

## STUDY OF AUGMENTED REALITY BASED APPLICATIONS IN EDUCATION

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**Abstract:** *Augmented reality is a technology that combines virtual things with the actual environment and allows them to interact with one another. Although augmented reality applications are employed in a variety of fields, education is by far the most essential. AR technology combines real things with virtual information to boost students' connection with physical environments while also facilitating their learning. Virtual reality gadgets, which are still under development, allow students to learn hard topics in a fun and easy method. Students can learn more about the virtual environment by interacting with objects in it. Lessons can be taught in the company of a teacher as if they were present at the time by scheduling digital tours to a museum or zoo in a completely different nation. In light of all of this, this research is a compilation. In this context, augmented reality technologies were introduced, and examples of their application in many disciplines of education were given. The prepared sections should be carefully studied by the educators and put into practise in their courses, according to a suggestion made at the conclusion of the study. Furthermore, it was stated that it should be preferred in order to successfully engage with pupils by interacting in real time.*

**keywords:** augmented reality research and applications, field of education, pandemic process, digital transformation, virtual environment.

### 1. INTRODUCTION

Individuals' lifestyles are affected and changed by quick changes and advances in science and technology nowadays. This transformation will have an impact on the educational process and educational surroundings, in addition to individuals [1].

When looking at educational technology from the past to the present, it is clear that there has been a shift from blackboards and chalk to computers and the internet, and even to smart technologies with artificial intelligence. Computer and internet technologies have had such a wide range of applications in our lives in recent years that it was impossible that education services would be left out [2].

The features of today's learners, referred to as the Z generation and/or digital generation, necessitate instructors keeping up with technology changes and employing the most relevant technical tools in learning environments. Augmented reality applications in education are one of these emerging technologies. When looking through the literature, academics have come up with a variety of definitions for the concept of augmented reality. These are some of the definitions:

Milgram and Kishino [3] define augmented reality as "a reality environment in which digital media items are used instead of real world things." This appears to be the most general description. Azuma [4] claims that augmented reality is a subset of virtual reality. According to this concept, augmented reality refers to virtual worlds that support existing reality.

In this setting, users can interact with both virtual and actual items in augmented reality environments. The interactive environment between the virtual and real world is created through augmented reality. This is accomplished through the use of augmented reality [5, 6]. When looking at the various definitions in the literature,

augmented reality might be characterised as "actual worlds supplemented with virtual items."

When the major applications of Augmented Reality (AR) Technology are considered:

- Education
- Health
- Marketing
- Video games and games
- Tourism
- Build
- Cinema
- Food
- Museums and Art
- Automotive

Although augmented reality applications are employed in a variety of fields, education is by far the most essential. Over time, new potential provided by AR technology for education have begun to grab educators' attention [7]. When evaluating these new chances and benefits [8–11], consider the following:

to provide more flexible and engaging learning environments for students

to be enthralled in a way they've never been enthralled before.

to improve their desire to study and their incentive to do so.

to assist students in making active observations as part of their learning processes and formulating hypotheses based on these findings.

Wearable technologies stand out when it comes to augmented reality technologies, which are commonly employed in the field of education. Smart sensors that track bodily motions are built into wearables. To sync with a smartphone wirelessly, these items often employ bluetooth, WiFi, or a mobile internet connection. With the use of sensors, users are connected to wearable devices. Wearable technology is a type of technology that is constantly with the user and delivers valuable services in a variety of sectors, including entertainment, health, employment, information, education, socialisation, and security. In the subject of education, wearable technologies are employed in learning and teaching contexts. Students can use modern visualisation approaches to examine existing instructional resources and learn new things [12].

## 4. METHODOLOGY

Augmented reality (AR) has been quietly but steadily revolutionising the education sector, digitising classroom learning and making training more diverse and engaging, much like its precursor virtual reality. Current studies in the literature on the integration of augmented reality apps into education are presented in this area.

A scoring key was created for the answers given to the researcher question in order to assess the ability to convey what they read in writing. As a consequence of the study, it was shown that stories had no significant impact on students' reading interest or comprehension skills, they did have a beneficial impact on their ability to tell what they read in both written and vocal form. Furthermore, as a result of the study, it was discovered that students' reactions to the texts had improved. In a similar study, Baysan and Uluyol [13] looked into the impact of augmented reality books on student academic progress and environmental attitudes. The HITLibHZ-BuildAR program's AR-based teaching material was employed in the laboratory for the experimental group of 22 participants, and the course was delivered by the researcher. As a consequence, based on the qualitative information gathered from the students, AR appears to be a promising technology. Rather than technology instruction, educational AR applications should be used in disciplines that require 3D spatial visualisation, such as geometry and geography. Participants accept the usage of augmented reality in computer hardware training, as long as platforms are better developed and designs are more professional (Figure 1).

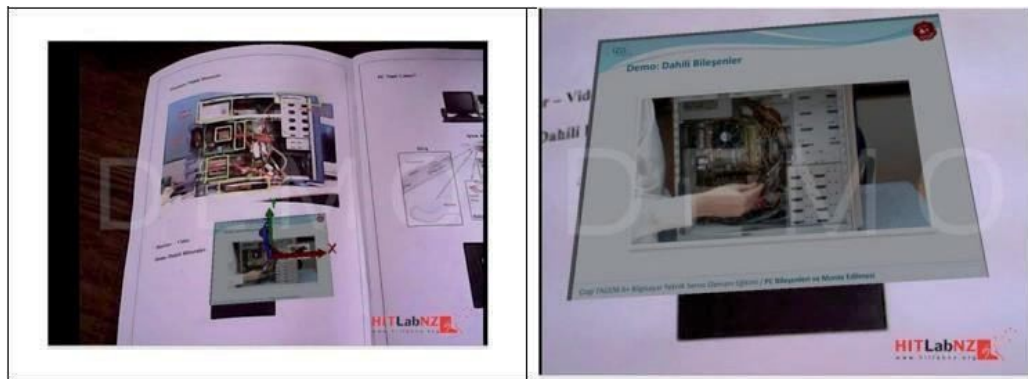


Figure 1. Augmented reality application book sample.

In their study, Almusawi et al. [14] examined innovation in physical education: instructors' perceptions on wearable technology integration readiness. The study is a case study with 38 public school physical education teachers participating in semi-structured interviews. In the study, the following scheme was used: (Figure 2).

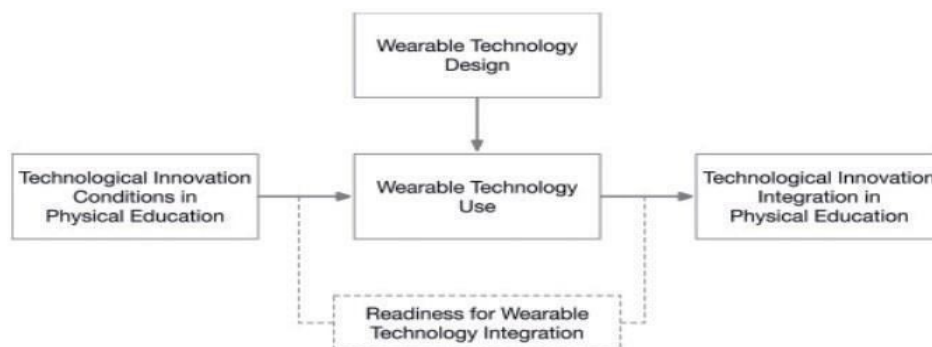
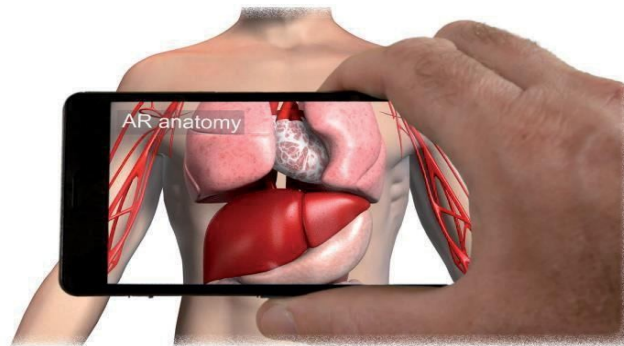


Figure 2. Augmented reality application book sample.

Physical education teachers are concerned about the design features of wearable technology, such as material design and device suitability for physical education, according to the research. To address these concerns, it is proposed

that wearable technologies that provide comfort, enhanced wearability, and injury prevention in physical education be used to create innovative learning environments that impact technology through collaborative, competitive, engaging, and evidence-based learning experiences.

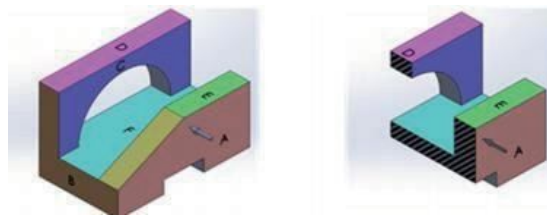
The prevalence of research in the literature indicates that augmented reality technologies have recently been employed often in medical education. When all of the relevant research in the literature are looked at (Figure 3).



**Figure 3.** Use of augmented reality technologies in medical education

### 3. RESULT

Augment is an ARCore-based mobile software that allows users to view 3D models in Augmented Reality, in their actual size and context, in real time. In their research looked into the effects of this application on technical drawing education. The data collected as a result of the usage of Augmented Reality technology in the technical drawing course from 2015 to 2016 was evaluated. As a result of the pre- and post-tests used in the survey, it was found that the students comprehend and accept Augmented Reality technology, which is a modern educational tool, and that this technology boosts their interest in the lesson (Figure 4).



**Figure 4.** Technical drawing with 3D modeling with AR technologies.

The Google Translate app presently provides text translations in 103 languages, offline translations in 52 languages, and augmented reality translations in 30 languages, according to Google. Google Instant camera translation aims to make users' lives easier with its smartphone translation software; it now supports a total of 88 languages, with the addition of 60 additional languages such as Arabic, Hindi, Malaysian, Thai, and Vietnamese (Figure 5).





Figure 5. Augmented reality-based Google translate app.

SketchAR, an application that mixes augmented reality with drawing, has recently become one of the most popular among artists. SketchAR, which is essentially a drawing app for artists, certifies that digital works generated by artists are unique and original, allowing them to be acknowledged as NFT (data unit). SketchAR, a Lithuanian project created in 2017 by Aleksandr Danilin, Alexander Danilin, and Andrey Drobitko, provides a unique sketching experience to its customers by merging augmented reality technology with drawing, as well as artificial intelligence help (Figure 6).



Figure 6. Drawing courses with SketchAR

## 4. CONCLUSION AND DISCUSSION

This study includes a thorough examination of augmented reality settings and applications that are frequently employed in the design of learning and teaching environments in the education sector as part of the digitalization process. As a result of the research's findings, different tools and resources have begun to be employed in teaching

methods as a result of the advent of technology into educational contexts. In this context, it can be seen that the use of mobile tools and applications in learning environments has recently become more widespread. With the rapid advancement of mobile technologies, new media environments with more interactivity provide a growing range of services to users. Technology that provides "Augmented Reality (AR)" is one of the places where this interaction is provided and which can connect things in virtual surroundings with real ones. Virtual objects can be placed on real-world photographs using these technologies. A camera, computer infrastructure, a marker, and actual objects are among the AR instruments.

The education industry is one of the most important areas where augmented reality technologies are applied. Augmented reality applications aid students in comprehending abstract concepts during the learning and teaching process, as well as providing environments in which students can share information with one another. Furthermore, research in the literature have shown that these environments considerably improve students' learning. Furthermore, it was stressed that augmented reality boosts students' interests, motivations, and experiences in the field of education, as well as aids in the transfer of knowledge and skills learned in the virtual environment to real-world situations. In this regard, the most important recommendations of this study are to increase the use of learning environments of augmented reality settings and applications, where the usefulness of their use in education has been determined to this degree, at various levels and course topics.

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