GAMIFYING THE LEARNING EXPERIENCE IN THE LANGUAGE CLASSROOM

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Abstract

Introduction:

This paper provided a comprehensive review of previous research on technologies surrounding gamified Augmented Reality (AR) and Virtual Reality (VR) and the effects of this amalgamation of Extended Reality (XR) on English language teaching and learning.

Methods:

A total of 138 articles were examined from six perspectives: explore the development of XR technology for use in education, especially English language learning; examine gamification; its theoretical background and the role motivation plays in gamified contexts; investigate if the pedagogical strategies associated with the integration of gamification techniques with XR technologies can improve English language learning; identify the potential benefits and challenges of using AR/VR technologies for teaching English; and detect current research limitations and gaps.

Results:

It was found that immersing learners into virtual and augmented worlds can improve vocabulary, bridge formal and informal learning, enable interaction and collaborative

learning, provide opportunities for situated learning, and reduce anxiety. Overall, gamified AR had a meaningful effect on student learning outcomes.

Discussion:

Review implications include the need for: more prepared instructors utilizing XR technology; sufficient theoretical backing, such as frameworks and models; and research that compares traditional approaches and XR technology for teaching English.

Keywords: Augmented Reality; collaborative learning; Extended Reality; Mixed Reality; Teaching English as a Foreign Language (TEFL); Virtual Reality

Introduction

Extended reality (XR) has transformed how individuals relate with their physical and virtual environments, from observation to immersion (Chuah, 2019; Taslim et al., 2023). XR encompasses augmented reality (AR), virtual reality (VR), and mixed reality (MR). All XR technologies modify the human-to-PC screen interaction, either by immersing users in a virtual environment, augmenting the user's surroundings, or combining the two (Hein et al., 2021). The reality-virtuality continuum refers to how mixed reality depicts the complete spectrum from AR to VR (Milgram and Kishino, 1994). For the past 15 years, language professionals have been fascinated using XR technologies in education, particularly in language learning. However, recent technological advancements, as well as a sharp decline in the cost of required hardware, have resulted in an astounding expansion of the XR market, creating new possibilities for the application of XR technologies in education (Panagiotidis, 2021). The purpose of this literature review is to explore the integration of gamification with XR technologies for Teaching English as a Foreign Language (TEFL).

The increased focus on XR or immersive technologies is due to the need for advancing new and unique teaching-learning designs, pedagogies, and effects (Wienrich et al., 2020a). The introduction of Extended Reality (XR) technology into learning institutions through gaming tools has revolutionized the learning of languages due to several attributes. Luo (2023) emphasized that XR has provided various technological options, including grammar checking, material storage, voice recording, and automated speech recognition. However, other studies demonstrate the prevalence of mixed results associated with gaming tools applications for learning. While gamification contributes to improved emotional responses and students' attitudes, competition's technical difficulties and adverse implications reduce its relevance in learning languages (Zhang & Hasim, 2023). Research shows that XR technologies can deliver educational benefits to pupils, such as enhancing their attention as well as motivation to learn (Chen et al., 2017; McKenzie et al., 2019; Palacios Moreno, 2023; Wulatari et al., 2023). Though research indicates that XR technologies offer educational benefits, this technology is cloaked in uncertainties. There are no generalizable instructional methods that can be utilized across platforms, contexts, and XR types and as a result, XR technology adoption is slower than anticipated (Chuah, 2019). It is also unknown whether XR immersive games and technologies can make language learning more engaging, enjoyable, and memorable when compared to traditional computer-assisted instruction and game-based language classes. Furthermore, XR technology's transdisciplinary applications have resulted in dispersed scholarly works and incomplete ideas being transferred into practice (Hein et al., 2021). In sum, the extant literature does not reveal key features that contribute to the effectiveness of immersive technologies in TEFL.

As a result, a thorough assessment and synthesis of existing XR research are urgently needed to strengthen this burgeoning discipline. This entails organizing and presenting a wide-ranging, descriptive, and critical evaluation of current research on gamifying the learning experience using XR technologies for teaching English. This systematic review aims at answering the research question:" What is the contemporary

literature on gamifying the learning experience using Extended Reality technologies for EFL?" It addresses the following objectives:

1. Explore the development of XR technology for use in education
2. Explore gamification as a high-impact methodology for learning languages
3. Explore the role of motivation in gamifying the language classroom
4. Explore if the integration of gamification techniques with XR technologies, such as VR and AR, and the pedagogical strategies adopted in various contexts and content areas can improve TEFL learning outcomes
5. Identify the potential benefits and challenges of using VR and AR technologies for TEFL
6. Identify research gaps and limitations and propose future research agenda

The databases used for the search include ACM, IEEE Xplore, Elsevier, MDPI, SpringerLink and Springer Open, Sage, Scopus, and Google Scholar as they are the most representative of the area of study considered in this review. All articles that were within the scope of this review were included, for example, peer-reviewed journal articles, dissertations, chapters in books, and reports published in conference proceedings. Articles written in English were given preference. The systematic review involved selecting the latest empirical studies and research papers/reports (2010–2023) barring a few. The descriptors that were used for searching and locating the resources included: Extended Reality, Augmented Reality, Virtual Reality, Mixed Reality, gamification, games, motivation, and TEFL.

This literature review begins by introducing XR technologies and their use in education, exploring the role of gamification as a high-impact methodology for learning languages, examining the integration of gamification with AR/VR to support TEFL, discussing the potential benefits and challenges of using XR technologies for teaching and learning English, and finally, depicting the gaps identified in extant literature.

Extended reality technologies in education

XR technologies are immersive and comprise a variety of applications, websites, and gadgets that alter the physical reality of users in some way (Wohlgenannt et al., 2020; Taslim et al., 2023). While VR is a completely artificial and immersive experience that excludes the actual world from view, AR refers to the real-time integration of digital and physical information using various technological devices (Wohlgenannt et al., 2020).

VR is a technological domain dating back to the 1960s but has recently resurfaced with the promise of providing sensory immersion into virtual settings (Mystakidis et al., 2017a). The most prevalent form of VR experience is immersive 3D virtual worlds that include a user's complete field of vision utilizing a headset (Bonner and Reinders, 2018). VR is intricately linked with the ideals of immersion and presence (Skarbez et al., 2018). Contemporary language scholars typically use the term immersion in the metaphorical sense of being immersed in language and culture (Blyth, 2018). Immersion is the feeling of being physically present in a virtual environment. The perception is formed by immersing the user in visuals, audio, or other stimuli that create an absorbing environment. Immersion is meant to create the illusion that the user has left the actual world and is "present" in the virtual environment. Although immersion is an objective "technology-related" characteristic of non-physical environments, presence is a psychological, perceptual, and cognitive result of immersion (Ochs et al., 2018). To put it another way, presence might be defined as psychological immersion in a virtual environment.

VR environments are now being used not only for entertainment but also for education (e.g., Enkin, 2022; Azar and Tan, 2020; Gadelha, 2018; Wulatari et al., 2023). Social VR environments (SVRE), also known as 3D virtual immersive environments (3D VIEs), which can be used by multiple users, provide social immersion and are

used in distance education (Mystakidis et al., 2017a). In SVREs, users experience a superior sense of self since the individual can control his or her personified agent or avatar (Mystakidis et al., 2021). When meeting with other avatars or peers, there is a powerful sense of co-presence (Ochs et al., 2018). In a virtual environment, identification with one's avatar can have a significant psychological impact on behavior and learning (Mystakidis et al., 2021). VR can make a significant contribution to education by letting students experience environments or scenarios that are too complex to duplicate using traditional computer-assisted teaching approaches (Ripka et al., 2020; Wienrich et al., 2020b).

AR is an emerging three-dimensional (3D) technology that provides a new way to connect the virtual and physical worlds (Lebeck et al., 2017; Fuchsova and Korenova, 2019; Abad-Segura et al., 2020; Alonso-Rosa et al., 2020; Erlandsson and Ivarson, 2021; Alshumaimeri and Mazher, 2023). The environment is real in AR, but it is supplemented by virtual elements or information (text, image, video, audio, computer graphics, simulation) that are layered on or combined with the real world. These virtual elements or static overlay on top of the physical world can be routinely placed in any real background, such as objects, landscapes, or books, without the user's involvement (Panagiotidis, 2021). Mobile AR technology has gained increasing research attention in language education, especially in English language acquisition (Redondo et al., 2020; Sáez-López et al., 2020) as it allows real-time interaction, provides learning through experience, increases users' interest and motivation (Chang et al., 2019; Chang et al., 2019), and improves retention or recollection (Fujimoto et al. 2013).

Mixed reality (MR) is the third type of XR, which refers to a particular subclass of immersive technologies that involves fusing AR and VR to create immersive experiences based on an individual physical environment (Milgram and Kishino, 1994). Mixed reality (MR) is a highly interactive and immersive educational environment and experience, which involves the use of 360° video, AR, and VR. This fusion of immersive technologies facilitates communication, interaction, and

collaboration, and enhances engagement (Lampropoulos et al. 2021; Hein et al. 2021). The distinction is that AR occurs in the real world, whereas mixed reality is a combination of the physical and digital worlds that creates new landscapes and representations in which physical and digital elements co-exist and interact in real time (Hein et al. 2021). Since MR applications for language learning are in the majority based on Microsoft Hololens 2 (Vazquez et al. 2017; Leonard and Fitzgerald, 2018; Panagiotidis, 2021), this review focuses only on VR and AR. However, it is worth mentioning that Hololens-based applications have been used for English language learning (for example, Huynh et al., 2019; Rzayev et al., 2020).

Gamification as a high-impact methodology for learning languages

Gamification is a common concept that originated in digital platforms and is now used in a variety of contexts (Kamel et al., 2017). The first example that comes to mind for most people is using gamification in the classroom to keep students engaged and motivated and promote a positive teaching-learning experience engagement and motivation (e.g., Ioannou, 2019; Rauschenberger et al., 2019). De La Cruz et al. (2023) demonstrated that most students engaging with gamified tools during English associated the learning environments with several attributes, including entertaining, competitive, enjoyable, and motivating. Teba (2023) emphasized that gamification promotes user engagement, resilience, and the development of high-quotient thinking capabilities.

Gamification, or the use of game design features in situations other than games, has become a reality (Linehan et al., 2015). Through game design, gamification is expanding and becoming more integrated (Deterding, 2015, 2016). Gamification is defined in various ways, and its meaning is dependent on the context in which it is situated. In the context of education, gamification is a pedagogical approach that

transfers the mechanics of games (e.g., missions, points, badges, and rewards) to the educational environment to improve learning outcomes (Dichev and Dicheva, 2017).

The role of motivation in gamifying the language classroom

Motivation is multidimensional (Steel et al., 2021), and therefore, it is defined in various ways. Although many researchers have attempted to develop a universal definition of motivation, there seems to be no consensus on how this concept should be defined. This may be because these definitions reflect their perceptions and experiences in a specific research area. Concerning education, motivation is associated with learning and academic achievement and includes a learner's beliefs about his/her ability to perform a chosen activity, purpose, or goals, and emotional reaction related to that activity (Green et al., 2012). Gamification of education is an innovative pedagogical approach for improving learners' motivation and engagement in educational settings by combining game design features (Dichev and Dicheva, 2017; De La Cruz et al., 2023; Gutiérrez-Colón et al., 2023). The mediating roles of learners' preferences illustrated the need for autonomy and independence during learning to increase individual performance and experience (Wang et al., 2023; Nguyen et al., 2023). Unlike other approaches to learning, gamification proved efficient in promoting student involvement, arousal of curiosity, collaboration, and an increased enthusiasm toward answering questions (Alshumaimeri et al., 2019; Szabo & Kopinska, 2023).

Researchers have identified a link between video game elements and motivation on the one hand, and self-determination theory on the other (Hamari and Koivisto, 2015). This theory hypothesizes that an action may be extrinsically or intrinsically motivated (Hamari and Koivisto, 2015). Gamification is based on internal and external factors, as it includes elements that motivate players extrinsically and intrinsically (Erickson et al., 2018). Intrinsic motivation is elicited among many target

groups using gaming aspects, game design, and data. Points, badges, and leader boards serve the competence requirement, profile building and avatar selection satisfy the autonomy need, and team activities and friendly competitions satisfy the relatedness need (Sailer et al., 2017). This idea of producing intrinsic motivation is why gamification is used in various applications, including education, the health sector, work process, organizations, and retaining customers (Mauroner, 2019).

When game-like mechanisms are used to make learning more interactive, dynamic, and flexible to inspire or affect learners' behavior (Kapp, 2012; Dichev and Dicheva, 2017; Koivisto and Hamari, 2019), students' motivation increases because the virtual environment allows them to complete tasks successfully and acquire self-confidence during the learning process (Korosidou and Bratitsis, 2021; Sari & Avifah, 2023; Shortt et al., 2023). Teachers must understand the mechanics of motivation as students may become dissatisfied with traditional ways of learning, which may lead to a drop out crisis (Bovermann and Bastiaens, 2020). New gamification technologies, such as VR and AR, are providing teachers with new and unique ways to engage and encourage students, as well as unique strategies to stimulate students' innate drive to learn (Perry, 2015; Godwin-Jones, 2016; Gadelha, 2018; Taskiran, 2018; Pinto et al., 2021; Enkin, 2022; Liu et al., 2023). Analysis of student perceptions towards gamification strategies demonstrated a significant improvement in engagement and the ease of recalling topics related to grammar (Liu et al., 2023). Koç and Sütçü (2023) demonstrated that while choosing or designing games, intrinsic motivations, including control elements, curiosity, struggle, and fantasy, improve students' learning capabilities and mastery. Rather than being assessed and graded, games provide learners with a great sense of achievement by delivering badges, medals, and points, and the opportunity to achieve. Ideally, gamification introduces the students to the big picture, part of a revolution that creates individual resilience to surmount learning difficulties. This insight is crucial for foreign language/English language learning because motivation has been frequently related to gamified learning

(Werbach and Hunter, 2012; Gibson et al., 2015; Bovermann and Bastiaens, 2020; De La Cruz et al., 2023).

Use of gamification to support EFL learning

Gamification is commonly seen as one of the most entertaining, absorbing, and effective strategies for teaching EFL and for bridging the gap between student learning and educational practice (Lui, 2014; Sundqvist and Wikström, 2015; Munday, 2015; Xu, 2023; Huang, 2023). This is because gamification aspects can boost learners' motivation and passion for studying English while diminishing learners' anxiety and fear of speaking in public (Arnold, 2014; Wu and Huang, 2017; Nilubol et al., 2023).

Duolingo, a language learning app that creates a motivating environment for learners, is one of the most popular and widely used gaming tools for learning English (Loewen et al., 2019; Govender and Arnedo-Moreno, 2020; Shortt et al., 2021). Kahoot! is another digital game-based language learning tool.

Researchers claim that Kahoot! improves the language classroom by allowing for more interactive and visible knowledge consolidation and assisting learners in achieving proficiency in the language, for example, in terminology and grammar (Wang and Tahir, 2020; Kohnke and Moorhouse, 2021). However, Kahoot! is not a very interactive tool and teachers must incorporate communicative activities, such as role-playing or discussion, to provide oral practice (Dehghanzadeh et al., 2021).

Dehghanzadeh et al. (2021) conducted a review of research on the integration of gamification for learning English and discovered that although studies have reported positive outcomes related to enthusiasm, engagement, and satisfaction, literature does not highlight the aspects of gamification that contribute to these learning outcomes. One example is the use of Duolingo for improving academic achievement in English (Abaunza et al., 2019), English vocabulary proficiency

(Guaqueta and Castro-Garces, 2018; Ajisoko, 2020), listening skills (Bustillo et al., 2017), and English communicative skills (Rolando et al., 2019). However, the results of these studies may not have been entirely accurate, as they did not account for larger samples and other extraneous factors (such as motivation, linguistic background, and use of other class activities) and variables such as gender and ethnicity when examining changes in students' language ability.

Furthermore, research on the use of gamified language learning applications has primarily focused on design (Huynh et al., 2018), and not on cognitive or learning styles or behaviors (e.g., Bustillo et al., 2017). This is critical because design features alone do not guarantee learning, even if they may provide an effective and interesting learning environment (Glassman, 2016). Although scientific research may show that game-based English language learning is more successful than non-game learning environments (Zarzycka-Piskorz, 2016) and gamification can facilitate the informal learning of English (Sundqvist and Wikström, 2015), the claims about the effectiveness of these tools leave much to question. This necessitates examining the integration of gamification with extended technologies.

Gamifying EFL learning using extended reality technologies

Gaining oral proficiency is typically identified as the major goal of language students (e.g., Alalou, 2001). On the other hand, anxiety, and a lack of preparedness for speaking in real-world settings can have a negative impact on speaking skills in language learning environments (Enkin and Correa, 2018; Horowitz, 2019; Yaghoubi & Kazemi, 2023). As a result, instructors have begun to employ emerging immersive technologies in their classroom instruction to enhance the development of speaking fluency (Blyth, 2018; Enkin, 2022) and other language skills and language components (Zainal, 2023). Attempts are being made to leverage immersive XR tools such as VR and AR for this purpose.

Gamifying English as a foreign language learning using virtual reality

Until recently, language acquisition was aided by a combination of desktop virtual spaces or virtual worlds such as Second Life (SL) (Chun et al., 2016; Chen, 2016). Although the desktop virtual spaces reduced learner anxiety, increased language learning motivation, and permitted freedom of expression through avatars, students were unable to communicate with others using paralinguistic cues or real thoughts and feelings, such as facial expressions or gestures (Enkin, 2022).

Unlike desktop social-based virtual environments such as Second Life, immersive social VR is a new platform where the presence of the users allows for more real conversations and the use of nonverbal cues (Lloyd et al., 2017). This concept of presence distinguishes immersive VR from desktop virtual environments, as users in immersive VR might feel as if they are in another physical world (and detached from the real world) by using cues such as realistic sounds and vivid pictures (Enkin, 2022). This distinguishing feature has substantial learning implications since it can improve attentiveness and encourage a strong connection to learning material (Gadelha, 2018). Huseinović (2023) argued that virtual reality (VR) provides kinesthetic learning, enhancing curiosity and attention toward mastering English skills.

The use of serious games in a 3D social virtual reality environment (3D SVRE) can have a positive impact on the quality of learning in online learning programs (Mystakidis et al., 2017a). These new technologies may provide some answers to one of the primary issues of educators: how to improve the quality of learning for all pupils. A 3D SVRE learning environment evokes a sense of realistic immersion. SVREs can offer a truly new way to actively engage with learning and increase motivation (Mystakidis et al., 2017b), increase attentiveness (Mystakidis et al., 2021), enhance social interactions among pupils as well as between educators and learners

(Mystakidis, 2019; Horowitz, 2019), acquire new skills for virtual teamwork, and provide a venue for rich, synchronous formal and informal learning (Mystakidis et al., 2017a; 2017b). These findings corroborate findings that VR environments can improve students' declarative and procedural knowledge in English as a Foreign Language (EFL) programs (Wang et al., 2012), improve knowledge retention (Downey et al., 2012), and sustain students' attention, which is very critical for the cognitive engagement of learners in language classes (Berns et al., 2013).

A recent study (Enkin, 2022) suggests that embedding games in an immersive SVRE can offer a more engaging experience with fewer feelings of self-consciousness as compared to face-to-face lessons. Enkin (2022) shows that the concept of presence in immersive VR is important (Cheng et al., 2017) and can boost learner engagement when compared to more traditional platforms (Mystakidis et al., 2017b) and desktop virtual environments (Chun et al., 2016; Chen, 2016). The usage of immersive VR can improve language learners' motivation for experiential learning-based activities (Enkin, 2022). Furthermore, the experience of being fully virtually embodied in a VR avatar within a VR world enhanced engagement and encouraged students to feel more comfortable and confident while speaking to others in the target language. This is consistent with Horowitz's (2019) and Suyunov et al. (2023) findings that increased interactions within the virtual environment can lower students' inhibitions.

Despite the usefulness of blending gamification with VR, there is a paucity of sufficient research on the use of these technologies for language learning. This finding corroborates Oyelere et al.'s (2020) literature review.

Gamifying English as a foreign language learning using augmented reality

In language education, AR and gamification have been combined to encourage students to create and engage in marker-based (e.g., image recognition AR using QR codes) and location-based (e.g., GPS data, Wi-Fi data, ping etc.) games (Reinders and

Wattana, 2014; Reinders et al., 2015) and software development kits (SDKs) for collaborative AR projects (Belda-Medina and Calvo-Ferrer, 2022) and for digital storytelling (Holden and Sykes, 2011; Perry, 2018; Arvanitis and Krystalli, 2021). This combination has been used for language learning, for example, to enhance students' language skills (Liu et al., 2007), improve language learning in Italian (Cervi-Wilson and Brick, 2018) and Spanish (Holden and Sykes, 2011), in the acquisition of French language skills (Perry, 2015), and to learn multiple languages (Thorne and Hellermann, 2017).

Gamified AR has been designed to promote learners' skills in English (Taskiran, 2019), to promote real-time contextualized English vocabulary learning (Godwin-Jones, 2016), to facilitate EFL students' writing performance (Allagui, 2021), to provide linguistic and content knowledge in English composition (Liu and Tsai, 2013), to collaborate in English language learning tasks (Seedhouse et al., 2014; Reinders and Wattana, 2014) using Microsoft Kinect's speech recognition to teach basic English words to children (Dalim et al., 2016), to augment English language learning using quizzes (Agata et al., 2021), and to enrich students' vocabulary in EFL classes (Hadid et al., 2019). In addition, AR gamification has increased language use, reducing the barriers associated with traditional methods. Students mastery improved while speaking assessments using AR (Basuki, 2023).

One of the ways of teaching early EFL is by integrating mobile learning activities in a gamified digital story (Korosidou and Bratitsis, 2021). The research revealed that Digital Storytelling and AR strategies had a favorable influence on children's verbal skills and, to a lesser extent, cultural knowledge gains. High levels of engagement and motivation were induced by the multimodal setting, digital narratives, and gamification pedagogy. These findings are in line with conclusions that the incorporation of Digital Storytelling and AR can allow learners to experience fun and maximize educational effectiveness (Arvanitis and Krystalli, 2021; Raffone, 2022). Other examples of AR educational games, game-based learning, and gamification include engaging students with multisensory learning experiences, for

instance, by creating word walls, using interactive posters, bulletin boards, and using self-evaluation approaches to improve vocabulary, phrases, and concepts (Bower et al., 2014; Liontas, 2021; Helvich et al., 2023).

The real-world outcome and the physical aspect of gamified AR activities can increase student motivation and interaction in a foreign language context (Reinders and Wattana, 2014; Reinders et al., 2015; Khan et al., 2019; Alshumaimeri and Mazher, 2023). This is because of the integration of visual elements and words that complement one another for pupils to gain a deeper understanding of what they are learning (Abad-Segura et al., 2020). Therefore, when implementing gamified AR, it is crucial to understand that the technologies establish a cognitive approach and will help students learn (Erlandsson and Ivarson, 2021).

Overall, digital game-based language learning can improve learning in the context of English language teaching and learning. Liu et al. (2023) affirmed that using AR-based instructions during language learning promoted student engagement, cultural understanding, and teachers' competency. AR with the incorporation of games (gamified AR) promotes language development due to its interactivity, which allows for the formation of a conducive learning environment in which learners are not apprehensive and do not feel tension (Raffone, 2022). However, little consideration has been given to how it may be used in conjunction with other technologies to improve students' intrinsic motivation and learning in the domain of English as a second or foreign language. While most researchers have examined these innovations individually, research on AR and gamification in an education setting as a combined design is lacking.

Despite the growing interest, AR and VR have yet to be widely adopted in basic, secondary, or even university-level language education (Bonner and Reinders, 2018). However, there are deeper, more ongoing benefits with AR, and how it can provide engaging learning strategies for students.

Potential benefits and challenges of using XR technology for TEFL

The affordances of AR and VR for language education

Gamification using XR technology increases student engagement while learning foreign languages. Several studies attest that XR creates an interactive and realistic environment in learning environments, promoting student engagement (Ratinho & Martins, 2023; Pratiwi et al., 2023; Akram & Abdelrady, 2023). It is believed that XR technology has a positive effect on learning experiences (Bonner and Reinders, 2018; Alshumaimeri and Mazher, 2023). Meccawy (2023) illustrated that these technologies have enabled contextual learning, primarily for language disciplines (Meccawy, 2023; Lowell & Yan, 2023; Binotti & Chambless, 2023). Taslim et al. (2023) indicated that interactive and multimodal environments offered instant feedback for improving learner's metacognition and comprehension skills. By eliminating graphic and auditory distractions in the classroom, VR has the capacity to enable students to deeply connect with the topic (Gadelha, 2018). This level of immersion also assists students in making real-world connections between the subject matter and their personal life (Bonner and Reinders, 2018). VR supports English language learners by providing an environment for effective communication and interaction with other learners or avatars (Alshumaimeri et al., 2019; Liaw, 2019) and engaging in kinesthetic activities (Urun et al., 2017; Huseinović, 2023). It also provides a stress-free environment, which helps to relieve pressure and provide inspiration to learn the language (Hong et al., 2014).

The affordances of AR for learning have long been acknowledged as it is ideal for teaching English to both young and adult learners (Godwin-Jones, 2016; Blyth, 2018; Perry, 2018; Bonner and Reinders, 2018; Basuki, 2023). Reinders and Pegrum (2016) used Klopfer et al.'s (2002) inventory of the numerous benefits of mobile learning and applied these to the domain of language education: portability,

connectivity, bridging formal and informal learning, enabling interaction and collaborative learning, offering context sensitivity, providing opportunities for situated learning, and emphasizing individuality and facilitating personalized learning (Reinders and Pegrum, 2016). AR's positive benefits include enhanced performance as well as increased motivation and engagement (Radu, 2014; Chaidir et al., 2023). These technologies also have the potential for supporting 'just-in-time' learning (Bonner and Reinders, 2018; Helvich et al., 2023) and contextual visualization of virtual information in rich situations (Chen et al., 2022). Furthermore, the integration of mobile technology (or apps), image or video, and 3D models simplifies the usage of AR and allows users to engage with objects in virtual environments while also interacting with the actual world (Liontas, 2021). It is seen to be especially effective since it allows for distant education, engages diverse learning styles, arouses interest and imagination, stimulates creative thinking, offers motivational-emotional incentives, and provides real-time feedback (Bower et al., 2014; Liontas, 2021). These potential benefits have been corroborated by a review of 64 studies from 2010 to 2018, which found that AR had a meaningful effect on student learning gains (Garzón and Acevedo, 2019).

Challenges in applying AR/VR technologies for teaching/learning English language

Although gamification, AR, and VR result in improvements in English language learning achievements (Mystakidis et al., 2017a; 2017b, 2021; Azar and Tan, 2020; Enkin, 2022; Nilubol et al., 2023; Xu, 2023; Huang, 2023; Yaghoubi & Kazemi, 2023), researchers, as well as teachers, are wary of the effect of the new technology and the distracting effect of animated objects, especially on younger learners (Hsieh, 2016). The availability and implementation costs override the scalability of gamified learning experiences (Xiao & Li, 2023). Further challenges include a lack of pedagogical expertise, gender-based disparities in results, and technical skills to ensure efficient designing and evaluation of gamified learning experiences. Cao and Yu (2023)

emphasized the adverse implications affecting regular learners with XR technology, including health issues, addiction, cybersickness, and distraction, affecting the overall learning experience.

While AR innovations are developing at a tremendous pace, there are some limitations that include relatively small display size compared to VR applications (Liontas, 2021), constraints related to tracking and recognizing as technology needs to rely on external or internal sensors, and constant updates (Lovreglio and Kinateder, 2020; España-Delgado, 2023; Gutiérrez-Colón et al., 2023), as well as the cost of developing and maintaining AR applications (Li and Shang, 2019; Alrashed et al., 2023). Candan and Basaran (2023) examined the inadequate support and training of educators affecting language comprehension. Furthermore, there are social and ethical problems associated with the rapid development of AR (Neely, 2019; De Guzman et al., 2020), such as privacy, deception, ownership, and intellectual property security (McPherson et al., 2015; Wolf et al., 2016; España-Delgado, 2023).

Internet-mediated virtual immersion technologies such as Google Pixel Buds, which is an AR wireless headphone that features real-time language translation, pose other challenges, as they eliminate the need to learn a foreign language (Blyth, 2018). This innovation is a blend of artificial intelligence, speech recognition, and translation technologies, and can enable a monolingual user to communicate in 40 foreign languages in real-time without understanding the nuances of those languages, which poses a big challenge (Blyth, 2018). In other words, the downside of gamified XR technologies is that they foster shallow learning, which is detrimental to long-term learning process (De-Marcos et al., 2016). Despite these challenges, it is apparent that many fascinating innovations in the AR/VR realm are occurring. Change is unavoidable, and competent teachers will constantly find ways to adapt. Briefly, developing technologies will continue to expand opportunities for intercultural communication and foreign language acquisition, necessitating the adaptation of teachers to the new learning environment (Blyth, 2018). Likewise, Liontas (2021) contends that XR developers and users will be able to manage these perceived

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challenges with some investments in time and effort. To summarize, despite current limitations and ethical concerns, XR technologies have demonstrated that they can positively affect motivation and performance in the field of education, as they offer a new level of social engagement, connectedness, and context awareness (Bonner and Reinders, 2018; Khan et al., 2019).

As stated previously, privacy and security issues associated with AR/VR raise important questions that should not be overlooked (McPherson et al., 2015; Wolf et al., 2016;). To avoid this becoming an issue, it is critical that students use password-protected social platforms, and that the instructor oversees their students' activities (Bonner and Reinders, 2018).

As AR social apps can be accessed by any user with a smartphone, malicious apps may obtain access to the phone and scan a user's browser history and other private information. Educators should be mindful of the potential rights offered to an AR app when it is installed on student phones. Students should be made aware of who has access to their personal information or location data while the applications are in use so that they may make informed decisions when using them (Bonner and Reinders, 2018).

When developing VR or AR activities for classrooms, instructors must consider cost as well as the parameters of the service's free-to-use model (Bonner and Reinders, 2018).

Research gap

The use of AR and VR in language instruction (particularly the use of 360° video in educational settings) is still in its early stages, with most papers encompassing experimental studies testing possibilities and student perspectives (Bonner and Reinders, 2018; Lampropoulos et al., 2021). It is evident from most studies that

researchers are generalizing based on some of the potential of the XR technologies, although these tools are still in various stages of development. Therefore, the concern exists that XR technologies are being developed so quickly that the researchers developing data-driven practices for integrating them into learning experiences are playing catch-up (Chuah, 2019). According to Wang (2023), researchers should evaluate ways to reduce contextual limitations, including individual technological expertise and the discomfort of prolonged usage. The unavailability of technical experts for implementing AR and VR contributes to learners' distraction, highlighting the need for digital experts (Paveen & Ikhtiar, 2023).

The emergence of 360° video in education (VR) and other XR technologies have caught teachers off guard and the reality exists that educational institutions need to better prepare instructors to utilize technology, such as in developing educational material or incorporating it into teaching activities (Lampropoulos et al., 2021; Paveen & Ikhtiar, 2023). Guerrero (2023) emphasized the need for future research to evaluate strategies for reducing the cognitive limitations affecting real-time performance. More research in this area is needed.

Previous studies on XR technologies frequently lack sufficient theoretical backing, such as frameworks and models. AR applications are obviously based on pedagogical theories such as informal learning, game-based learning, and task/project-based learning, as well as situated learning and constructivist learning theories (Dunleavy and Dede, 2014; Wang et al., 2018). Gamified AR technologies extend learning beyond traditional classroom settings, allowing for collaborative learning and presenting learners with contextual information (Thorne and Hellermann, 2017). These affordances are consistent with some of the key concepts in socio cultural theory and social constructivism, namely, mediation and Zone of Proximal Development (ZPD). Therefore, it is suggested that future research should consider language learning theories and principles.

Research on immersive VR using head-mounted displays (HMDs) is inadequate in the area of language teaching (e.g., Andujar and Buchner, 2019; Parmaxi, 2020). Despite the paucity of research and Lloyd et al.'s (2017) claim that immersive social VR has not yet been analyzed methodically in TEFL, there is a lack of research in immersive VR settings. Wang (2023) suggests that a need emerges to explore the impact of gaming mechanisms, including clues, combination, and sequential steps.

The review also makes it obvious that there have been no comparisons made between traditional approaches and XR technology for teaching English. Therefore, it is challenging to claim that this new learning approach performs better than the old one. Even though most research found that utilizing VR improved learning outcomes, this evidence is insufficient to prove that completely replacing traditional learning techniques with VR would be beneficial. It is only viable to advocate employing technologies to help second language acquisition and not completely replace conventional methods due to the absence of focused inquiry (Pinto et al., 2021). It is simpler to supplement education with technologies that are so prevalent in our daily lives as e-learning and digital learning methods expand, especially in the generation that was born in the digital era.

Conclusion

This empirical review focused on the impact of gamification on English language learning using AR/VR technologies. Overall, the findings suggest that gamified AR and VR have enormous potential for creating authentic contexts for learning English as a foreign/second language. AR/VR technologies are a promising addition to the educational technology learning space due to their immersive nature, and the integration of gamification has created new avenues and experiences. Gamification elements can augment AR/VR technologies and enable learning to take place in

formal as well as informal learning environments. The immersive experience that the two XR technologies afford can be motivating and relevant for learners.

Although these technologies are still in their early stages, the literature reviewed provides evidence that many promising examples are already in use in schools and universities. Gamified AR/VR can provide educators with interactive and engaging tools for online and face-to-face instruction, including immersive content and experiences tailored to language learning and learning objectives. Many students benefit from these experiences in terms of engagement and learning. The goal is to include and involve students in experiences that will assist them in learning the content and skills being taught. This includes manipulating physical objects in non-physical environments. By incorporating hands-on activities and scaffolds that teach or reinforce a lesson and having students move around the virtual environment, educators can increase engagement while helping lower the linguistic demand for English learners and helping make abstract concepts more concrete (see Fig. 1).

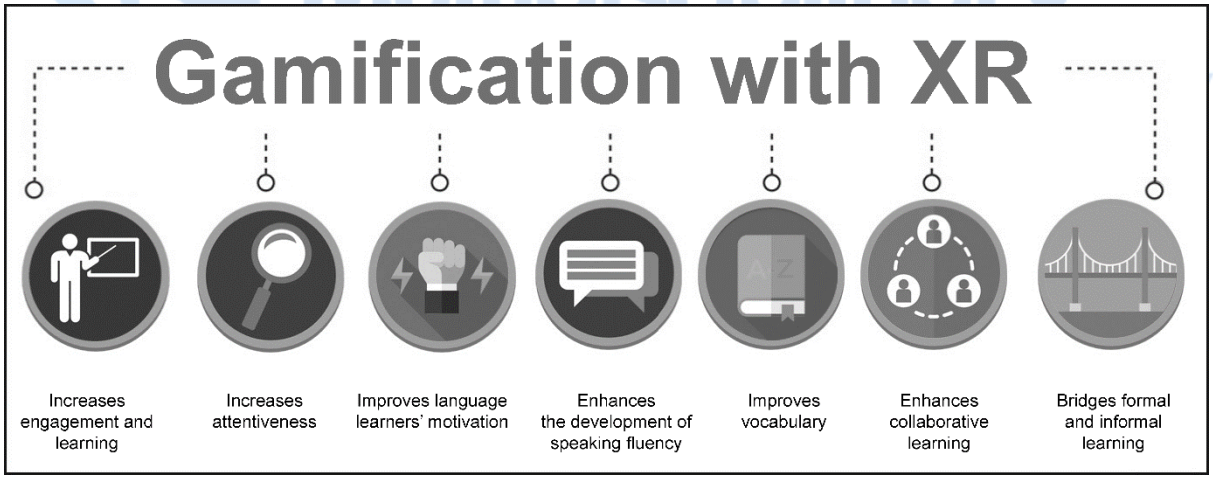

Fig. 1 The potential benefits of gamification in the language classroom

Going forward, it will be critical to ensure that instructors have the necessary skills and knowledge to integrate gamified AR/VR technologies into their lesson

plans, as well as to create opportunities for developing necessary content, including enabling students and teachers with the necessary skills. Policymakers should encourage more innovation by enabling the development of content, investing in research, and continuing support efforts to increase access to these technologies.

A potential limitation introduced by the eligibility criterion, which is to consider only articles written in English, may bias the findings of this review. Other studies may tend to follow this trend even if the focus of research is using gamified XR technologies for teaching other languages as a foreign language.

However, more research is required to shed light on the potentially significant affordances and the inherent limitations of these emerging technologies and close the gaps in the literature, specifically, the lack of generalizability. As a result, gamification can be the subject of additional research and investigation.

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