Pedagogic Relevance of Integrating Augmented Reality in Saudi English Classrooms: A Systematic Review

ABSTRACT

Every day is a new experience as technology in general has become an integral part of each aspect of modern life. Today, the learning environment plays an important role in influencing learning outcomes, especially after the Covid-19 pandemic. Researchers and educators have begun to discuss and test the implications of these realities for education/learning. Currently, augmented reality and virtual reality environments have been studied to find out their effects, especially in learning English. The purpose of this study was to find out the pedagogical significance of augmented reality (AR) in learning English. It researched into the effects of AR on English language learning in general. Teachers' perceptions and digital skills regarding the use of AR were also investigated. 20 related studies were utilized for this review (study). The results showed that the use of AR applications is very effective. Teachers' perceptions of AR were found to lead to the conclusion that it improves achievement and increases student motivation and interest. However, the teachers were not very familiar with the AR environment. These findings have implications for learners, teachers, curriculum designers, and administrators seeking to integrate AR into English language teaching and learning.

Keywords: Augmented Reality, Teacher's Perception, Learner's Attitude, Achievement

1. INTRODUCTION

Technology has become a large and influential part of education and industry. Students around the world have access to devices such as smartphones and tablets that allow them to overcome time and geographical barriers (He et al., 2014). These devices can also be used for entertainment, such as playing games, watching videos or listening to podcasts, without time or location restrictions. However, English teachers often challenges related to engaging students in classrooms (Ekiz and Kulmetov, 2016; Demir, 2017). Technology in general and digital media in particular is developing rapidly and offers new ways to make language learning more effective. Augmented reality (AR) is a technology that can be combined with gaming and teach English in an innovative and motivating way. AR can create an immersive and interactive learning environment that integrates virtual objects with the physical world. Investigating the effect of AR-based mobile application in gamified content and language-integrated learning, Lin and Lin (2019) advocated the use of AR. Various studies and reviews have explored the other side of the reality saying that there aren't enough experimental studies showing the role of using mobile-learning approach to enhance language learning (Albion, 2014; Gutiérrez-Colón et al., 2020). In yet other study, Demetriou (2020) found out teachers' perceptions of AR and its impact on student attitudes and achievement. English language instructors can appropriately integrate AR into language teaching and learning. AR technique enables learning through 'learner-centered' learning approach, which can have a positive impact on the development of students' competence and autonomy (Anastassova et al., 2014).

2. Literature review

Augmented reality (AR) is a technology that blends the real environment with virtual elements (Klopfer& Sheldon, 2010; Diegmann et al., 2015; Akçayir and Akçayir, 2017). This is intended to provide learners with spatial experiences, which are often seen through a tool that overlays virtual objects and sounds into the real environment. In an optimal manner, the use of Augmented Reality allows students to view both physical and natural environments. Almenara & Osuna, 2016. Learners can utilize AR to access normally inaccessible content (Merzlykin et al., 2019; Wojciechowski &Cellary, 2013). AR has been implemented in a variety of educational settings, including art as studied by Ibáñez et al. (2014). Similarly, use of AR and its benefits in astronomy (Liou, Yang, Chen, & Tang, 2017), and science education (Chang & Hwang, 2018) were investigated. The context of other subjects such as medicine was explored Tang, Cheng, & Greenberg (2019), biology by Erbas & Demirer (2019). Studies have indicated that AR has a potential of arousing positive emotions, facilitate interaction, and provide valuable learning opportunities. AR can be used to teach both receptive (listening, reading) and productive language skills (writing and speaking).

2.1. Augmented Reality (AR) in Education

AR is a kind of technology that combines the real world and virtual elements, such as audios, videos, images, text, 3D models and many similar things. This technology allows users to interact with and immerse themselves in both the physical and digital worlds. It has been utilized in various fields, including gaming, education, healthcare, and many others. According to Diegmann et al. (2015), numerous large corporations and organizations have embraced AR for training and visualization purposes. There are multiple ways to incorporate AR into education. For example, it can be utilized to develop interactive textbooks that enable students to interact with the content in a more meaningful manner. Iatsyshyn et al. (2019) claim that AR is one of the most advanced technologies for visualizing information. Bower et al. (2014) discovered that AR has been applied in diverse areas such as tourism, social interaction, communication, commerce, and education. AR can enhance student engagement by allowing them to explore complex phenomena or abstract concepts in a realistic manner. Solak and Cakır (2015) examined the impact of AR-based materials on vocabulary learning. Ogawa (2016) assessed the use of Aurasma, an AR platform, in enhancing vocabulary engagement and retention among second-grade EFL students. The findings indicated that AR had a beneficial influence on comprehension and engagement with students. Taskiran (2018) explored the consequences of AR on students' encounters in Turkey and explored the benefits of the game-based approach. Zhang (2018) contended that AR has the potential to enhance learners' attitudes and enjoyment, foster contextual awareness, amplify comprehension, and provide an authentic learning experience.

2.2. AR In Education and Language Teaching

The utilization of AR has proven to be effective in improving the quality of online education and enhancing the performance of students. Billinghurst and Duenser (2012) state that technology integrationenhances educational experiences, and certainly boost student's achievement unlike the traditional teaching methods. The implementation of AR has greatly contributed to the practice of e-learning for learner's achievement. (Ibanez & Delgado-Kloos, 2018). AR applications have a positive impact on students' academic success (Akcayir&Akcayir, 2016) and contribute to a more interactive learning process (Wojciechowski &Cellary, 2013). The main focus of AR is on combining digital and physical environment to create immersive- hybrid learning environments. This immersive learning is expected to facilitate critical thinking and problem-solving which is one of the major curricular aims in these days. (Dunleavy et al., 2009). In recent past, numerous studies contended the use of AR in educational settings that eventually enriches learners' achievement (Chang et al., 2015; Ferrer-Torregrosa et al., 2015, Cao and Yu, 2023). Di and Zheng (2022) in a meta-analysis defended the impact of virtual technologies on students' spatial ability. Investigating Characteristics of learning environments during the COVID-19 pandemic was systematically reviewed by Abdullah (2022) who advocated the integration of AR. Other researchers who defended AR in various settings for better learning outcomes are: Singhal et al., 2012; Ibanez et al., 2014; and Santos et al., 2014. Similarly researchers have identified specific benefits of AR in reducing academic and cognitive burden. (Bressler and Bodzin, 2013; Kucuk et al., 2014).

2.3. AR in Reading Comprehension

Radvansky (1999) describes successful comprehension as the ability to construct and maintain a coherent and reasonably accurate situation model. EFL learners may face several challenges in reading comprehension including difficult words, their contextual meanings. Research has shown that there is a close connection between mental visualization and comprehension of the reading texts (Perfetti &Stafura, 2014).

AR technology motivates the learners due to which they start enjoying the learning process. (Billinghurst & Spencer, 2012). It reduces students' anxiety to a great extent levels while 'reading' therefore, 'process of word learning' is appropriately enhanced. (Piriyasurawong, 2020).

Digital tools and devices can aid readers. E-books, audiobooks, text-to-speech software, assistive recording, mind mapping tools, and other educational apps are all some of the examples of efficient tools. Gadgets like tablets, cell phones, or PCs also facilitate readers in many ways (Biancarosa& Griffiths, 2012; Hutchison and others, 2012). It has been already been proved that Use of augmented reality (AR) apps has suitably supported readers. (Huisinga, 2017). According to Billinghurst &Buenser (2012), augmented reality (AR) offers an option to experience information gathering in

a new way rather than reading a traditional text reading. (Billinghurst and Buenser, 2012; Green and other, 2014). While Kun-Hung Cheng (2017) investigated students' mental burden, inspiration, and perspectives involving AR innovation in understanding exercises. Lin (2018) investigated how children's reading abilities were affected by augmented reality. Majority of children responded positively to the use of augmented reality in reading experiences, according to the study. They were captivated by the visual aspect. The children's participation in the reading activity was evident in qualitative observations. The scientists suggested the grown-ups' help for youngsters' AR story perusing as it assumed a significant part in furnishing them with investigation encounters.

Bursali and Yilmaz (2019) concluded that the exploratory gathering understudies experienced fulfillment with their support in intelligent perusing exercises in light of AR and further developed their perusing understanding level. The qualitative findings showed that augmented reality (AR) applications could be useful educational tools. Besides, Piriyasurawong (2020) found that the SC-AR Model (Platform Expanded Reality) successfully further developed students' understanding.

Wang (2023) studies if the innovative augmented reality (AR) technology can be well integrated into an online learning course especially during the COVID-19 period. This study investigated the effects of reducing face-to-face teaching/learning practices via using mobile augmented reality learning systems (MARLS) on learning, and the results were positively related.

2.4. Vocabulary Learning

Vocabulary is the most essential element of any language. Without knowing a word (sound, meaning in context, spelling, grammar, etc), learning is not complete. (Khan, 2011). Long ago, Wilkins (1972) states that 'without syntax', very little can be conveyed, without jargons (specific words) nothing can be communicated. Showing jargon envelops the course of word procurement, articulation, and importance (Country, 2001). It includes and emphasizes learning 'words', elaborate and contextualize morphological (grammatical), and syntactic properties (Barani et al., 2010; Kalyuga et al., 2013). In a Saudi EFL setting, jargon is thought of quite significant as closely related to vocabulary and culture. Sms through Mobile applications, micro-blogging, in addition to 'interpersonal organizations' opens up new rooms for learning English as a foreign language. (Yang, 2013). The utilization of Expanded Reality (AR) in EFL has been investigated by a few examinations (Zainuddin &Idrus, 2016; Ogawa, 2016; Richardson, 2016). Students' motivation has been found to be positively correlated with augmented reality technology. A few examinations have researched the impact of AR on EFL students (He et al., 2014; Solak and Cakır, 2015; 2018 (Kaenchan). The positive effects of AR on students' achievement and motivation are highlighted in these studies.

3. The present Study

The study is a systematic review that focuses on those studies which are closely related to the present study. Systematic review details can be seen in Appendix A.

3.1. Research questions

1 How significant is AR in learning English?

2-Which aspect of English is more easily learned through AR environment?

3 -To what extent are English teachers aware of AR, and integrate in their classes?

3.2. Tool of data collection

Systematic reviews of 20 related studies were done. Details can be seen in Appendix A.

4. Results, Discussion, conclusions

4.1. Results

Research question- 1. How significant is AR in learning English?

Based on the review, the findings suggest that AR is very important in the learning process of English language.

Research question- 2.Which aspect of English is more easily learned through AR environment?

AR is significant for all the skills and elements of English language, however Vocabulary learning and reading skills are the two most benefitted area/skill.

Research question- 3. To what extent are English teachers aware of AR, and integrate in their classes?

It has been noted that many teachers are not aware of the term AR, but the teachers use technology and media in the teaching/learning of English.

4.2. Discussion

The findings of the literature review show that the utilization of AR opens a valuable opportunity to help EFL learning. In other words, AR yields better language learning outcomes. In this review, the findings demonstrate the benefits of AR integration in EFL learning one of the promising advancements in language learning. Students can effectively develop their ability to visualize and communicate through the use of augmented reality technology. This outcome focuses what was found in past examinations with respect with the impact of intuitive learning assignments on fostering understudies' language abilities (Chen and Wang, 2015; Parmaxi& Demetriou, 2020; Wen, 2021, Ustun et al, 2022,Marrahí-Gómez, & Belda-Medina, 2022). Additionally, teachers' positive perceptions of the significance of using augmented reality lessons in English language instruction are bolstered by augmented reality technology. They emphasized that AR encourages

language practice in students. Moreover, educators upheld the possibility that the utilization of AR contributes class time and enthusiastically suggested involving AR for its benefits in assisting understudies with fostering their English language abilities. The positive insights among EFL educators towards utilizing AR innovation are likewise upheld by past examinations (Mundy et al., 2019; Webb, 2018). Besides, AR innovation helps EFL learners to be independent. With AR innovation, understudies can learn English independently, foster time usage abilities, finish the illustration task on time, pick English exercises they can do all alone, know about their mix-ups and right them, diminish their dependence on instructors' direction, utilize the web and PCs to study and work on their English and simply decide and define objectives for their learning.

4.3.Conclusion and Recommendations

The study shows that augmented reality helps EFL students improve their language learning. It likewise shows that instructors see the utilization of AR as important, inspiring, and useful as it assists understudies with creating language abilities and encourages independent learning. According to the findings of the study, many teachers are not aware of AR so they need to attend professional development programs to refresh their existing knowledge.

Extra preparation could give instructors more certainty and guarantee that they are utilizing AR really. AR innovation evaluation may likewise empower educators to go with informed choices on its utilization in the homeroom.

The basic aim of this review research was to explore the impact of involving AR in EFL classrooms. Additionally, the study examined teachers' awareness, and attitude toward augmented reality. They were not much aware, but they were found using some techniques which were quite similar to AR. The findings uncovered that involving AR in classrooms enhanced EFL students' achievements. As an outcome of this study, coursebook writers are encouraged to embrace AR reality environment to enable students to connect with the content. Researchers, pedagogues and educators are additionally encouraged to utilize AR in their texts and learning materials to facilitate them to acquire both subject and language skills.

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Appendix-A.

(Studies considered for Reviews, however details can be accessed through references).

Authors, articles/journals' briefly mentioned	**Major findings**
Mohammad Wedyan et al (2002) in the journal *Electronics*	AR enhances language skills and improves academic achievements. It relaxes students, develops creativity among learners, and boosts interaction.
Cipresso et al. (2018). *Front. Psychol*.	AR creates interactive environment by motivating the learners.
Ebadi &Ashrafabadi (2022), *Educ Inf Technol*	Students were happy using augmented reality and preferred it to traditional reading.
Fernandes et al(2023).*International journal of environmental research and public health*	The proposed game improved children's knowledge.
Elmqaddem (2019). *Int. J. Emerg. Technol. Learn.*	The nature of AR and VR offers new teaching and learning models in the 21st century learning context.
Lee (2020). *Educ. Inf. Technol*.	EFL instruction if performed in accordance with game-based learning and problem-based learning principles, students may engage them to learn better.
Chang et al,2020. *Appl. Sci.*	The learning performance was found 'enhanced' and the feedback of using AR is positive. Students can focus more on the practice of speaking, and their confidence was boosted.
Tulgaret al.(2022). *Particip. Educ. Res.*	The bibliometric mapping results indicated that related studies mostly focused on the effectiveness of mobile learning and gamification.
Taskiran(2019). *E-Learning and Digital Media*.	AR-based activities increase attention and reinforce motivation through M-learning.
Nermin(2021). *Educational Research*	The results showed that much emphasis has been on vocabulary learning. Hence, it is desirable to examine the effects of AR on the different language skills of language learners.
Dalim(2020). *International Journal of Human-Computer Studies*	By creating an innovative teaching strategy using modern technologies there can be an increase in knowledge that feels better when compared with traditional strategy.

Hu et al (2022). *Occupational therapy international*	The AR software can be employed for teaching pronunciation in elementary school English classrooms.
Xu (2023) *Open Journal of Social Sciences*	The application of AR technology in the university English classroom enhances students' interest in English learning which leads to better outcomes.
Alharbi (2022).*Journal of Positive School Psychology*	AR technology can yield better results in achieving proficiency in vocabulary.
Oksana(2022).Russia SHS Web of Conferences, *AESHE*	The research validated the idea of the effectiveness of the application of augmented reality techniques in teaching a foreign language at the University.
Sabbah(2023). *International Journal of Information and Education Technology*	Results indicated a positive effect of integrating AR technology in teaching and learning on all dimensions of motivation (attention, relevance, satisfaction, and volition), and reflective thinking.
Caetano (2023)…In *Designing Interactive Systems Conference (DIS '23), July 10--14, 2023, Pittsburgh, PA, USA.* ACM, New York	Participants preferred learning with virtual labels on real-world objects outdoors over learning with flashcards. The findings motivated further investigation into mobile AR-based learning systems in outdoor settings.
Rasalingam et al(2014)	The use of Augmented Reality (AR) has the potential to enhance the traditional learning method.
Sinha (2022)	AR can improve learning by helping educators create interactive classrooms that increase student engagement for better outcomes.
Yulian et al (2022). *JurnalTeknologi Pendidikan*	Students who used AR application performed better than those who studied through the traditional method.
Tripathy and Panda (2021) *Int. J. Edu. Appl. Soc. Sci*	The result revealed that the teacher education institutes of Odisha (India) and the TEs & PSTs have adequate resources to use augmented reality. However, awareness level among them was found to be very low.
Oueida et al(2023). (iJET), https://doi.org/10.3991/ijet.v18i13.39021	As a result, the papers were collected in a table-based format to provide researchers with better and easier insights on how to improve the use of AR in education before real implementation. This study helped in highlighting potential future work, discussing limitations, advantages, disadvantages, and the latest advances in this technology.