The Role Immersive Technology in Creating Rich Affordance Environment for ELT

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ABSTRACT

In contemporary educational contexts, the application of immersive technologies (VR, AR, and MR) in English Language Teaching (ELT) has gained significant attention. Thus, the aim of this literature review is to investigate the benefits of these technologies in creating rich affordance environments for language learning within ELT via the theoretical frameworks of affordances and sociocultural theory. This review synthesizes recent research on the impact of VR, AR, and MR on language acquisition, emphasizing their established benefits in enhancing engagement and interactivity. The analysis of current studies via the lens of Socio-cultural theory reveals that immersive technologies effectively support the process of creating meaningful and contextualized learning experiences. This review intends to offer insights to educators and researchers who want to utilize immersive technologies to design language learning experiences that are engaging, successful, and aligned with current pedagogical approaches.

Keywords: immersive technology, English Language Teaching, affordance, socio-cultural theory

Introduction

Immersive technology, encompassing Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), is poised to revolutionize English Language Teaching (ELT). By offering "rich affordance environments," these technologies enable experiential learning, simulating real-world scenarios and interactions (Alizadeh & Hawkinson, 2021). VR transports students to virtual worlds for authentic conversations and cultural immersion (Akçayır & Akçayır, 2017; Kavanagh et al., 2017). AR enhances the real world with interactive language learning opportunities (Santos et al., 2014; Shadiev et al., 2021). MR combines both, deepening language understanding and fostering collaboration (Parveau & Adda, 2018).

Immersive technologies like VR, AR, and MR are becoming increasingly important in ELT due to their novel opportunities for students' practice and interaction, also referred to as 'affordances' (Aagaard, 2018; van Lier, 2004). These affordances encompass both the technological features and how learners engage with them. By providing immersive and

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challenging contexts, these technologies enable students to practice language skills, manipulate virtual objects, and collaborate with peers (Chen et al., 2021). These affordances are categorized into three dimensions:

- Material affordances, relating to the technology's physical characteristics, like high-quality visuals and immersive audio in VR, create a sense of presence and realism that boosts engagement.
- Affective affordances, focusing on the emotional and psychological aspects, like the interactive and gamified nature of many immersive language learning applications, can increase motivation and enjoyment.
- Social affordances, providing opportunities for interaction and collaboration, enable learners to practice communication skills with virtual avatars, collaborate on tasks with peers in virtual spaces, and interact with native speakers in virtual environments.

This study builds on prior research that has provided evidence of how these affordances can potentially support different dimensions of language learning such as engagement, confidence and commitment (Liu et al., 2018). For example, the affordances of mobile learning technologies such as enhanced interactivity and real-time feedback have resulted in higher engagement levels among students. When we are able to tap into the affordances of these new platforms, researchers become better equipped at designing and implementing effective language learning experiences using immersive technologies. Thinking intentionally about the material, affective and social dimensions at play can provide a sound basis for them to design such learning spaces - making use of these technologies' potential in order to achieve real language acquisition combined with increased intercultural competence.

Recent studies have evaluated the affordances of Virtual, Augmented, and Mixed Realities in second language contexts. The application of virtual reality was investigated by Parmaxi (2023) with the use of a comprehensive study of 26 publications that were published between the years 2015 and 2018. The researcher identified a number of different virtual reality platforms that are utilized in language schools, as well as the advantages and disadvantages of each. However, the study did not distinguish between language skills (e.g., reading, writing, listening, speaking) or target languages, limiting its applicability to specific second language acquisition contexts. AR, by overlaying virtual elements onto the real world, enhances interaction with physical surroundings while focusing on educational content. Research has shown that AR improves cognitive and affective engagement, facilitating vocabulary acquisition, pronunciation, and grammar practice (Alshumaimeri & Mazher, 2023). Bui and Nguyen (2023) emphasize the transformative impact of digital strategies on education, noting a paradigm shift in teaching and learning methods through technologies such as AR/VR and adaptive learning. Moreover, MR, combining VR and AR, creates interactive spaces for language use, although its adoption in ELT is limited by technological challenges. Nevertheless, MR has the potential to foster collaboration and context-based learning, particularly when integrated with Task-Based Language Teaching (TBLT) (Altun & Lee, 2020). For instance, applications like WordSense provide contextualized vocabulary support, though they still require further refinement to mitigate technical limitations such as latency issues (Alizadeh & Hawkinson, 2021)

On the other hand, the incorporation of immersive technologies into ELT is not without its difficulties. According to Shi et al.'s research from 2020, there are some technical issues that can be obstacles to general adoption. These include the requirement for specialized hardware and software. Additionally, guaranteeing fair access to these technologies for all learners, regardless of their socioeconomic background, is a key concern (Aylett, 1999). According to

Shadiev and Yang's research from 2020, the successful application of immersive technology calls for a change in educational techniques, as well as a significant amount of training and professional development for educators.

Educational technology tools have been shown to improve grammar teaching by creating more engaging and interactive lessons, which are essential for language learning (Tu, 2022). Despite the growing interest in immersive technologies, there is still a need for a deeper understanding of how these technologies can be fully integrated into ELT to create rich affordance environments. While emerging research has begun to recognize the potential of VR, AR, and MR for language learning, there is a lack of comprehensive research addressing their combined implementation, cohesive learning experiences, and long-term impact on language acquisition (Kavanagh et al., 2017; Parmaxi, 2023; Peixoto et al., 2021). This gap impedes the development of holistic pedagogical frameworks that effectively harness the affordances of immersive technology for diverse ELT contexts.

This literature review seeks to investigate how immersive technologies can create complex affordance worlds for ELT. This review consolidates empirical research, theoretical constructs and real-world applications to shed light on the disruptive role that VR, AR and MR can play in language learning. We will also consider the pedagogical potential of these technologies: how they might facilitate language learning, encourage communicative competence and even promote learner autonomy. Furthermore, this review will also tackle the issues and barriers met when adopting immersive technologies within ELT giving hints and guidance for not only educators but researchers as well as policymakers should they decide to embark on such a journey.

To fulfill the purpose of the study, the research sought to answer the following research questions:

1. How do immersive technologies like virtual reality (VR), augmented reality (AR), and mixed reality (MR) contribute to the creation of rich affordance environments in ELT?
2. What challenges exist in integrating immersive technology into ELT environments?

Literature Review

Teachers of English as a foreign language are always keen on looking for new strategies that can be employed to make learning more effective and fun. Virtual, Augmented, and Mixed realities are emergent trends that have been attracting lots of focus and they have the potential of enhancing “rich-affordance” contexts for ELT (van Lier, 2004). These technologies offer an opportunity to improve the flow and strive for an optimal learning environment that can give the students an experiential view in language learning (Chen et al., 2021; Tai & Chen, 2021).

The Power of immersion and definitions

The term "immersive technology" refers to a broad spectrum of digital tools and systems that integrate virtual and augmented experiences to create highly interactive, multisensory learning environments (Radianti et al., 2020). Immersive technology encompasses a range of tools, including virtual reality (VR), augmented reality (AR), and mixed reality (MR), which collectively transform the educational landscape by blurring the boundaries between the real and virtual worlds. These tools are increasingly adopted in language education for their ability to simulate real-world contexts, foster interaction, and engage learners through experiential learning (Kuhail et al., 2022). Unlike traditional methods, immersive technologies facilitate

learner-centered environments where authentic communication and collaboration take center stage (Weng et al., 2024).

Virtual Reality (VR) takes learners into computerized contexts instead of real ones; therefore, enhancing cognitive ability, language comprehension and general learning performance (Alharbi, 2022; Alizadeh & Hawkinson, 2021; Sherman & Craig, 2018). Also, having interaction with avatars or immersing in cultural-related VR scenarios help students in their language skills and cultural affordances (Akçayır & Akçayır, 2017; Kavanagh et al., 2017). According to Nguyen and Nguyen (2024), virtual classrooms support four skills integration and promote the efficiency in teaching, which fit the purpose of immersive technologies, as to expand more English teaching methods. In addition, it has been shown that virtual reality provides an interactive and multisensory learning environment that boosts the ability of language learning and active involvement. For example, as recent research has shown, virtual contexts with cultural integration improve learners' awareness of cultures as well as engaging possibility in cultural interactions (Liaw, 2019; Yudintseva, 2023).

Augmented reality (AR), by seamlessly overlaying virtual elements onto the real world, enhances the learner's interaction with their physical surroundings while maintaining a focus on educational content (Hockly, 2019). Studies have shown that AR improves learners' cognitive and affective engagement by offering gamified and interactive experiences that facilitate vocabulary acquisition, pronunciation practice, and grammar drills (Alshumaimeri & Mazher, 2023). AR has been shown to cater to diverse learning styles, enhancing engagement and supporting different types of learners, such as visual, auditory, and kinesthetic (Ngo & Vo, 2024). By using AR apps like vocabulary that can print over the real objects or language learning game apps it can be effective in expanding Acronym’s vocabulary and filling the knowledge gap (Viktoria et al., 2018). AR-based learning materials designed with a game-based approach have been found to increase learner motivation, engagement, and enjoyment, making language learning more immersive and effective (Taskiran, 2019). Additionally, integrating AR with problem-based learning (PBL) has been shown to enhance learners' problem-solving skills and critical thinking while fostering authentic language use in context (Sorte & Kim, 2023). Furthermore, AR tools such as QR codes, AR flashcards, and mobile AR applications have been successfully utilized in ELT to improve vocabulary retention, listening comprehension, and interaction in communicative tasks (Rosyidah & Anugerahwati, 2024).

Mixed reality (MR) can be defined as the integration of real and virtual worlds, where AR integrates virtual objects with the real environment for language learning (Marcel, 2020; Parveau & Adda, 2018). Mixed reality enhances the real environment and supports the segregation of abstract objects and tangible objects simultaneously; thus, students can employ virtual objects in real environments. The above dynamic approach facilitates real cultural interactions, enhanced language acquisition, cooperation, and problem-solving (Parveau & Adda, 2019). Recent research has highlighted that MR environments, when integrated with Task-Based Language Teaching (TBLT), enable learners to navigate complex linguistic tasks through real-time feedback and authentic communication scenarios (Altun & Lee, 2020). For instance, applications like WordSense provide contextualized vocabulary support, though they still require further refinement to mitigate technical limitations such as latency issues (Alizadeh & Hawkinson, 2021).

Overall, immersive technologies leverage digital affordances to create engaging, interactive, and contextually rich learning environments, which have been shown to improve learner motivation, engagement, and performance in ELT and beyond (Merchant et al., 2014; Liaw, 2019; Sorte & Kim, 2023). However, their effectiveness depends on technological accessibility,

pedagogical integration, and learner adaptability, factors that must be critically considered when implementing these tools in educational settings (Shadiev et al., 2021; Khodabandeh & Mombini, 2024).

Theoretical foundations: Affordances and Sociocultural Theory

The implementation of immersive technology in ELT draws on the concepts of affordances and sociocultural theory. Affordance, introduced by Gibson (1979), emphasizes the interactive possibilities offered by the environment to learners. Van Lier (2004) defines affordances as the set of options available to learners in a given context, which in ELT creates a "rich affordance environment." This environment provides ample opportunities for learners to act, broadening their perception of language learning and enhancing effectiveness. Van Lier (2004) stresses that such environments promote engagement, collaboration, and authentic interaction. Aagaard (2018) categorizes affordances into material (e.g., digital simulations), affective (e.g., reducing anxiety), and social (e.g., promoting collaboration). Yudintseva (2023)adds that rich affordance environments include interactive tasks, real-world activities, active learner involvement, collaboration, and feedback, all of which enrich the language learning process. Xiangming and Song (2018) emphasize that affordances positively affect learning outcomes, encompassing material, affective, and social dimensions that enhance learners' engagement, such as practicing with avatars in VR, manipulating objects in AR, and collaborating with peers in virtual spaces Ezeh (2017).

Affordances align closely with sociocultural theory, which emphasizes social interaction and cultural context in learning. Vygotsky's (1978) Zone of Proximal Development (ZPD) highlights the gap between what learners can do independently and what they can achieve with guidance. Immersive technologies, such as VR and AR, provide scaffolding by simulating authentic contexts and enabling collaboration with avatars, peers, and instructors. These interactions foster co-constructed knowledge, making learning more engaging and effective (Liaw, 2019; Lin & Lan, 2015). Vygotsky (1978) asserts that learning activates internal processes that only occur through collaboration, and this knowledge is co-constructed at the inter-psychological level before being internalized at the individual level (Wertsch, 1985). Sociocultural theory also underscores that language learning is not just about linguistic acquisition but involves developing intercultural competence. Van Lier (2004) extends this idea by describing "action in potential," emphasizing the importance of environments that prioritize social and cultural interactions for enhancing learning.

By bridging affordance theory with sociocultural and constructivist perspectives, immersive technologies provide a robust framework for understanding their potential in language education. They enable the alignment of theoretical principles with practical applications, such as leveraging VR to create stress-free zones for anxiety-prone learners or employing AR to merge physical and virtual elements for contextualized vocabulary acquisition (Takkaç Tulgar et al., 2022). Moreover, these technologies can reduce the gap between formal instruction and informal learning by offering flexible and engaging learning environments (Weng et al., 2024). This integration of theory and practice not only enhances our understanding of immersive technology's role in language learning but also opens avenues for further exploration and refinement of these tools in diverse educational settings.

Research gap

Despite the growing interest in immersive technology, a deeper understanding into how they can be fully integrated and thereby, the production of rich affordance environments is still invited. Such integration needs to extend to a wider range of technologies, pedagogical

frameworks, and long-term learning outcomes (Tang, 2024). While the emerging research has begun to recognize the potential of VR, AR, and MR for language learning, there is a lack of comprehensive research addressing their combined implementation, cohesive learning experiences, and long-term impact on language acquisition (Kavanagh et al., 2017; Parmaxi, 2020; Peixoto et al., 2021). This gap impedes the development of holistic pedagogical frameworks that effectively harness the affordances of immersive technology for diverse ELT contexts. Additionally, while studies have demonstrated the benefits of immersive technologies in enhancing engagement, motivation, and cultural awareness (Alizadeh & Hawkinson, 2021; Alshumaimeri & Mazher, 2023), there is limited research on how these technologies can be scaled and sustained in real-world educational settings. Challenges such as high costs, technical limitations, and unequal access (Huang, 2023; Mohd Nabil et al., 2024; Shi et al., 2024) are often overlooked, leaving educators and policymakers without clear guidance on how to implement these technologies equitably and effectively.

Upon such an observation, the current study is diving deeper to shed light on the full capacity of immersive technology in ELT and provide practical insights into overcoming barriers to adoption, such as cost, accessibility, and teacher training, to ensure that immersive technologies can be implemented equitably across diverse educational contexts. By addressing these gaps, this study seeks to contribute to the development of more holistic pedagogical frameworks that leverage the full potential of immersive technologies in ELT, ultimately enhancing language learning outcomes for students worldwide.

Methods

Design of the Study

This literature review investigates the integration of immersive technologies - VR, AR, and MR - in ELT. The review is anchored in the concept of creating "rich affordance environments" to enhance language learning. The aim is to synthesize existing research, identify patterns, and analyze the specific features and challenges associated with these technologies in ELT. By systematically selecting, analyzing, and categorizing studies, this review ensures alignment with the principles of validity and reliability.

Data collection & analysis

This stage begins as authors sift through various academic databases in an extensive manner. Through Google Scholar, ERIC, ProQuest, Web of Science, and JSTOR, various combinations of the keywords and terms related to the theme of interest are selected: “immersive technology”, “virtual reality (VR)”, “augmented reality (AR)”, “mixed reality (MR)”, “English language teaching (ELT)”, “language learning”, “affordance in education”, and "technology in language education”.

Table 1.

Studies were further filtered with specific criteria as the following table.

Criteria	Inclusion	Exclusion
Focus	Studies explicitly addressing the use of VR, AR, or MR in ELT and their impact on creating affordance environments.	Studies not explicitly addressing the use of these technologies in ELT or their impact on affordances.
Publication Type	Peer-reviewed journal articles, book chapters, conference papers, credible reports from recognized educational organizations.	Non-peer-reviewed articles, opinion pieces, blog posts.
Publication Date	Published within the last ten years (2014-2024).	Studies published before 2014.
Language	Published in English.	Published in languages other than English.
Methodology Quality	Empirical studies with clear methodology and significant findings; rigorous qualitative, quantitative, or mixed methods studies.	Studies with unclear methodology, low-quality, or inconclusive findings.
Relevance	Directly relevant to research questions/themes: language learning, affordances, challenges, and opportunities.	Indirectly related or irrelevant to the core themes of the review.

After applying these criteria, **44 studies** were selected for final analysis. To analyze the selected studies, a thematic analysis approach was used (Braun & Clarke, 2006), where patterns and recurring themes related to immersive technology affordances in ELT were identified. The themes were developed inductively, meaning they emerged naturally from the data rather than being predefined (Nowell et al., 2017). The thematic analysis categorizes the selected 44 studies into five core themes, ensuring that each theme is well-supported by relevant literature. The studies were analyzed to extract recurring patterns and insights that align with the objectives of this review. The five thematic categories—(1) Enhanced Learner Engagement, (2) Support for Communicative Competence, (3) Promotion of Learner Autonomy, (4) Teacher Affordances and Professional Development, and (5) Obstacles and Challenges—were identified based on a rigorous process of coding and classification, which involved the following steps. First, all selected studies were reviewed in-depth to extract key findings, methodologies, and conclusions relevant to immersive technologies in ELT. Next, recurring ideas and key terms related to affordances, engagement, interaction, and barriers were coded. Then it comes the thematic mapping where similar codes were grouped into broader themes representing distinct aspects of immersive language learning. Finally, themes were reviewed against the dataset to

ensure internal consistency and validity, with an iterative refinement process to avoid overlap or redundancy (Braun & Clarke, 2006).

The thematic categories identified in this study were not arbitrarily assigned but were grounded in existing research on technology-enhanced learning. While some of the categories (e.g., enhanced learner engagement, communicative competence) align with previous frameworks on digital learning affordances (Aagaard, 2018; van Lier, 2004), others—such as teacher affordances and professional development—were inductively derived from recurring patterns across the selected studies. This hybrid approach ensures that the findings are both theoretically robust and empirically grounded, addressing the specific needs of ELT instructors and learners.

Enhanced Learner Engagement**:** The literature highlights that immersive technologies such as VR and AR create realistic, engaging environments that captivate learners and immerse them in meaningful language use contexts. These technologies reduce learner anxiety, promote active participation, and enhance the overall learning experience by providing authentic simulations and game-based interactions (Alharbi, 2022; Alizadeh & Hawkinson, 2021; Belda-Medina & Marrahi-Gomez, 2023; Chen et al., 2021; Cheng & Kent, 2020; Li & Zhou, 2021; Lin & Lan, 2015; Reinhardt, 2021; Shi et al., 2024; Taskiran, 2019; Ustun et al., 2022; Wang et al., 2021; Wu et al., 2021; Zheng et al., 2018)

Support for Communicative Competence**:** Immersive technologies provide platforms for the interactive practice of language skills and context-based learning, fostering communicative competence. AR and MR environments allow learners to engage in role-playing, vocabulary acquisition, and conversation-based tasks in meaningful, authentic contexts. These affordances are particularly useful for oral language development and intercultural communication (Alizadeh & Hawkinson, 2021; Arslantaş & Tokel, 2018; Castillo, 2016; Chen et al., 2021; Cheng & Kent, 2020; Ebadi & Ebadijalal, 2022; Ezeh, 2017; Li & Zhou, 2021; Liaw, 2019; Liu et al., 2018; Merchant et al., 2014; Mohd Nabil et al., 2024; Selfa-Sastre et al., 2022; Shadiev et al., 2021; Shi et al., 2024; Sorte & Kim, 2023; Xiangming & Song, 2018; Yang et al., 2020; Yip et al., 2019).

Promotion of Learner Autonomy**:** Studies demonstrate that immersive technologies promote self-directed learning by allowing learners to explore language content at their own pace and tailor their learning experiences. These technologies offer adaptive feedback, personalized learning paths, and interactive tasks, fostering motivation and independence. Additionally, VR and AR applications help reduce anxiety in language learning by creating a controlled and immersive space where learners can practice without fear of making mistakes (Alharbi, 2022; Chen et al., 2021; Cheng & Kent, 2020; Khodabandeh & Mombini, 2024; Liu et al., 2018; Reinhardt, 2021; Selfa-Sastre et al., 2022; Shadiev et al., 2021; Shih, 2015; Tai & Chen, 2021; Tang, 2024; Taskiran, 2019; Ustun et al., 2022; Yang et al., 2010; Yip et al., 2019; York et al., 2021).

Teacher Affordances and Professional Development**:** Immersive technologies offer new tools for lesson planning, classroom management, and teacher training. They enhance teachers' ability to design engaging, interactive lessons while supporting professional growth through immersive training programs that allow educators to experiment with innovative pedagogical approaches. However, teachers require technical training and institutional support to integrate these tools effectively into ELT settings (Aagaard, 2018; Alizadeh & Hawkinson, 2021; Squires, 2019; De Back et al., 2023; Herrera Mosquera, 2017; Huang, 2023; Li & Zhou, 2021; Liaw, 2019; Lin & Lan, 2015; Liu et al., 2018; Rauf et al., 2021; Shi, 2020; Sorte & Kim, 2023; Wu et al., 2021; Yip et al., 2019).

Obstacles and Challenges: Despite their potential, immersive technologies face barriers to adoption. High equipment costs and technical difficulties that make them inaccessible to underfunded institutions (Hockly, 2019; Li & Zhou, 2021; Lin & Lan, 2015). Limited accessibility and equity concerns, particularly for students from low-income backgrounds or those with disabilities (Castañeda et al., 2018; Shadiev et al., 2021). Challenges in content design—educators struggle to develop high-quality and culturally appropriate materials that align with curriculum goals (Alharbi, 2022; Alizadeh & Hawkinson, 2021; Huang, 2023; Khodabandeh & Mombini, 2024; Rauf et al., 2021). Ethical and privacy concerns surrounding data collection in VR/AR applications, requiring stronger security frameworks (Arslantaş & Tokel, 2018; Castillo, 2016; Wu et al., 2021) .

To ensure validity and reliability, the findings are cross-referenced with multiple sources to ensure consistency (Denzin, 2017). Next, the research selection and analysis process are fully documented, allowing for reproducibility. Finally, a subset of studies was independently reviewed by a second researcher to confirm consistency in coding and ensure inter-coder reliability.

Findings

Contributions of Immersive Technologies to ELT Affordances

In terms of the first research question, immersive technologies like VR, AR, and MR significantly contribute to a more effective learning process in ELT by offering diverse opportunities for interaction and engagement. These technologies provide learners with a vast array of interactive experiences.

First, VR and AR have contributed greatly to ELT thanks to its material affordances through realistic simulations and interacting tools in genuine scenarios. Students can enhance their language skills via immersion. For example, making a food order in a restaurant, try on a tour guide in a city or museum, in which everything is virtual (Alharbi, 2022; Alizadeh & Hawkinson, 2021; De Back et al., 2023). These scenarios allow students to use language skills in controlled environments where mistakes do not carry real-world consequences (Bonner & Reinders, 2018; Squires, 2019; Li & Zhou, 2021). Also, the sense of presence that these immersive platforms bring about enables learners to improve their ability in language usage in real life. Moreover, students can try out more appealing and understandable real-time interactions than those in traditional methods (Cheng & Tsai, 2020; Merchant et al., 2014; York et al., 2021). Tools such as Google Expeditions and personalized virtual environments offer learners tailored opportunities for learning at their own pace, fostering better comprehension and meaningful learning (Ebadi & Ebadijalal, 2022).

Second, technologies like VR, AR and MR better learners' attitude and motivation through their fascinating and stress-free environments. Such tools are suitable for those who are introverted and antisocial, as immersive and collaborative tasks that they provide can make even these kinds of people to be able to actively engage in (Huang, 2023). Gamified VR and AR environments increase learner motivation by involving them in meaningful, context-rich activities that elevate their desire to learn and communicate (Belda-Medina & Marrahi-Gomez, 2023; Yip et al., 2019). In addition, virtual adoption promotes people's perception of cultures and reduces stress by cross-cultural connection. Learners can network with various types of backgrounds, cultures and enhance their confidence when using the language (Arslantaş & Tokel, 2018; Liaw, 2019). This also helps them to acquire some perspectives of cultures and

develop the intercultural sensitivity (Cheng & Kent, 2020; Khodabandeh & Mombini, 2024; Marcel, 2020; Shih, 2015).

Thirdly, immersive technologies create opportunities for social affordances via meaningful social interaction, enabling learners to engage in collaborative language tasks. Social VR platforms like Second Life provide real-time interactions where students can practice public communication skills with peers, mentors, and native speakers (Castillo, 2016; Yang et al., 2020). Such environments not only improve language skills but also enhance cultural competence by allowing students to socialize across cultures (Liaw, 2019; Zheng et al., 2018). Role-playing and mission-based activities within these platforms further support communicative competence by mimicking real-world tasks (Cheng & Kent, 2020). Additionally, collaborative virtual games require learners' active engagement and teamwork, fostering both linguistic and interpersonal skills (Huang, 2023). These platforms effectively simulate real-world dynamics, preparing learners for authentic social interactions (Marcel, 2020; Zheng et al., 2018).

Fourthly, VR and AR technologies empower learners by fostering learner autonomy. Personalized tasks allow learners to progress at their own pace, adjust task difficulty, and receive targeted feedback (Peixoto et al., 2021; Taskiran, 2019; Ustun et al., 2022). Extended reality tools offer learners the flexibility to explore virtual environments that suit their preferences, further fostering self-directed learning (Reinhardt, 2021). Immersive platforms also provide learners with opportunities to access diverse content and engage in activities tailored to their needs, making language acquisition more effective and meaningful (Chen et al., 2021; Parong & Mayer, 2018). However, guidance from educators remains essential to maximize the effectiveness of such tools and ensure alignment with learning objectives.

Lastly, immersive technologies also provide affordances for teachers by enabling innovative lesson design and delivery. VR and AR tools facilitate the creation of interactive presentations, virtual field trips, and gamified language activities, making lessons more engaging and effective (Alizadeh & Hawkinson, 2021; Alshumaimeri & Mazher, 2023; Bonner & Reinders, 2018; Yip et al., 2019; Yousif & Noman, 2023). For instance, teachers can use virtual environments to simulate real-world language use scenarios, providing learners with authentic opportunities for practice (Bonner & Reinders, 2018; Shi, 2020). However, the effective use of these tools requires proper training and mentorship. Teachers need support to develop pedagogical strategies that leverage immersive technologies while addressing potential challenges, such as high costs and technical difficulties (Alharbi, 2022; Shadiev & Yang, 2020; Takkaç Tulgar et al., 2022).

Challenges in Integrating Immersive Technologies in ELT

Hypothetically, the incorporation of innovative technologies will be promised to revolutionize the way English is taught in the future challenges as it is prepared nowadays. This review focuses on barriers in the second research question, which are categorized into three aspects: technical constraints, teaching and learning factors, as well as the fairness issue. Thus, to overcome these challenges the use of these technologies in ELT classrooms must also be optimally utilized.

Firstly, the use of immersive technologies in ELT presents significant technical and organizational challenges. For example, the need for stable internet connections, high-performance computers, and VR/AR headsets can impose financial burdens on schools with limited resources, especially in rural or underfunded areas (Shadiev et al., 2021; Parong & Mayer, 2018; Akçayır & Akçayır, 2017). Additionally, the lack of infrastructure in some

institutions further hinders the adoption of these technologies (Wang et al., 2021; Kuhail et al., 2022). Software and hardware issues can disrupt the learning process, with technical failures like lagging or crashing software causing frustration for both teachers and students (Parong & Mayer, 2018; Wang et al., 2021; Shadiev et al., 2021; Alizadeh & Hawkinson, 2021). To mitigate these challenges, it is essential to provide technical support and problem-solving measures to ensure the functionality of these tools (Cheng & Tsai, 2020; Peixoto et al., 2021).

Another challenge lies in creating engaging, relevant, and culturally appropriate content. Poorly designed VR/AR activities may fail to engage students or meet learning objectives, leading to decreased motivation (Alizadeh & Hawkinson, 2021; Alharbi, 2022; Chen et al., 2021). Additionally, the lack of standardized guidelines for integrating immersive technologies into existing curricula poses a barrier to widespread adoption (Chang et al., 2020; Khodabandeh & Mombini, 2024; Wu et al., 2021). Furthermore, unstructured or uncontrolled learning environments on social VR platforms, such as Second Life, can lead to negative experiences. For instance, students may encounter rude or inappropriate behavior, which can undermine their motivation and willingness to participate (Herrera Mosquera, 2017; Rauf et al., 2021). Moreover, the lack of visual and auditory cues, like facial expressions and body language, reduces communication effectiveness in virtual interactions (Castillo, 2016; Chen et al., 2021). Traditional teaching methods may also conflict with immersive technologies, requiring careful integration with existing curriculum standards (Khodabandeh & Mombini, 2024). Additionally, culturally insensitive or overly generalized content can alienate learners, highlighting the need for content that is both relevant and inclusive (Chen & Kent, 2020; Arslantaş & Tokel, 2018). Adapting teaching strategies to effectively leverage these technologies without compromising traditional practices remains a significant challenge (Belda-Medina & Marrahi-Gomez, 2023; Shadiev & Yang, 2020).

Thirdly, assessing learning outcomes in immersive environments poses unique challenges, as traditional assessment tools often fail to capture the multifaceted skills acquired through VR/AR experiences (Zheng et al., 2018; Shadiev et al., 2021). For instance, the development of cultural awareness, problem-solving abilities, and collaborative skills in immersive settings cannot be adequately measured using standard tests (Viktoria et al., 2018; Kuhail et al., 2022). Additionally, the lack of standardized assessment frameworks tailored for immersive learning environments hinders the ability to evaluate their effectiveness. Researchers have called for the creation of new assessment models that account for the complex and dynamic nature of language learning in virtual settings (Peixoto et al., 2021; Alizadeh & Hawkinson, 2021). These models should address not only linguistic skills but also intercultural competence and social interaction abilities, which are integral to immersive learning (York et al., 2021; Cheng & Tsai, 2020).

Finally, the collection and use of learner data in immersive environments raise significant ethical and privacy concerns. Many VR/AR applications collect extensive user data, which, if misused, can compromise students' privacy and security (Rauf et al., 2021; Zheng et al., 2018). Schools and educators must ensure that data protection measures are in place and comply with legal and ethical standards to maintain trust among learners and their families (Wu et al., 2021; Alharbi, 2022). The ethical implications extend to the potential misuse of immersive tools for purposes unrelated to education. For instance, commercial interests or third-party involvement in data management could exploit learners' personal information, underscoring the need for strict regulation and oversight (Shadiev et al., 2021; Castillo, 2016).

Discussion

This literature review has explored the role of immersive technologies including VR, AR, and MR in creating rich affordance environments for ELT. The findings suggest that these technologies have significant potential to enhance language learning by providing authentic, interactive, and engaging experiences that align with the principles of sociocultural theory and affordance-based learning (van Lier, 2004; Aagaard, 2018). However, while the benefits of immersive technologies are well-documented, a more critical analysis reveals both the strengths and limitations of their application in ELT, as well as important implications for practitioners and researchers.

The findings highlight several key strengths of immersive technologies in ELT. First, they provide material affordances such as high-quality visuals, immersive audio, and realistic simulations that create a sense of presence and engagement, allowing learners to practice language skills in safe, controlled environments (Alizadeh & Hawkinson, 2021; Alharbi, 2022). Second, immersive technologies offer affective affordances that enhance motivation and reduce anxiety. Gamified and interactive applications, such as AR vocabulary games or VR role-playing scenarios, cater to diverse learning preferences and draw even introverted learners into active participation (Yip et al., 2019; Belda-Medina & Marrahi-Gomez, 2023). These technologies also promote cultural awareness by allowing learners to interact with virtual avatars or explore culturally rich environments, thereby fostering intercultural competence (Liaw, 2019; Shih, 2015). Third, immersive technologies support social affordances by enabling collaborative learning and real-time interaction with peers, mentors, and native speakers. While previous studies have demonstrated the benefits of gamification in language learning (Yip et al., 2019), this review extends the discussion by highlighting how immersive technology enhances engagement not just through rewards-based motivation but also by fostering a sense of presence and embodiment.

Unlike traditional CALL (Computer-Assisted Language Learning) platforms that focus primarily on structured content delivery, immersive VR-based approaches provide authentic and interactive environments where learners feel physically present (Reinhardt, 2021; Kuhail et al., 2022). These findings align with Cheng & Tsai (2020), who suggest that contextualized learning in VR environments enhances cognitive load in a positive way, leading to higher retention rates and deeper comprehension. Moreover, while Liaw (2019) highlighted VR's potential to enhance intercultural communication, this review expands on this argument by demonstrating that VR not only facilitates exposure to diverse linguistic input but also actively reduces anxiety in language learners through social immersion in low-risk environments. This aligns with findings from Selfa-Sastre et al. (2022) but contrasts with studies that argue VR lacks sufficient linguistic scaffolding for structured grammar instruction (Shadiev et al., 2021). In addition, from the findings about the benefits of immersive technology, it can be concluded that the social interactions offered by these platforms align with Vygotsky's (1978) sociocultural theory, emphasizing the importance of social engagement in language learning. Such technologies enable the learners to converse with other learners or even the native speakers of the area. Learners are also, therefore, enabled to learn various customs, traditions, and even norms. Consequently, immersive technologies create a dynamic interplay between affordances and sociocultural factors, resulting in a rich and engaging environment for language learning. By letting learners interact with others, work together, and experience different cultures virtually, these technologies empower them to take ownership of their learning journey and develop the communication skills necessary for success in the globalized world.

Despite the apparent advantages of immersive technologies, some contradictions emerge in the literature. While many studies emphasize learner autonomy in VR-based environments (Peixoto et al., 2021; Wu et al., 2021), others caution that immersive technology may lead to increased dependence on structured teacher guidance, particularly for learners with lower self-regulation skills (Alharbi, 2022; Kuhail et al., 2022). This suggests that while VR and AR enhance engagement, their effectiveness may vary depending on learner proficiency levels and individual learning strategies. Additionally, while immersive platforms are widely recognized for improving oral proficiency through role-playing and interaction (Chen et al., 2021), some studies highlight the limitations of conversational AI in VR simulations, where responses may not be as dynamic or grammatically correct as human interaction (Liaw, 2019; Shih, 2015). This suggests that immersive technology may be more effective as a supplementary tool rather than a standalone replacement for communicative instruction. Another key challenge is the issue of privacy and safety in open social VR platforms. While some research argues that virtual environments foster authentic communication (Castillo, 2016; Yang et al., 2020), other studies raise concerns about exposure to inappropriate content and unmoderated interactions in social VR spaces (Rauf et al., 2021). This contradiction highlights the need for institutional policies and pedagogical safeguards when incorporating open VR tools into ELT.

The findings of this review have several important implications for ELT practitioners and researchers. For practitioners, immersive technologies offer exciting opportunities to create dynamic, learner-centered environments that enhance engagement, motivation, and cultural awareness. However, successful implementation requires careful planning, including professional development for teachers to build their technical and pedagogical skills in using immersive technologies (Shadiev & Yang, 2020). In addition, it is necessary for institutions to provide equitable access to ensure that all learners, regardless of socioeconomic background, can benefit from these tools (Aylett, 1999). Administrators should also consider thoughtful integration of immersive technologies into existing curricula, with a focus on aligning these tools with learning objectives and assessment frameworks (Khodabandeh & Mombini, 2024).

For researchers, this review highlights the need for further investigation into several areas including the long-term impact of immersive technologies on language acquisition, particularly in terms of fluency, accuracy, and intercultural competence. It is also necessary to investigate the combined use of VR, AR, and MR to explore how these technologies can complement each other in creating richer learning experiences. Last but not least, the development of standardized assessment tools to measure the effectiveness of immersive learning environments should be further investigated, particularly in terms of skills that are difficult to assess through traditional methods, such as cultural awareness and collaborative problem-solving (Zheng et al., 2018; Peixoto et al., 2021).

In summary, while immersive technologies hold immense promise for transforming ELT, their successful integration requires a balanced approach that considers both their potential and their limitations. By addressing the challenges of cost, accessibility, and ethical concerns, and by providing clear guidelines for implementation, educators and researchers can unlock the full potential of these technologies to create engaging, effective, and equitable language learning experiences. Future research should focus on bridging the gaps identified in this review, ensuring that immersive technologies are not only innovative but also practical and sustainable in diverse educational contexts.

Conclusion

This comprehensive literature review underscores the transformative potential of immersive technologies—Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)—in reshaping the landscape of English Language Teaching (ELT). The findings reveal that these technologies create rich affordance environments that significantly enhance learner engagement, interactive learning processes, and personalized language acquisition. By offering authentic, context-rich, and immersive experiences, VR, AR, and MR enable learners to practice language skills in realistic scenarios, fostering both linguistic proficiency and intercultural competence. The integration of these technologies aligns with sociocultural theory, emphasizing the importance of social interaction, collaboration, and cultural immersion in language learning.

The review highlights that immersive technologies provide material affordances through high-quality simulations and interactive tools, allowing learners to practice language skills in safe, controlled environments. Additionally, affective affordances are evident in the way these technologies reduce learner anxiety and increase motivation through gamified and interactive experiences. Learners, including those who are introverted or socially anxious, are drawn into active participation, enhancing their confidence and willingness to communicate. Furthermore, social affordances allow learners to interact with peers, mentors, and native speakers, fostering collaborative learning and intercultural communication. However, the integration of immersive technologies in ELT is not without its challenges. Technical constraints, such as the high cost of equipment, the need for stable internet connections, and the complexity of software, pose significant barriers to widespread adoption. Additionally, the lack of standardized guidelines for integrating these technologies into existing curricula and the absence of equitable access for learners from diverse socioeconomic backgrounds remain critical issues. Ethical concerns, particularly regarding data privacy and security, also need to be addressed to ensure the responsible use of immersive technologies in educational settings.

The pedagogical implications of immersive technologies are profound. They offer teachers innovative tools to design dynamic, learner-centered environments that enhance engagement, motivation, and cultural awareness. However, successful implementation requires professional development for teachers to build their technical and pedagogical skills. Institutions must also ensure equitable access to these technologies and thoughtfully integrate them into curricula, aligning them with learning objectives and assessment frameworks.

Future research should prioritize addressing the identified gaps and challenges. This includes investigating the long-term impact of immersive technologies on language acquisition, particularly in terms of fluency, accuracy, and intercultural competence. Researchers should also explore the combined use of VR, AR, and MR to understand how these technologies can complement each other in creating richer learning experiences. Additionally, the development of standardized assessment tools tailored for immersive learning environments is crucial to measure the effectiveness of these technologies in fostering skills such as cultural awareness, problem-solving, and collaboration.

In summary, while immersive technologies hold immense promise for enriching ELT by creating immersive and interactive learning environments, addressing the challenges of cost, accessibility, and ethical concerns is essential for their successful and equitable integration. By focusing on these areas, future research can unlock the full potential of immersive technologies to revolutionize language education, providing learners with unparalleled opportunities for language acquisition and cultural understanding.

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