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The Role of Augmented Reality in English Language Learning: Increasing Engagement and Cultural Immersion

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ABSTRACT

Background. Augmented reality (AR) is increasingly being integrated into education, enhancing learning experiences through interactive and immersive environments. In language learning, AR holds promise for increasing engagement and cultural immersion.

Purpose. To investigate the impact of AR on English language learning, comparing engagement and cultural immersion in formal and informal contexts.

Method. Mixed-methods approach involving middle school, high school, and university students. Participants were divided into experimental (AR) and control (traditional methods) groups. Data were collected through pre- and post-tests, surveys, and interviews to measure language proficiency, engagement, and cultural awareness.

Results. Significant improvements were observed in both learning contexts. In formal settings, there was a 17% increase in test scores, while informal settings saw a 13% increase. Formal learners exhibited higher engagement and cultural awareness, with 80% reporting high engagement compared to 70% in informal settings. Formal learners frequently utilized interactive features, enhancing their learning experience, whereas informal learners showed a preference for independent study tools offered by AR applications.

Conclusion. AR significantly enhances English language learning, particularly within formal educational environments. The study highlights AR's potential to boost student engagement and cultural understanding, suggesting that tailored approaches are necessary to optimize its use across different learning contexts. The findings indicate that while both formal and informal settings benefit from AR, the structured environment of formal education leverages the technology's interactive features more effectively, leading to greater student engagement and improved learning outcomes. These insights are valuable for educators and developers aiming to integrate AR in language learning, emphasizing the need for context-specific strategies to maximize its educational benefits.

KEYWORDS

Augmented reality, language learning, cultural immersion, engagement, education technology

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INTRODUCTION

Augmented Reality (AR) has emerged as a powerful tool in education, transforming the traditional learning experience by overlaying digital information

onto the real world. In language learning, AR can create immersive environments that simulate real-life scenarios, enhancing the learning process by making it more interactive and engaging (Al-Ansi dkk., 2023). This technology allows learners to visualize and interact with language concepts in a tangible way, which can lead to better retention and understanding (Z, 2021).

Language learning is not just about mastering vocabulary and grammar; it also involves understanding cultural contexts and nuances. AR can bridge the gap between language and culture by providing learners with virtual experiences that mimic real-world interactions (Adebileje, 2020). For example, an AR application can transport learners to a bustling market in a foreign country, where they can practice conversational skills with virtual vendors. This type of immersive learning experience can help learners gain a deeper appreciation of the language and its cultural significance (Al-Shemary, 2020).

Studies have shown that using AR in language education can significantly increase student engagement. The interactive nature of AR applications captures learners' attention and keeps them motivated. Unlike traditional methods, where students might passively receive information, AR encourages active participation. Learners can explore virtual environments, interact with digital objects, and receive instant feedback, making the learning process more dynamic and enjoyable (Aldawood, 2023).

AR also offers the potential for personalized learning experiences. AR applications can adapt to individual learners' needs, providing customized content and activities based on their proficiency levels and learning styles (Morrice, 2021). This personalized approach can help learners progress at their own pace and focus on areas where they need the most improvement. By catering to individual differences, AR can make language learning more effective and efficient (Ramalingam, 2022).

The use of AR in language learning is supported by advancements in mobile technology. With the widespread availability of smartphones and tablets, learners can access AR applications anytime and anywhere (Lai, 2023). This convenience allows for continuous learning opportunities outside the classroom, making it easier for learners to practice their skills in real-world contexts. Mobile AR applications also provide a cost-effective solution for educational institutions, as they can leverage existing devices without the need for expensive hardware (Ra, 2019).

Despite its potential, the integration of AR in language education is still in its early stages. While there are promising results, more research is needed to understand the long-term effects of AR on language learning outcomes (Klimova, 2020). Educators and developers must work together to create high-quality AR content that aligns with curriculum standards and meets the needs of diverse learners. As the technology evolves, it is crucial to explore innovative ways to harness the full potential of AR in enhancing language learning and cultural immersion (Jia, 2022).

The long-term impact of augmented reality (AR) on language retention and proficiency is not well-documented. While short-term studies suggest improvements in engagement and motivation, the durability of these benefits over extended periods remains unclear. Research is needed to evaluate whether AR can lead to sustained language learning outcomes and how it compares to traditional methods over time (Meirovitz, 2022).

The specific elements of AR that most effectively enhance language learning are not fully understood. Different AR applications offer various features, such as interactive dialogues, cultural simulations, and vocabulary drills, but their relative effectiveness in promoting language acquisition is yet to be determined. Identifying the key components that drive successful language learning through AR will help optimize its use in educational settings (Santos, 2019).

The accessibility and scalability of AR for language learning across diverse educational contexts have not been thoroughly explored. While AR technology has advanced, its

implementation in resource-limited settings and its adaptability to different educational systems and learner demographics need further investigation. Understanding these factors is crucial for ensuring that AR can benefit a wide range of learners (Arslan, 2020).

The role of AR in promoting cultural immersion alongside language learning is still under-researched. While AR has the potential to simulate cultural environments and interactions, the extent to which these experiences enhance cultural understanding and competence in language learners is not well-defined. Further studies are needed to explore how AR can effectively integrate cultural elements into language education (Muftah, 2024).

The integration of AR into existing language curricula poses challenges that have yet to be fully addressed. Educators need to understand how to seamlessly incorporate AR into their teaching strategies without disrupting the flow of traditional lessons. Research is required to develop best practices for blending AR with conventional instructional methods to create a cohesive and effective language learning experience (Tuan, 2021).

Understanding the long-term impact of AR on language retention and proficiency is essential for maximizing its educational potential. By evaluating the durability of language learning benefits provided by AR, educators can develop more effective strategies to integrate this technology into their curricula. This research aims to fill this gap by conducting longitudinal studies to assess how AR influences language acquisition over extended periods (Norton, 2019).

Identifying the specific features of AR that most effectively enhance language learning will help optimize the design of educational applications. By determining which elements, such as interactive dialogues, cultural simulations, or vocabulary drills, contribute most significantly to language proficiency, developers can create tailored AR experiences that cater to learners' needs. This research focuses on evaluating these features to identify the key components that drive successful language learning through AR (Srivani, 2022).

Ensuring the accessibility and scalability of AR for diverse educational contexts is crucial for broadening its impact. By investigating how AR can be implemented in resource-limited settings and adapted to different educational systems, this research aims to develop strategies that make AR a viable tool for language learning across various demographics. Addressing these challenges will help ensure that AR can provide equitable educational opportunities for all learners (Zadorozhnyy, 2023).

RESEARCH METHODOLOGY

The research design for this study involves a mixed-methods approach, combining quantitative and qualitative data to assess the impact of augmented reality (AR) on English language learning. This study aims to evaluate how AR applications influence student engagement and cultural immersion compared to traditional learning methods (Ahmadov & Borg, 2019). The approach includes pre- and post-tests, surveys, and interviews to gather comprehensive data on language proficiency, engagement levels, and cultural understanding (Alhalafawy & Zaki, 2022).

The population and samples consist of English language learners from middle schools, high schools, and universities. Participants include students from various educational backgrounds and proficiency levels, ensuring a diverse sample. Both experimental and control groups will be established, with the experimental group using AR applications as part of their language learning curriculum, while the control group continues with traditional methods (Constantinescu, 2024).

Instruments utilized in this research include AR-based language learning applications, standardized language proficiency tests, engagement surveys, and cultural awareness questionnaires. The AR applications selected for the study feature interactive dialogues, cultural

simulations, and vocabulary drills. Standardized tests measure language proficiency before and after the intervention. Surveys and questionnaires assess student engagement and cultural understanding, while interviews provide qualitative insights into student experiences (Zhang, 2023).

Procedures begin with the recruitment of participants and the division into experimental and control groups. Pre-tests are administered to establish baseline language proficiency and cultural awareness levels. The experimental group is introduced to AR applications, which they will use regularly over the study period, while the control group continues with conventional learning methods. Throughout the study, both groups complete engagement surveys and cultural awareness questionnaires at regular intervals. Post-tests are conducted at the end of the study period to measure any improvements in language proficiency and cultural understanding. Interviews are held with selected participants from the experimental group to gather qualitative feedback on their experiences with AR applications. Data from tests, surveys, and interviews are analyzed to compare the effectiveness of AR in increasing engagement and cultural immersion in English language learning. Findings will inform recommendations for integrating AR into language education curricula effectively (Suitor & Gilligan, 2022).

RESULT AND DISCUSSION

This study analyzes data from the use of Augmented Reality (AR) applications for English learning in formal and informal contexts. Data shows that students who use AR apps experience a 15% increase in test scores after three months of use. The data shows that students who study in formal environments have an increase in scores of 17%, while students in informal environments have experienced an increase in scores of 13%.

Learning Context	Average Starting Score	Average Final Score	Increase (%)
Formal	70	82	17
Informal	68	77	13

Table 1. Comparison of Average Starting and Final Scores and Percentage Increase by Learning Context

Other data shows that students in formal environments are more likely to use AR app features such as cultural simulations and interactive dialogues. Students in informal settings tend to use vocabulary quizzes and pronunciation exercises more. This difference shows the variation in the preference for using AR applications depending on the learning context.

App Features	Usage in Formal (%)	Informal Usage (%)
Cultural Simulation	55	40
Interactive Dialogue	60	45
Vocabulary Quiz	45	60
Pronunciation Practice	50	65

Table 2. Preferences for Using AR Application Features by Learning Context

The third data shows that the level of student engagement is higher in formal settings, with 80% of students showing high engagement in learning activities. In informal settings, only 70% of students show high engagement. These data suggest that formal environments may be more conducive to increasing student engagement in learning using AR applications.

Learning Context	High Engagement (%)	Low Engagement (%)
Formal	80	20
Informal	70	30

Table 3. Student Engagement Levels by Learning Context

The fourth data shows that students in formal settings report an increase in cultural awareness by 18%, while students in informal settings report an increase of 12%. These data show that AR applications are effective in improving cultural understanding in both contexts, although the results are more significant in formal settings.

Learning Context	Early Cultural Awareness (%)	Late Cultural Awareness (%)	Increase (%)
Formal	60	78	18
Informal	58	70	12

Table 4. Increase in Cultural Awareness by Learning Context

The data shows that the use of AR applications in formal environments results in a greater increase in test scores compared to informal environments. A 17% increase in formal settings shows that the app is effective in supporting language learning in the classroom. A 13% increase in scores in informal settings also shows the effectiveness of the app, albeit on a smaller scale.

Differences in the use of app features between formal and informal environments suggest that the context of learning affects how students utilize technology. Students in formal settings are more likely to use features that are integrated with classroom activities, such as cultural simulations and interactive dialogues. In contrast, students in informal settings more often use the vocabulary quiz and pronunciation practice features that allow them to study on their own schedule.

Higher levels of engagement in formal settings suggest that the structure and support in place in the classroom can help increase student motivation. High engagement is an important indicator of learning success, as engaged students are more likely to complete tasks and achieve better learning outcomes. These data suggest that while AR apps can be used in both contexts, formal environments may be more supportive of student engagement and motivation.

Data analysis shows that the increase in test scores in formal environments is more significant compared to informal environments. The data shows that students in formal environments have an average score increase of 17%, while students in informal environments have experienced an increase of 13%. This increase shows that AR apps are effective in improving students' English language skills in both contexts, albeit with different success rates.

The use of application features also varies depending on the learning context. In formal environments, students more often use cultural simulation and interactive dialogue features. These features may be more suitable for structured and interactive classroom activities. In informal settings, students more often use the vocabulary quiz and pronunciation practice features, which allow them to study independently according to their schedule and preferences.

Student engagement is also higher in formal settings, with 80% of students showing high engagement compared to 70% in informal settings. This high engagement suggests that class structure and support from teachers can help increase student motivation and participation in learning. This data is important to understand how the learning context affects the effectiveness of using AR applications.

The data shows that a greater increase in test scores in formal settings can be attributed to the support and structure that exists in the classroom. Direct teaching from teachers and interactions with classmates may help students make the most of the app. The 17% increase in scores shows that AR apps can be used as a powerful complementary tool in English learning in the classroom.

The use of different features between formal and informal environments suggests that students adapt the way they utilize technology depending on their learning context. In the classroom, interactive features such as cultural simulations and interactive dialogues are more popular, perhaps because they are integrated with more structured classroom activities. In informal settings, the vocabulary quiz and pronunciation practice features are used more frequently, allowing students to learn according to their schedule and preferences.

Higher levels of engagement in formal settings suggest that class structure and support from teachers can help increase student motivation. This high engagement is important because engaged students are more likely to achieve better learning outcomes. These data suggest that while AR apps can be used in both contexts, formal environments may be more supportive of student engagement and motivation in English language learning.

The relationship between improving test scores and the use of AR apps shows that these apps are effective in improving students' English skills in both formal and informal settings. This data shows that AR applications can be used as a powerful learning tool in a variety of contexts. The increase in test scores by 17% in formal settings and 13% in informal settings shows that this app can support English learning with different success rates.

The relationship between the use of app features and the learning context shows that students adjust the way they utilize technology depending on their needs and preferences. Interactive features such as cultural simulations and interactive dialogues are more popular in formal settings, while vocabulary quizzes and pronunciation practice features are more commonly used in informal settings. This data is important to understand how AR applications can be tailored to the needs of students in various learning contexts.

The relationship between student engagement levels and learning context suggests that classroom structure and support from teachers can help increase student motivation and participation. High engagement in formal settings suggests that students may be more motivated to learn when they have support from teachers and classmates. This data is important to understand how the learning context affects the effectiveness of using AR applications.

A case study was conducted to evaluate the effectiveness of AR applications in English language learning in a high school. Students in the class who used the AR app as a complementary tool showed an 18% improvement in test scores after one semester. Students report that the app helps them understand the material better and provides a more interactive and enjoyable learning experience.

Data analysis showed that students who used the cultural simulation and interactive dialogue features more often showed higher score improvements compared to those who rarely used these features. Data shows that these features help students understand English in a broader cultural context, which improves their understanding and skills.

The results of the case study show that AR applications can be used as an effective complementary tool in English learning in the classroom. An 18% increase in test scores shows that the app can help students achieve better learning outcomes. This data supports the use of AR applications in English learning in formal settings.

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learning outcomes. Students report that the app helps them understand the material better and provides a more interactive and enjoyable learning experience.

The use of cultural simulation features and interactive dialogues shows that these interactive features help students understand English in a broader cultural context. The data showed that students who used this feature more often showed a higher improvement in scores compared to those who used this feature infrequently. This shows that these interactive features are important for improving students' understanding and skills.

These results support the use of AR applications in English learning in formal settings. An 18% increase in test scores shows that the app can help students achieve better learning outcomes. This data is important for understanding how AR applications can be used in English learning in a variety of contexts.

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The relationship between the use of app features and the learning context shows that students adjust the way they utilize technology depending on their needs and preferences. Interactive features such as cultural simulations and interactive dialogues are more popular in formal settings, while vocabulary quizzes and pronunciation practice features are more commonly used in informal settings. This data is important to understand how AR applications can be tailored to the needs of students in various learning contexts.

The relationship between student engagement levels and learning context suggests that classroom structure and support from teachers can help increase student motivation and participation. High engagement in formal settings suggests that students may be more motivated to learn when they have support from teachers and classmates. This data is important to understand how the learning context affects the effectiveness of using AR applications.

The study found that the use of augmented reality (AR) applications for English language learning resulted in a significant increase in test scores in both formal and informal settings. A 17% increase in scores in formal settings shows that AR is effective in supporting language learning in the classroom. A 13% increase in scores in informal settings also showed AR effectiveness, albeit on a smaller scale. These results show that AR can be used as a powerful learning tool in a variety of contexts.

The results of this study are consistent with previous studies that show that AR technology can improve language learning outcomes by increasing student engagement and motivation. However, this study stands out by showing significant differences between AR effectiveness in formal and informal settings. In contrast to some studies that focus on a single context, this study provides comprehensive insights into how AR can function in a variety of learning settings. The study also highlights the importance of interactive features such as cultural simulations and interactive dialogues in improving language understanding in cultural contexts.

The results of this study mark that AR has great potential to improve English language learning, especially in a structured formal environment. These findings suggest that classroom support and structure can play an important role in maximizing the benefits of learning technology. The study also highlights the need for a more tailored approach to optimize the use of AR in informal contexts. These findings suggest that AR can help improve cultural understanding, which is important for more holistic language mastery.

The main implication of the results of this study is that the integration of AR applications in the formal curriculum can significantly improve the effectiveness of English language learning. As such, educators and policymakers should consider adopting these technologies more broadly in formal education settings. The study also suggests that a more individualized and flexible approach may be needed to maximize the benefits of AR in informal contexts. Additionally, increasing cultural awareness through AR can help students not only master the language but also understand the cultural context behind it.

Higher effectiveness in formal settings may be due to the additional support provided by teachers and a more organized class structure. Students in formal classes benefit from live tutoring and interaction with classmates, which can reinforce their learning. AR applications in this context can act as complementary tools that enrich the learning experience. Informal contexts offer flexibility that allows students to learn on their own schedule, but may be lacking in structure and guidance. This could explain why the results in the informal setting are not as good as in the formal setting. Certain features of AR apps, such as cultural simulations and interactive dialogues, may be more effective in formal environments where there is more structured support and interaction.

The next step is to develop and test AR applications tailored for different learning contexts. Further research should focus on how ARs can be integrated more effectively in formal curricula and how they can be adapted for better use in informal contexts. Additionally, it is important to explore how specific features can be optimized to improve engagement and learning outcomes in both contexts. Further research should also evaluate the long-term impact of the use of AR in English language learning, including language skill retention and sustainability of learning outcomes. Collaboration between technology developers, educators, and researchers is essential to ensure that AR is developed and implemented taking into account the needs of students and different learning settings. With a collaborative approach, the full potential of AR technology in strengthening English language learning can be realized, providing far-reaching benefits to students around the world.

CONCLUSION

The study found that augmented reality (AR) applications improved English test scores more significantly in formal settings compared to informal. These findings suggest that the support and structure that exists in formal learning plays an important role in maximizing the benefits of AR learning technology.

The main contribution of this study is a comparative approach that evaluates the effectiveness of AR in both formal and informal contexts. This method provides deeper insights into how the learning context affects the outcomes achieved, aiding in designing more effective strategies for the integration of technology in language education.

The limitations of this study include a limited sample size and a relatively short duration of the study. Further research should consider larger populations and longer research periods to evaluate the long-term impact of AR use in English language learning.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.
Author 4: Formal analysis; Methodology; Writing - original draft.
Author 5: Supervision; Validation.

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