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How age-friendly is the use of augmented reality in the learning process? A Systematic Survey

Bawa, Nura

Department of Curriculum Studies and Educational Technology, Faculty of Education and Extension Services, Usmanu Danfodiyo University, Sokoto, Nigeria
ORCID ID: https://orcid.org/0000-0001-5835-7393

Abstract

Augmented reality has a direct connection to the visual perception of information. Scientists lamented that individuals perceive 70 to 80 percent of the information they receive with their eyes. Based on the claim, it can be deduced that AR has a major role to play in the learning process. This study aims to determine whether AR is age-friendly and to enable its use for learning across all age groups at all educational levels. The study adopts a qualitative survey design. The population of the study includes all students currently in Sokoto State, Nigeria (across all levels). The purposive sampling technique is used to select 192 students who have experience using AR for learning. For the study, an instrument called AR Key Information Interview was developed. It was validated, a pilot study was conducted, and a reliability index of 0.83 was found using Chrombact Alpha. The study finds that AR is age-friendly and can be used at all educational levels. The study concluded that AR is one of the best technologies that can promote lifelong learning in the 21st century. The study therefore recommended that more AR be developed to facilitate the implementation of our national curriculum for sustainable national development.

Keywords: *Age-friendly; augmented reality; learning process*

Introduction

The current technological advancement, as well as the adaptation of generations of young people who have grown up and developed between screens, video consoles, tablets, and other technological gadgets, have made it possible to incorporate augmented reality (AR) into the curriculum plan. The impact of technology allows for the transformation of educational

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instruments into others that are much closer to current reality, such as augmented and virtual reality. Education must account for and articulate social changes brought about by technological progress (García, & Losada, 2021). Recently, learners of all ages have shown a strong interest in the use and application of novel educational technologies. These new technologies provide captivating experiences by allowing people to share their knowledge, skills, and practices in a natural, active, and participatory way.

Furthermore, the internet's diversity of media and multimedia elements (high quality ultra4KHD, 4K images, animations, and so on) combined with the flexibility of communication and information provided an increase in motivation for the classes because they receive immediate feedback (reinforcement). Based on the characteristics of digital native learners, it can be assumed that they are the best users of emerging technologies used within and outside of the educational learning environment. To accommodate all types of learners, technological advancements should take into account some factors that may influence the use of learning technologies, such as age and gender. Against this backdrop, the researcher intends to determine how age-friendly the use of AR for learning purposes is.

Literature Review

The fact that AR is a technology that can help students learn is unquestionable. It promotes creativity and innovation in the learning process. AR technology has the potential to increase student interest in science and social science courses (Haryadi & Pujiastuti, 2022). This technology also aids in the development of 21st-century learning skills such as critical thinking, problem solving, communication, collaboration, and science literacy (Setiawan, Rachmadtullah, Subandowo, Pramujiono, & Srinarwati, 2022).

AR is a technology that, when integrated into education, can improve learners' analytical skills, motivation, and participation levels, leading to a rapid increase in learners' academic performance (Garcia & Losada, 2021; Calişir, Sabuncu, & Altun, 2022). This is due to the fact that AR, as an immersive virtual environment, provides interaction opportunities based on the use of realistic images and effects that imitate situations that students cannot or will only rarely encounter in real life (Hite, Childers & Jones, 2019). AR is a relatively new technology in which virtual elements are interactively and in real time added to the real world view. AR technology allows users to see the real world while superimposing virtual objects on top of it (Peleg-Adler, Lanir, & Korman, 2018).

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Augmented reality is a technology that is increasingly finding a place in the classroom, regardless of our age, stage, or level of education, or the subject or discipline in which we find ourselves. Numerous authors have determined that it is a tool that improves learning and facilitates understanding of specific concepts and processes by providing the student with assistance in the form of graphic information superimposed on the real environment (Alvarez, 2022). This type of technology, according to research, aids in the individualization of the teaching process. As a result, each student will have an information base customized to his or her specific requirements.

Augmented Reality (AR) is a relatively new technology that is gaining traction as it becomes more affordable. AR applications superimpose computerized objects on top of the users' real-world surroundings. Users can see their physical surroundings as well as digital artifacts by using mobile devices or AR glasses. AR has been heralded as the next technology that will replace our current smartphone and desktop experiences for daily activities (Derby, & Chaparro, 2020). It is widely acknowledged that keeping older adults up to date on technological developments is critical. Technology may benefit the elderly in maintaining their independence and connection to society. Adoption of new technologies, such as augmented reality (AR), by older adults, on the other hand, may be difficult due to declines in cognitive and physical abilities, as well as hostility and apprehension about the use of technology (Peleg-Adler, Lanir, & Korman, 2018). According to their findings, elderly participants had a better user experience with the AR interface than younger participants. In a study conducted by Vieira, Civitella, Carreno, Junior, Amorim, D'Souza, Ozer, Ortega, and Estrázulas (2020) on using augmented reality with older adults in the community to select design features for an age-friendly park, it was found that it is feasible for older adults to use AR at all times.

Current technological advancements in VR and AR, combined with significant reductions in device costs and widespread availability of high-speed internet connections, have increased the use of these systems (Aldowah & Ghazal, 2022). As multidisciplinary tools, VR and AR provide a safe environment for older adults to practice without exposing them to potentially dangerous situations in the real world. AR allows them to interact with their physical surroundings in new ways, whereas VR allows them to immerse themselves in virtual worlds. As a result, they can encounter situations and places that they would otherwise be unable to

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encounter due to their impairments. Similarly, Peleg-Adler, Lanir, and Korman (2018) discovered that older adults did not have any specific performance deficits when using AR.

Objectives of the Study

The main aim of the study is to determine how age-friendly the use of augmented reality is. Specifically, the study intends to:

1. Determine whether the students are aware of the existence of learning augmented reality.
2. To ascertain if the students have experience of using augmented reality for learning.
3. To determine how age-friendly the use of augmented reality is in the learning process.

Research Questions

1. Are the undergraduate students aware of the existence of learning augmented reality?
2. Do the students have experience of using augmented reality for learning?
3. How age-friendly is the use of augmented reality is in the learning process?

Methodology

A qualitative survey design was used for the study. This type of design allows for the collection of qualitative data from respondents. It allows respondents to express themselves freely about a specific phenomenon. The study's population included all current students in Sokoto State, Nigeria (across all levels). The total student population in the state is estimated to be 28,300. The purposive sampling technique was used to select 192 students with prior experience using AR for learning. An instrument called the AR Key Information Interview was created for the study. It was validated by experts, and a pilot study was conducted with twenty (20) participants from outside the study's sample, yielding a reliability index of 0.83 using Chrombach Alpha. The collected data was qualitatively analyzed, and a portion of it was presented in pie charts.

Results

The results of the study would be presented in line with the research questions posed by the study.

Research question 1: Are the undergraduate aware of the existence of learning augmented reality?

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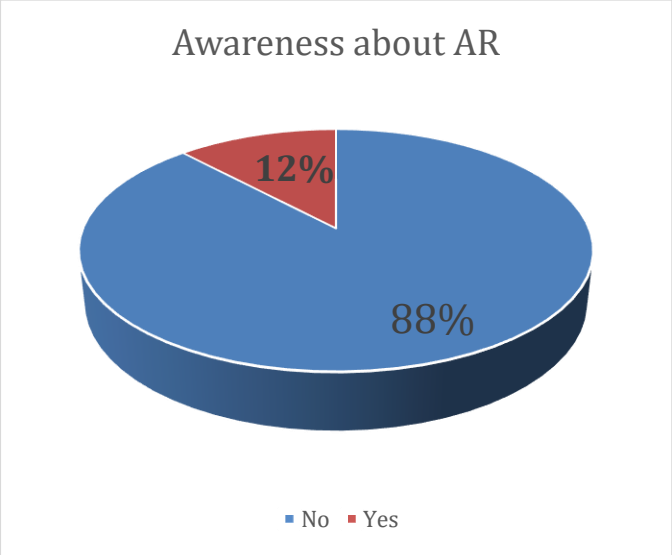

Figure 1: pie chart on the awareness about the existence of AR for learning.

Source: Field report 2023.

Figure 1 shows that 88% of students in Sokoto State are unaware of the existence of augmented reality for learning. Despite the fact that AR has been around for decades, awareness of its existence has been limited, particularly in developing countries.

Research question 2: Do the students have experience of using augmented reality for learning?

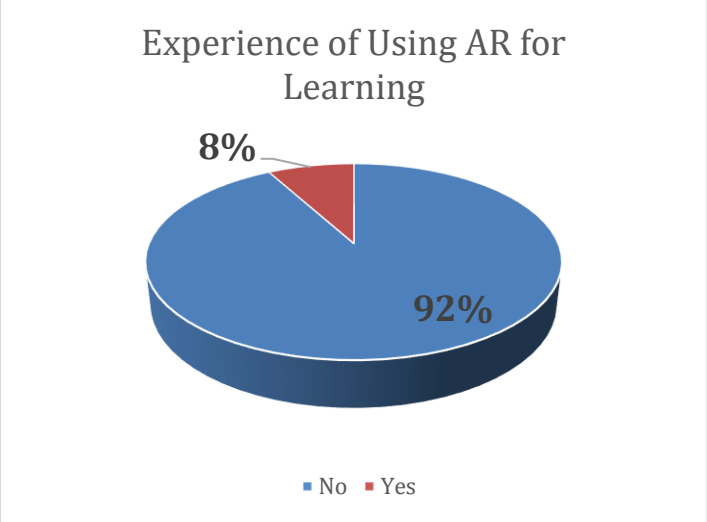

Figure 2: Experience of using AR for learning

Source: Field report 2023.

Figure 2 shows that only 8% of all students (participants) interviewed have used augmented reality (AR) for learning. While the remaining 92% (majority of respondents) are only aware of AR, they have never used it.

Research question 3: How age-friendly is the use of augmented reality is in the learning process?

There are 192 respondents (only 8%) of the entire population who have used AR for learning. Based on the interview, they all agreed that augmented reality is suitable for people of all ages. According to some of the respondents in this study:

Sampled respondent 1. *"When using the AR, I couldn't recall that I am old"* (A 50 year old pilot).

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Sampled respondent 2. *"It is fantastic having experience of using AR in my life. Very user friendly"* (A 29 year old student).

Sampled respondent 3. *"What a nice technology! AR is an apt innovation for young learners"* (A 17 year old student).

Sampled respondent 4. *"As old as I am, I couldn't believe how I enjoyed using AR for learning"* (A 60 year old woman).

Sampled respondent 5. *"My child and I used AR during our morning exercise. It's a nice experience"* (A 47 year old household).

Sampled respondent 6. *"The only thing I can say is that AR provides solution to most of our learning problems"* (A 56 year old lecturer).

Discussion

According to the study's findings, augmented reality (AR) is a new learning technology that is age-appropriate. The user-friendliness is appropriate because it promotes lifelong learning and the attainment of 21st century learning skills. The goal of this study was to look into the possibilities of using augmented reality to teach an older group of students. Based on the responses of the majority of respondents, it was concluded that AR is capable of transporting all types of learners, regardless of their age brackets.

The findings of this study support Derby and Chaparro's (2020) contention that AR technology may benefit the elderly in maintaining their independence and connection to society. Similarly, Peleg-Adler, Lanir, and Korman (2018) discovered that older adults did not have any specific performance deficits when using AR. Furthermore, older adults are capable of using AR at all times (Vieira, Civitella, Carreno, Junior, Amorim, D'Souza, Ozer, Ortega, & Estrázulas, 2020). These submissions demonstrated that the technologies being developed in the twenty-first century are vastly different from those developed in previous centuries in terms of novelty and usability.

The findings contradicted the assertion that older adults may find it difficult to adopt new technologies such as augmented reality (AR) due to declines in cognitive and physical abilities, as well as hostility and apprehension about using technology (Peleg-Adler, Lanir, & Korman, 2018).

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Conclusion

Based on the study's findings, it is concluded that AR plays an important role in the learning process. AR is one of the best technologies for promoting lifelong learning in the twenty-first century due to its age-friendliness. AR in education includes elements that improve learning abilities such as problem-solving, collaboration, and creation in order to better prepare students for the future. It is also appropriate for both traditional and technology-enhanced pedagogies that emphasize technical knowledge and proficiency. Furthermore, AR allows teachers to assist students in grasping abstract concepts. Teachers can enhance classroom experiences, teach new skills, inspire student minds, and get students excited about exploring new academic interests by utilizing the interaction and experimentation that AR technologies provide.

Recommendation

Based on the findings of the study, it is therefore recommended that more AR be developed to facilitate the implementation of our national curriculum for sustainable national development.

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