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An Innovative Techno Culture for Modern Classrooms: A Meta Review of Augmented Reality in English Language Pedagogy

Manjunatha ,Prasadu. Department of Robotics , Rajasthan

Research Article

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ABSTRACT

Through interaction with virtual items in the actual world, augmented reality is an ever-evolving technology that captures users' attention and guarantees in-depth knowledge and information. In the field of English language instruction, technology and gadgets are widely used to provide students a real-world language experience and to make learning more engaging and interactive. The more recent techno-pedagogy, augmented reality, allows the student to improve the many facets of the target language. The systematic review of reviews of scientific research that examined Augmented Reality technology in modern English language instruction was the main topic of this work. The study's conclusions are: AR improves English language learning, boosts motivation to learn the language, fosters a positive attitude toward the language, makes learning the language enjoyable (either consciously or unconsciously), and allows for the development of rich vocabulary. Additionally, AR helps students improve their target language proficiency. The research also examined the important problems with employing augmented reality in the classroom, both generally and specifically in language acquisition, such as budgetary limitations, privacy and security regulations, distracting students from the main idea, etc.

Keywords: English language, augmented reality, modern education, technology, and meta-analysis

Introduction

The development of research and scientific knowledge seems to have contributed to the flourishing of technology. Technology is widely acknowledged and serves as a link between people and products. The phrase "education technology" is often used in modern classrooms to improve teaching and learning results. Technology's adaptable modalities have been tested in the fields of science, art, social science, and even language teaching. For both instructors and pupils, teaching or studying languages other than one's native tongue seemed to be a risky endeavor. The majority of knowledge and information about all facets of life may be found via language, which is a treasure. Non-native speakers respect English as a language that guarantees many viewpoints of valuable information. Therefore, learning English must be both simple and engaging for pupils to explore the language without bias. The most advanced and useful technology in English language classrooms that helps students perform better in the target language is augmented reality. These technological advancements are widely visible in language classrooms for the better inculcation of target language culture among the learners. A cutting-edge technique called augmented reality (AR) helps students become proficient and eliminate the complexity of foreign languages.

The widespread use of augmented reality technology in business, healthcare, engineering, and education gives instructors, students, and parents more optimism. Therefore, in order to learn more about the applicability of AR technologies as a new techno culture in the area of English language teaching to improve the present

procedures. In order to obtain a clear picture of why augmented reality is a highly preferred technology in English language classrooms, the current study aimed to conduct a systematic review of reviews of empirical studies conducted in the area of augmented reality and its application in English as a second language or as a foreign language. How do the students profit from it? What are the limitations of using augmented reality in

modern classrooms?

Augmented Reality; An Overview

The process of bringing virtual items into the actual physical world is known as augmented reality, or AR. Virtual reality and the real world are combined in augmented reality. In 1990, Tom Caudell, a researcher at Boeing, coined the phrase "augmented reality." However, Ivan Sutherland's invention of the first head-mounted display system in 1968 led to the discovery of the precise concept of augmented reality. It enables the observer to see a composite image of the actual world and virtual things created by the computer. The virtual items created by computers add more objects to the actual world. Although there are several definitions of augmented reality, Azuma's (1997) concept is the most often used. According to Azuma (1997), "Augmented reality is a field in which 3D virtual objects are integrated into a 3-D real environment in real-time." According to Kotranza et al. (2006), augmented reality may also be defined as "the process of using a head-mounted display to overlay computer-generated imagery to the real world." Augmented reality is a platform that combines the actual world with virtual reality. In order to provide a realistic and engaging user experience in real time, augmented reality attempts to enhance virtual items on actual ones or settings. It is an interactive setting where virtual objects improve real life in real time (Kesim & Ozarslan, 2012).

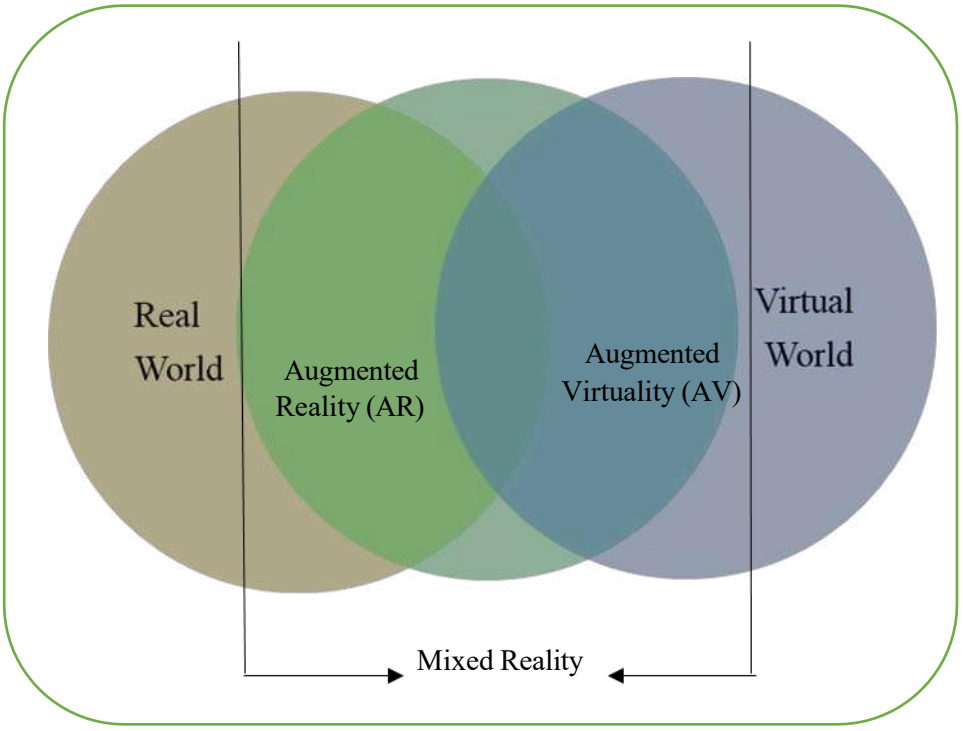


Figure1: Augmented Reality (Milgram & Fumio, 1994) (adopted from Nijholt & Traum, 2005)

Milgram's Reality-Virtuality Continuum, which is described as "augmenting natural feedback to the operator with simulated cues" (Milgram et al., 1994), was shown in Fig. 1. Paul Milgram and Fumio Kishino (1994) made a distinction between virtual and real-world contexts. By overlaying a computer-assisted

Augmented Virtuality (AV) and Augmented Reality make up the contextual layer. AV is more like a fully virtual environment, whereas AR is more like the actual world (Sairio, 2000). The integration of virtuality into the physical world to provide visual clarity and a three-dimensional visual experience is known as augmented reality.

Technological gadgets for Augmented Reality experiences

- **Head-Mounted Display**

One such gadget is the head-mounted display (HMD). It serves as the



Figure 2. Head-Mounted Display



Figure 3. Head-Mounted Display

(Figure 2 & 3 are cited from Google image)

device for both augmented reality (AR) and virtual reality (VR) (Figures 2 and 3 are taken from a Google picture). It is a device worn over the head that resembles a helmet and shows in front of both eyes. Only simulated visuals and data are shown in front of the eyes in virtual reality. In contrast to virtual reality, augmented reality uses a device called an optical head-mounted display, or OHMD, to show clear digital information placed in the actual world.

- **Smart Glasses**

Smart glasses are Augmented Reality (AR) displays that resemble eyeglasses. These include eyewear that uses cameras to intercept the real world view and re-display its augmented view through the eyepieces and devices where the AR imagery is projected through or rejected off the surfaces of the lens pieces of the eyewear. (Google Image is quoted in Figure 4.)



Figure 4. Eye Glasses

- **Head- up Display**

One of the main tools for augmented reality is the Head-up Display (HUP). AR head-up display that maintains the head-up posture rather than looking down



Figure 6. Head-up Display



Figure 5. Head-up Display

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(Figure 5 & 6 are cited from Google Image)

position. In 1950, head-up displays were first developed for military pilots. It is possible to employ near-eye augmented reality devices as a portable head-up display. As the user observes the actual world, facts, information, and photos will be shown.

- **Contact lenses**

  Another gadget that is still in the early stages of development is AR contact lenses, and others



Figure 7. AR Contact lenses



Figure 8. AR Contact lenses

(Figure 7 & 8 cited from Google Image)

The usefulness of AR contact lenses, which may be used to superimpose information on the actual environment, is the subject of several types of study. In 1999, the first contact lens display was documented. A radio transmitter/receiver, motion sensors that follow the user's eye movements and stable the MicroLED display, and the most power-efficient image sensor in the world tuned for computer vision (Coxworth, 2020). Even still, there are some obstacles to overcome, such as the need for very tiny AR contact lens displays.

- **Hand held display**



Figure 9. Hand Held Display



Figure 10. Hand Held Display

The most common augmented reality gadget is the hand-held display. Typically, in

(Figure 9 & 10 are cited from Google Image)

Touch screen interaction is the most popular and preferred approach for hand-held displays (Ahmad et al., 2013). Devices that can be operated by holding them in the user's hand are called hand-held displays. The handheld display promises to be the first successful commercial product and is very user-friendly. The omnipresent nature of camera images and the ease of portability are the main advantages of AR hand-held displays. However, because to physical limitations, users must constantly keep the handheld devices in front of them, and if they freeze their vision, the whole view will also freeze.

- **Pinch Gloves**



Figure 11. Pinch Gloves

Pinch Gloves are a pair of gloves having sensors on each tip that detect and interact with graphical items between the hands in augmented reality applications (Thomas & Piekarski, 2002). Hand gestures are a major means of communication. According to Kesim and Ozarslan (2012), "the main input devices used in augmented reality are pinch gloves, wands with buttons, and smartphones that signal its position and orientation from camera images." (Google Image is quoted in Figure 11.)

Augmented Reality in Education

Concerns about augmented reality technologies are not new. According to Azuma, Baillot, Behringer, and Feiner (2001), it has been extensively used in a variety of disciplines, including the military, medical, engineering design, robotics, telerobotics, manufacturing, maintenance and repair applications, consumer design, psychiatric therapies, and more. These days, the versatility of augmented reality technology allows for experimentation in the field of education to provide creative and engaging learning experiences. The area of education is drastically altered by augmented reality, not only in a particular stream but across education. In contrast to non-interactive media like textbooks, manuals, and instructional films, augmented reality provides interactive simulation and educational games that alter the conventional perspective of the teaching-learning process, such as teacher-peer interaction (Radu, 2014).

According to Kasim and Ozarslan (2012), augmented reality guarantees learning, entertainment, or edutainment that improves the learner's perspective and engagement with the actual world. Due to the high practical concern and results that are assured in the teaching-learning environment, augmented reality is frequently used in education, despite the fact that its use is limited in the area due to cost restrictions. With Google Glass, smartphones, tablets, and other devices, augmented reality (AR) is an appealing technology that allows students to actively participate in educational activities without becoming bored. AR is utilized in regular classrooms to enhance the engagement and material. By bringing the material outside of the classroom and using other technologies to enhance specific applications, it enhances the educational process.

General Features of Augmented reality in Education

A greater understanding of the subject. By offering a distinctive perspective and participatory experience that integrates virtual experiences into the actual world, augmented reality helps to understand complicated phenomena (Billinghurst & Dunser, 2012). Consequently, the learners' subject understanding of both tangible and abstract ideas was improved.

Retention of long-term memory. The learner's learning experience has a major impact on long-term memory retention. Because of the long-term retention of the material presented, the Augmented Reality learning environment has shown to be beneficial for active learning (Santos et al., 2014). Additionally, Macchiarella et al. (2005) found that learning in an augmented reality (AR) environment improved long-term memory

retention.

Active education. Students are more actively involved in the learning activities than passively because of the Augmented Reality engagement experience. They encourage active learning and enhance topic understanding via active engagement since they are highly driven and interested in interacting with virtual items in the real world.

Enhanced cooperation. Collaborative learning is a successful teaching strategy that encourages students to share their knowledge within the class, which improves their comprehension of the subject matter and increases their drive to

Acquire knowledge. Augmented reality provides a collaborative learning environment that facilitates students' simple material absorption. Matcha & Rohaya (2013) have examined that AR provides different forms of collaborative interaction that can take place concurrently or simultaneously, and they have also highlighted the positive evidence to support the raised conjuncture that AR could be one of the effective tools to support collaborative learning. According to Martin-Gutierrez et al. (2015), augmented reality (AR) in higher education enables both independent and interactive learning as well as group laboratory exercises with other students without the help of instructors.

Enhanced motivation among students. The primary aspect influencing kids' learning is motivation. Students that are motivated strive hard to achieve their goals. Students' enthusiasm to study was boosted by augmented reality instruction, which also had a favorable impact on their attention, contentment, and confidence (Khan et al., 2019). Furthermore, there was a favorable correlation between AR technology and motivation (Gopalan et al., 2016).

Enhanced inventiveness. One educational tool that fosters creativity in students is augmented reality. According to Liu et al. (2009), learning using Augmented Reality (AR) enhances students' creativity as well as their capacity to investigate and assimilate new information and solve problems. According to Kerawalla, Luckin, Seljeflot, and Woolard (2006), augmented reality (AR) has a huge potential to engage, motivate, and promote kids' creativity in a confined educational context.

Methodology

In order to include pertinent reviews for the current study, the researcher used a systematic review approach and prioritized articles that were published in legitimate citations. Developing a research topic, defining inclusion and exclusion criteria, finding studies, choosing studies, evaluating study quality, extracting data, critically evaluating the chosen studies, synthesizing data, and lastly analyzing and presenting findings are some of the stages that are used. The current research reviewed several papers that addressed the use of augmented reality technology in English language instruction. Even so, it examined if augmented reality might be used in modern language classes. To guarantee the quality of the research, a systematic review was conducted to gather pertinent reviews of studies published in reputable journals. In order to confirm the validity of the gathered studies, the researchers carefully examined and assessed each study's many procedures, instruments, and data analysis techniques. The papers are found using keywords like "English Language Pedagogy" and "Augmented Reality." The research were restricted to the fields of "English language," "Science & Technology," and "Education" after replications were eliminated; over 100 studies were discovered from books, journals, and conference proceedings. The relevant papers were chosen for the final review procedure after the preliminary evaluation, which took into account abstracts, keywords, and the overall structure.

Analysis on Augmented Reality in English Language Pedagogy

As a more recent technology, augmented reality is often utilized in English language classrooms to improve English language pedagogy, guarantee quality in the teaching-learning process, and provide high learning potential. The goal of the current meta-analysis was to determine why augmented reality is a very desirable technology for English language instruction. How do the students profit from it? What are the limitations

of using augmented reality in modern classrooms? The review's study was primarily divided into two categories: the advantages of augmented reality in modern English language classrooms and the risks of AR in general and language education in particular.

Benefits of AR in the contemporary English language classroom

Several potential advantages of cutting-edge technoculture, such as augmented reality, in English language instruction were identified by the research that analyzed the systematic review. Twenty research in the relevant area of emphasis were analyzed, and the results showed that AR was positively implemented in English language classrooms, leading to the following elements.

Boost enthusiasm for studying English

When learners are introduced to augmented reality technology, the English language pedagogy is more effectively engaged. Because they can engage with virtual items in a real-world setting, they are very motivated to study English in the classroom. The empirical research provided genuine insight into it. The usefulness of augmented reality for learning English as a second language was assessed by Redondo et al. (2020). The outcome demonstrated that students' enthusiasm to study English is increased via augmented reality. The impact of augmented reality games on English language motivation was investigated by Taskiran (2019). According to the survey, the majority of students found language exercises in an enhanced learning environment to be very inspiring. According to a recent research by Wang & Khambari (2020) on AR games and their effectiveness in teaching English sentences, AR improves learning interaction, boosts motivation, and lessens students' mental strain to learn English as a foreign language. According to Boonbrahm et al. (2015), AR may encourage students to learn English, which supports the findings of the aforementioned studies.

Develop your vocabulary.

Vocabulary learning is the first step in language acquisition; the more vocabulary a person learns, the more effortlessly he can speak in that language. The idea that augmented reality is the greatest technology for teaching vocabulary in the English language is backed by a number of empirical studies that have been carried out around the globe and among various samples. An empirical research by Chen et al. (2018) assessed the advantages of using augmented reality to improve vocabulary acquisition in English. According to the research, children may acquire common English vocabulary by interacting with speech, images, and real-world situations using augmented reality. According to Lee et al. (2019), augmented reality, particularly the usage of AR block builders, improves learners' vocabulary in the English language and stimulates their creativity. Furthermore, Hsieh & Lee (2012) reported that their empirical study's findings were comparable to those previously mentioned. According to the study's findings, participants learned English language using augmented reality and interacted with it. Yi (2017) conducted another significant research in which he investigated how to utilize an AR system based on Web 3.0 to make it helpful for learning English vocabulary. As a consequence, the issue of information overflow will be lessened in certain respects, and each person's load of acquiring language will be lessened by a user-friendly learning environment. Additionally, the suggested approach will have a favorable impact on vocabulary acquisition.

A high degree of accomplishment

The expectation of improved learning outcomes or excellent academic performance is the primary reason for the employment of various tactics or technologies in the area of English language teaching. There is substantial evidence that augmented reality improves students' academic performance in the English language. According to a research by Kucuk et al. (2014), students who took English language classes using augmented reality demonstrated both a high degree of accomplishment and a low amount of effort throughout the implementation process. Ismaeel & Mulhim (2019) looked at how AR technology affected the English language proficiency of ambiguity-tolerant and intolerant students. According to the study's findings, ambiguity-tolerant pupils outperformed intolerant kids in terms of performance. Additionally, Redondo et al. (2020)'s empirical

study backed the aforementioned study, which examined the use of augmented reality technology in English as a foreign language instruction and found that it improved students' academic performance. Donald (2016) investigated the use of location-based augmented reality (AR) for English language learning and found a correlation between advanced level of accomplishment and location-based AR engagement.

A positive outlook about the English language

For those whose first language is not English, English is often regarded as either a foreign language or a second language. Therefore, one of the main factors influencing the learning of the English language is attitude toward the language. A good attitude toward the English language is favorably influenced by the widespread use of innovative technologies like augmented reality. According to Yang & Mei's (2018) analysis of the research study's actual data, learners' attitudes and perceptions of the immersive language learning experience provided by the AR application were good.

Improve your linguistic abilities

Learning a language can only be evaluated based on one's ability to use the language's fundamental abilities, such as speaking, listening, reading, and writing. According to the majority of research, using technology helps students improve their language proficiency. Recent research suggests using augmented reality (AR) technology to improve English language proficiency. Gundogmus et al. (2016) investigated how students felt about using augmented reality apps to improve their English language proficiency. According to the research, students who are learning English using augmented reality apps have a positive outlook that helps them improve their language abilities. According to Liu et al. (2010), learning English via augmented reality improved speaking, listening, reading, and speaking skills. According to Silva et al. (2015), AR Blocks may support kids' language development and motivation. According to research by Salmon & Nyhan (2013), augmented reality technology facilitates the integration of four fundamental skills as well as particular language abilities. According to Jamrus & Razali (2019), AR is very helpful for improving pupils' English language reading abilities.

Make English language instruction enjoyable and joyous for both conscious and unconscious learning.

There are two different ways to learn a language: conscious learning and subconscious learning, particularly when learning a second language. The best thing for a person is to learn a second language, whether consciously or unconsciously. AR provided a more pleasant, interactive English language study platform that enhances the learning process. The goal of Li et al.'s (2016) research was to create an AR English classroom such that both conscious and subconscious learning could take place in a happy, comfortable atmosphere. They discovered that the AR English learning environment provided both conscious and subconscious learning. Additionally, Taskiran (2019) emphasized that augmented reality is very entertaining and motivating in English language classrooms. According to Chen (2019), using augmented reality in English as a second language is crucial for fostering autonomous learning and thinking. The main goal of augmented reality is to create a fun and engaging interactive classroom where students can quickly grasp the material. Risks associated with AR in general and language learning in particular

When used in a teaching setting, augmented reality technology offers many potential advantages. Nonetheless, educators should always be aware of the problems with pupils' use of augmented reality. Mobile phones are the most practical augmented reality gadget that both instructors and students like; each has a distinct socioeconomic position. While some students can afford the cost of the mobile gadget, others cannot. In this case, financial limitations pose a danger to the AR learning environment, and the cost of AR applications might sometimes make them unaffordable for use in classrooms.

Another issue is that AR applications are highly appealing and draw students' attention, but this will cause them to concentrate more on the virtual visuals than the actual material being exchanged, which might prevent students from achieving the actual learning objective. When incorporating techno-pedagogies into the actual classroom setting, the

teacher's effectiveness must be the main priority. To effectively transfer material using appropriate technology in real-time, the educator must possess both subject-matter and technological expertise. A major problem arises if the teacher lacks the necessary skills to manage such a class.

Additionally, there is a significant privacy and security problem when utilizing online augmented reality games and classroom conversations. In order to protect kids from cybercrimes, instructors should monitor each student's online activity and let them to utilize passwords to secure social spaces (Bonner, 2018). These are the main issues of using augmented reality in a school setting.

Conclusion

The study's objective was to methodically analyze evaluations of empirical research that examined the usefulness and application of augmented reality in modern English language classrooms. When using Augmented Reality (AR) technology in the relevant field, more than 20 research were analyzed to determine the many elements that favorably impact English language education.

The majority of research found that augmented reality might be used to improve various aspects of the English language. According to the research, AR improved language proficiency (Jamrus & Razali, 2019; Salmon & Nyhan, 2013; Silva et al., 2015) and improved both conscious and subconscious learning (Chen, 2019; Li et al., 2016; Taskiran, 2019). Additionally, research has shown that they improve motivation (Taskiran, 2019; Wang & Khambari, 2020; Redondo et al., 2020) and offer a fun interactive learning environment. Additionally, research has shown that the use of augmented reality (AR) enables learners to accept the English language with a positive attitude and perform academically with excellence (Kucuk et al., 2014; Ismaeel & Mulhim, 2019; Redondo et al., 2020; Donald, 2016) and high vocabulary acquisition (Chen et al., 2018; Lee et al., 2012; Yi, 2017). Lastly, the report clarifies the risks and security and privacy concerns that arise while using AR technology.

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