Augmented Reality Technology in Education

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Abstract
Augmented reality technology has entered the field of education, and augmented reality is one of the innovations of technology. The educational institutions that allow uniqueness and enrichment of educational jobs through feeding them with many different sources and alternatives, which constitute an integrated combined methodological unit aimed at achieving ideal learning that is characterized by a large degree of effectiveness, efficiency and mastery and supports the learning process through its new and different by adding audio, 3D, and video. This technology transmits information by adding a new virtual image (audio visual information) to the still image (the real world) and this allows the learner to interact with this technology by dealing with additional information or objects that are displayed in the real world. In this paper, the proposed method for promoting and supporting the traditional method of teaching and converting difficult and complex materials into easy materials is presented easy to understand and memorize, which is called Technology Enhanced Learning (TEL). In this technique is produced virtual elements such as explanatory video, audio and three-dimensional shapes, these elements are stored in the database and linked to the note in the study material created when the learner focus the phone camera towards the mark, then camera picks up the mark, and opens the default elements on the phone screen.

Keywords: Augmented reality, virtual reality, marker, Traditional education.

1. Introduction
The development of educational systems has been linked in most of its forms to the development of modern technologies. The success of these systems depends on the optimal use of modern technologies in society informatics, knowledge economy, technology integration, and e-learning[1]. The development of information and communication technologies has had an impact in activating the operations of the scientific program theories and modern trends in the field of teaching and learning methods and strategies and their development to help prepare new generations better able to face the developments of the times and challenges the future[2]. There are some important trends that underpin the development process, including: Developing a role positive student and his ability to participate, research and self-reliance. And necessity developing teaching methods and strategies, and using modern teaching strategies that depend on employing modern technologies in the educational process undoubtedly [3], the best type of education is one that generates the yearning for knowledge and it makes
the learning process more fun and more lively with a few traditional lectures many of the projects, readings, and learning insights center around the student, not the teacher [4]. And with the greater the use of modern technology in the educational process, the greater the number of teachers who are they want to teach their students creative ways the employment of modern technology in the educational process is a prerequisite for a qualitative shift in objectives to be achieved,[5] so that the focus is on providing the learner with a set of skills suitable for the information age, including self-learning skills informatics skills and the skills involved in dealing with technical innovations[6].With this technological development, the concept of Augmented Reality (AR) emerged as a modern technology based on learning digital Augmented Reality is a composite display that combines the real scene a user sees the computer-generated virtual scene, which enriches the scene with additional information,[7] The user feels that he is interacting with the real world, not the virtual, with the aim of improving cognition sensory user. AR is known as an interactive system that allows users by interacting with the virtual world and the real world at the same time [8].

2. Related work

Many of studies contributions have been achieved to used AR in educations, some of them are:-

In 2016 Ahmed and Islam [9], aimed to identify the effectiveness of the use of a program based on the development of skill in thinking of students and the results of the study pointed to the existence of statistical differences between the grades of students between students who rely on AR and students who rely on the traditional method and also pointed out that the program based on AR achieves high effectiveness in developing students' thinking skills.

In 2018 Muhammad Fahim Ghaleb [10] aims to know how to use augmented reality technology in learning the Arabic language and its topics and skills that students can learn using technology, and researchers believe that augmented reality is appropriate for them to be used in presenting Arabic language materials because of their positive properties and their ability to Combine 3D shapes, videos, animations, recording sounds and slide shows within the selected unit.

In 2019 Juan Garzon et al [11], conducted a study to demonstrate AR technology in educational environments. However, these studies have analyzed important issues such as the effect of AR on education their study provides a literature review that covers 61 studies published between 2012 and 2018, the results indicate that AR has a high impact on learning effectiveness. The most important advantages of AR systems
in education are learning gains and motivation. Given the obvious multiple benefits of using AR systems in educational environments

3. Augmented Reality Technology

Augmented Reality Technology differs from virtual reality [12], which the user enters into an industrial environment in it, he can see the real world. Augmented reality complements reality rather than substituting it completely about it by merging a part of the virtual world with the real world three-dimensional (3D) [13]. According to the augmented reality technology, there are several types of it, each with different differences in its objectives and use cases as follows:

1. Marker-based augmented reality: Programs based on this type are often based on open source technology and use a camera and optical mark to determine the center, orientation and set of spherical coordinate system. It is the type used in the current study [14].

2. Marker less-based on Augmented Reality: and is currently one of the best tracking technology, as it implements a set of active tracks that recognize information spread in the real environment without using Special signs [15]. It is also called site-based, position-based, and uses a system GPS, digital compass, speedometer, or acceleration which is embedded device to provide data based on your location, like directions maps, find nearby companies, and other location-focused mobile software.

4. Methodology

The goal of augmented reality is to experiment in visualizing virtual information in the original (real) world. The Augmented Reality system works with the AR Core library, which also calculates the location and size of the 3D object. smart phone is allowed to estimate lighting by estimating the current lighting conditions, and motion tracking allows the smart phone to understand and track its location relative to the world and allows the object to rotate, zoom in and out as shown in Fig.1. The Augmented Reality methodology consists of the following units:-

1. Camera smart phone
   Android smart phone's camera captures the 2D image that is present in the real world and scans marker, the camera component is the input unit of the AR system.

2. Capturing Module
   In this unit, image acquisition and object capture are obtained.

3. Tracking Module
   Here the object is traced by calculating the location and direction of the object in the tag in order to identify the object

4. Render Module
This unit is the heart of the augmented reality system, it specifies the virtual components that will be placed, presented or merged with the original image, and the results of augmented reality are displayed on the phone screen.

![Architecture Block diagram of AR System](image)

5. Results

Augmented Reality system was tested on primary school students especially on the first stage students. They were divided into two groups: group A is taught in the experimental way by applying the AR system, and group B is taught in the traditional way. All results are obtained by real testing and then used to compare it with the students are learned in the traditional education. See the table(1.1) Augmented Reality is a stimulating way for students to achieve the required educational goals through AR technology, which has left a positive
impact on students' attitudes towards the educational process, and many results have been achieved, including, see Fig. 2. Augmented Reality in the educational process succeeded in saving many students and families from private teaching and spending money or if parents are unable to educate their children or because of their working conditions, with Augmented Reality the student will be able to rely on himself / herself for the videos, images, texts and

![Diagram](image)

**Fig. 2: Comparison of AR and traditional education students**

The following table (1.1) shows the percentage of satisfaction between the AR method and the traditional method for every student:

| Study way | Stu.1 | Stu.2 | Stu.3 | Stu.4 | Stu.5 |
|-----------|-------|-------|-------|-------|-------|

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6. Conclusions

From the above discussion we can say the Augmented Reality system is rapidly evolving and presenting and commensurate with most of the study materials, and help to achieve the required education and create educational activities that support teaching and learning and achieve its goals and perhaps we can call the technology of Augmented Reality: technology educational future. Augmented Reality technology is assisted our country in COVID19 to learn pupil without attend to real class.

7. Work in The Future

Some suggestions and recommendations that can be taken in the future: -
1. The need to use augmented reality technology in the educational process and develop it in proportion to the Iraqi curricula, especially the materials that need clarification.
2. Holding training courses for teachers to train them on how to use the AR system in the educational process.
3. Develop the augmented reality system by adding a button to share and ask questions and comments.

8. References

1. L.S. Rodrigo Silva, “Introduction to augmented reality “
   [http://virtual.lncc.br/~rodrigo/links/AR/node19.html](http://virtual.lncc.br/~rodrigo/links/AR/node19.html)
2. Al-Suhaim, Anood Ibrahim, “Employ augmented reality in the educational process (educational vision)”. International Conference on E-Learning Technology and Techniques. Sharjah, United Arab Emirates, 2016, Oct
3. Obari, Al Hussein (2015, August,18), “What is augmented reality technology? What are their applications in education? “Retrieved 17, March, 2017. From [http://www.new-educ.com/tech-augmented-in-education](http://www.new-educ.com/tech-augmented-in-education)
4. Iulian Radu, “Augmented reality in education: a meta-review and cross-media analysis- 2014.”
5. Tosti H. C. Chiang, Stephen J. H. Yang and Gwo-Jen Hwangin, 2014 “An Augmented Reality-based Mobile Learning System to Improve Students’ Learning Achievements and Motivations in Natural Science Inquiry “
6. Jorge Bacca, Silvia Baldiris, Ramon Fabregat, Sabine Graf and Kinshuk, “Augmented Reality Trends in Education: A Systematic Review of Research and Applications 2014”.
7. Ahmed and Islam 2016 ,” effectively use a program based on augmented reality technology in the development of thinking skills of students Al -Azhar University”
8. Al-Suhaim, Anood Ibrahim (2016) “Employ augmented reality in the educational process (educational vision)”. Paper presented to the International Conference on E-Learning Technology and Techniques. Sharjah, United Arab Emirates. Ahmed and Islam 2016,” effectively use a program based on augmented reality technology in the development of thinking skills of students Al -Azhar University
Muhammad Fahham Ghaleb  & Inborn Noor Al-Ain Nordin Employing reality as an enforcing technic in learning Arabic Memanfaatkan unsur realiti sebagai satu teknik dalam pembelajaran Bahasa Arab – 2018

Juan Garzón, Juan Pavón & Silvia Baldiris “Systematic review and meta-analysis of augmented reality in educational settings”

Anthes, Christoph & García Hernandez, Rubén & Wiedemann, Markus & Kranzlmüller, Dieter. (2016). State of the Art of Virtual Reality Technologies. 10.1109/AERO.2016.7500674.

Anuroop Katiyar, Karan Kalra and Chetan Garg 2015, Marker Based Augmented Reality.

Y. Genc S. Riedel F. Souvannavong C. Akınlar N. Navab, Marker-less Tracking for AR: A Learning-Based Approach.

Mark Billinghurst, Adrian Clark, and Gun Lee, 2014, A Survey of Augmented Reality.