emphasizing practical solutions and improvements to teaching outcomes. Pragmatism supports the integration of empirical research to explore the real-world application and effectiveness of VR in English language instruction, offering actionable insights for teaching practice.

3.3 Research Design

A mixed-methods approach was adopted, integrating both quantitative and qualitative techniques.

Quantitative methods involved administering questionnaires to measure changes in student engagement, motivation, and academic achievement following VR-enhanced instruction.

Qualitative methods included semi-structured interviews and classroom observations to capture in-depth perceptions and experiences from both teachers and students regarding VR integration.

The research was conducted over a period of eight weeks during the spring semester of 2024. The sample consisted of 120 middle school students and 6 English teachers, ensuring adequate representation and statistical power for both quantitative and qualitative analyses. This dual approach enables triangulation of findings, enhancing both the validity and depth of the research outcomes.

3.4 Research Procedures

The research was carried out in five sequential phases:

1. Analysis: Literature review and observation of existing teaching practices to identify research gaps and objectives.
2. Design: Formulation of detailed research plans, including participant selection, scheduling, and instrumentation.
3. Development: Design and implementation of VR-based English teaching activities, with iterative optimization based on feedback.
4. Implementation: Execution of teaching experiments and systematic data collection.
5. Evaluation: Quantitative and qualitative assessment of teaching effectiveness and the impact of VR on student learning outcomes.

3.5 Research Sample and Research Tools

Participants were drawn from a middle school, comprising both English teachers and students to ensure representativeness.

Qualitative instruments: Semi-structured interview protocols, focus group guidelines, observation logs, and document analysis.

Quantitative instruments: Structured questionnaires on engagement, motivation, and learning outcomes.

This multi-tool approach enabled comprehensive data collection on user perceptions, classroom experiences, and measurable teaching effects.

3.6 Pre-research and Pilot Validation

Prior to the main research, a pilot phase was conducted. All research instruments—including interview guides, focus group prompts, and questionnaires—were pretested and refined based on feedback from participants and expert reviewers. This ensured the tools' clarity, reliability, and construct validity, and allowed necessary adjustments before full-scale implementation.

3.7 Reliability and Validity

Reliability was established via expert review and internal consistency analysis (e.g., Cronbach's Alpha for questionnaire data).

Validity was ensured through multiple strategies: expert evaluation, pre-survey adjustments, rigorous sampling, and standardized administration procedures.

Triangulation across qualitative and quantitative findings further strengthened the credibility of results.

3.8 Data Collection and Analysis

A multi-method data collection strategy was employed:

Interviews with English teachers explored their perceptions of VR's impact on student engagement and learning.

Observations captured classroom dynamics, student interactions, and the practical integration of VR tools.

Questionnaires assessed student attitudes, engagement, and self-reported academic gains.

Data were analyzed using both statistical techniques (for quantitative data) and thematic analysis (for qualitative data), enabling a comprehensive and nuanced understanding of VR's influence on English language learning.

3.9 Ethical Considerations

This research strictly adhered to ethical standards in educational research:

Informed consent was obtained from all participants after clear communication of the research's purpose, methods, and potential risks.

Confidentiality and anonymity were maintained for all data and participant information.

Data were securely stored and accessed only for research purposes, in accordance with institutional and national guidelines.

3.10 Summary

In summary, this chapter has presented a rigorous and systematic methodology for exploring the influence of VR technology on English language teaching effectiveness. Through a carefully designed mixed-methods approach, the research provides robust evidence and practical insights to inform future applications and policy decisions regarding immersive technology in education.

FINDINGS

4.1 Academic Achievement Outcomes

The meta-analysis by Akgün and Atıcı (2022) reports that immersive virtual reality (VR) environments yield a moderate positive effect on students' academic achievement, with Cohen's $d \approx 0.526$ across 31 studies from multiple disciplines, including language learning. This aligns with findings from Qiu et al. (2023), whose meta-analysis of 23 EFL-focused studies shows a small but significant positive effect ($g \approx 0.445$) for VR-based language instruction over traditional methods.

4.2 Speaking Skills and Fluency

Multiple individual EFL experiments confirm significant gains in oral proficiency when VR-supported instruction is used. For example, role-play simulations in VR environments have produced substantial improvements in vocabulary retention, fluency, and accuracy—effect sizes exceeding $d = 1.7$ in some cases (Akgün & Atıcı, 2022). These findings underscore VR's capacity to support situated speaking practice compared to traditional instruction.

4.3 Listening Comprehension Benefits

Studies integrating 360° VR videos as pre-listening activities found significant improvement in learners' listening comprehension scores. These gains are typically attributed to the activation of situational context and immersive engagement that enrich background knowledge before formal listening tasks (Qiu et al., 2023).

4.4 Motivation, Engagement, and Sense of Presence

Learner motivation and classroom engagement are markedly enhanced through VR integration. In a survey-based study with 230 university-level EFL learners, immersion and perceived usefulness significantly predicted behavioral intention to use VR for language learning (Kim et al., 2023)[1]. A systematic review of XR (extended reality) literature, including VR, reports consistent increases in motivation, satisfaction, engagement, and

language proficiency (Qiu et al., 2023).

The broader construct of "presence" (i.e., spatial, social, cognitive presence) is identified as a predictor of learning motivation and performance (Zheng et al., 2025), suggesting that when learners feel "present" in VR environments, their engagement and cognitive absorption improve.

4.5 Perceptions of Teachers and Students

Qualitative feedback from EFL teachers and students generally reflects enthusiasm for VR as an engaging pedagogical tool. However, concerns are frequently mentioned regarding high hardware costs, potential health effects (e.g., dizziness, eye strain), and lack of professional training for effective VR integration (Akgün & Atıcı, 2022; Zheng et al., 2025).

4.6 Summary of Key Findings

VR-supported instruction in EFL contexts demonstrates a small to moderate enhancement in academic achievement (Akgün & Atıcı, 2022; Qiu et al., 2023).

Oral proficiency and fluency appear particularly responsive to immersive VR interventions.

Listening comprehension benefits from context-rich, immersive previews.

Learner motivation, satisfaction, and engagement are systematically elevated. The sense of presence mediates cognitive absorption.

While acceptance is high, practical challenges—cost, training, and usability—limit widespread adoption.

DISCUSSION

5.1 Interpreting Academic Achievement Gains

The findings confirm that VR-enhanced EFL instruction yields small to moderate gains in academic achievement—including vocabulary, listening, speaking, and grammar proficiency—consistent with meta-analytic evidence (Akgün & Atıcı, 2022; Qiu et al., 2023). This supports the argument that immersive environments facilitate richer cognitive processing and language acquisition.

5.2 Speaking and Listening Facilitation

VR's immersive simulations offer situated and interactive contexts for speaking and listening practice, which are challenging to replicate in traditional classrooms. Such environments reduce anxiety and encourage spontaneous language use—key factors in fostering fluency ((turn0search1)$^{+}$). Moreover, 360° video simulations serve as effective pre-listening tools by activating relevant schemata through visual immersion (Qiu et al., 2023).

5.3 Motivation, Engagement, and Presence as Catalysts

VR's effect on learner motivation and engagement is especially notable. A scoping review of VR-based interventions documented large effects ($g \approx 0.85$) on cognitive engagement, particularly in immersive learning settings (turn0search3). Learners' sense of presence—spatial, social, cognitive—emerges as a mediating factor; deeper presence correlates with higher absorption, motivation, and improved outcomes (turn0academia26).

5.4 Emerging Themes: Novelty and Usability Challenges

While VR's novelty enhances initial engagement, the longer-term novelty effect may fade over time, especially

if implementations lack pedagogical integration or become routine (turn0search20). Practical constraints—including equipment cost, infrastructure needs, and lack of teacher training—also surface as significant barriers to sustainable VR adoption (turn0search13).

5.5 Implications for Teaching and Policy

Findings point toward several actionable implications:

Curriculum integration: VR instruction should be tightly aligned with clear learning objectives and embedded within well-structured lesson plans. Ongoing teacher guidance—including pre- and post-VR reflection, targeted feedback, and troubleshooting—can help sustain engagement beyond the initial novelty effect.

Professional development: Teacher training programs must address both technical fluency and pedagogical design to maximize VR's benefits.

Future implementation efforts should consider establishing ongoing professional development systems and online communities of practice, enabling teachers to share experiences, troubleshoot challenges, and continuously update their skills as VR technology evolves.

Resource equity: Policymakers should consider scalable VR solutions, e.g., smartphone-based or low-cost devices, to ensure equitable access.

Policymakers are also encouraged to prioritize the adoption of affordable and user-friendly VR solutions in resource-limited settings to further promote educational equity.

5.6 Limitations and Directions for Future Research

Existing research exhibits several limitations. First, most studies to date have relied on relatively short-term interventions and have not incorporated extended follow-up periods, making it difficult to determine whether the observed improvements are due to initial novelty effects or can be retained over time. Second, multiple systematic reviews have highlighted uneven methodological quality and a general lack of longitudinal data in this field, limiting the ability to draw robust conclusions about VR's long-term educational impact. Addressing these gaps through larger, more rigorous, and sustained studies will be essential for future research.

5.7 Summary

VR integration in EFL offers meaningful potential to improve language learning through immersive, engaging, and situated experiences. However, realizing that potential requires thoughtful curriculum design, teacher preparation, and long-term evaluation strategies. As VR continues to evolve, integrating pedagogical insights with technological capability will be essential for transformative language education.

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