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The Effectiveness of an Educational Environment Based on Augmented Reality in Developing the Motivation for Achievement among Female Students of the University of Jeddah

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ABSTRACT

In response to the demands of digital transformation in the Kingdom of Saudi Arabia, Vision 2030, which aims to improve education and provide future jobs, and depends on production, technical skills and the speed with which they are acquired, this research was conducted. The researcher used the two approaches (descriptive and quasi-experimental with an educational design based on one group with measurement (before / after) the first group test before the post-test) to achieve the objectives of the research and answer its questions. The research community consists of all female students of the College of Computer Science and Engineering in the Department of Information Systems and Technology - seventh level - at the University of Jeddah for the second semester 1440-1441 AH. The number of (35) students enrolled in the human-computer interaction course. The study found an interactive effect between an educational environment based on augmented reality and the development of the achievement motivation skill among female students of the University of Jeddah.

Keywords: Augmented reality, Achievement motivation, Technology, Education.

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1. Introduction

The current era has witnessed a scientific and technological revolution that has had a wide-ranging impact on human existence, including education. The use of digital technology in education is critical for teaching abstract vocabulary, which is difficult to teach in traditional education. Where the devices of educational patterns from traditional education, especially individual learning and self-learning, provide solutions to the challenges facing the educational process.

Augmented reality technology is a technological development that enables the real-time display of computer-generated virtual image information within the immediate and indirect real-world surroundings. It also has a significant impact on the location and timing of education and training.

Motivation is also one of the most fundamental and important issues in psychology, both in theory and in practice, because it is the driving force behind many activities. Motivation changes people's existing experiences and provides them with new ones; thus, it can be considered as potential energy that must be present for learning to occur. More recently, learning theories aspire to relate knowledge, motivation, and the social context in which learning processes occur in order to improve participation in the educational process within technology-based contexts. Previous research has shown that motivation influences choices and enhances efforts and energy on the part of students and teachers to reach a specific goal.

Several studies have discovered that virtual reality has the ability to enhance achievement and motivation, improve performance, and enhance communication and cooperation among learners. Due to sensory, visual, and auditory stimulation, augmented reality technology is one of the vital educational settings that attempt to increase achievement motivation. As a result, it helps students immerse themselves, stimulating and arousing the interests of the product, making them accept their learning activities with enthusiasm. According to Ahmed and El-Sayed (2017), it is crucial to build a 3D environment in accordance with the standards of technological education in order to take care of the development of self-regulatory learning skills and stimulate achievement.

In pursuit of applying the acquired knowledge in solving new problems and innovations by allowing learners to modify and develop ideas for the purpose of improving education, by relying on educational development methods built by the University of Jeddah in the College of Education to achieve universality. Quality standards in the teacher preparation program and the integration of information technology, assistance and technical support.

1.1 Research Problem & Questions

According to the recommendations of educational conferences such as the Ninth International Scientific Conference in Egypt (2012), the Fourth International Conference on E-Learning in Riyadh (2015), the Fifth Conference for Teacher Preparation at Umm Al-Qura University in Riyadh (2016), and the International Conference on Education Evaluation in Sharjah (2017). (2018). All of the aforementioned conferences emphasized the importance of utilizing new and

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contemporary technological breakthroughs, as well as ways to benefit from them, in the field of education in order to enrich digital content.

As well, during her work at the University of Jeddah, the researcher saw a dearth of courses in most colleges that are in line with the current and future requirements of the era, technology and digital transformation of productive abilities, and the construction of digital educational settings. Since a result, it was discovered that using augmented reality technology is significant in developing students' motivation to achieve using augmented reality employment in Saudi educational settings, as no study that contains this research topic was found. As a result, the current study sheds light on the usefulness of an augmented reality-based educational environment in building the skill of accomplishment motivation among female students at the University of Jeddah. The primary goal of the study was to address the following question:

What is the usefulness of an educational environment based on emotional reality in developing the skill of achieving motivation for female students at the University of Jeddah?

It leads to the following sub-questions:

1. What is the image of the augmented reality-based educational environment in building the skill of accomplishment motivation for female students at the University of Jeddah?
2. How does an augmented reality-based teaching environment affect the growth of achievement motivation among female students at the University of Jeddah?

1.2 Research Aim and Objectives

This research aims to investigate the usefulness of an educational environment based on emotional reality in developing the skill of achieving motivation for female students at the University of Jeddah.

The main objectives that the research seeks to cover are:

- Investigate the image of the augmented reality-based educational environment in building the skill of accomplishment motivation for female students at the University of Jeddah.
- Investigate how an augmented reality-based teaching environment effects the growth of achievement motivation among female students at the University of Jeddah.

1.3 Research Significance

The significance of the current study is demonstrated by the importance of the factors it addresses, which are the abilities to generate motivation for achievement.

Theoretical significance

- The current study may be useful to faculty members in developing students' learning and producing skills in various courses.
- It may also contribute to the enrichment of educational literature, which tends to use augmented reality to better the educational process.
- In addition to delivering advanced scientific solutions to decision makers on various university education issues, such as institutions keeping up with technological changes in a framework that mirrors reality.

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In terms of practical significance:

- It is possible that the current study will id in the improvement of the learning environment that fosters creativity and innovation.
- Providing education and training programs that are up to date with current advancements and needs.
- Providing education and rehabilitation programs that are appropriate for development and the work market.
- Offering education and training programs that meet the needs of the Fourth Industrial Revolution.

1.4 Research Key-terms

A virtual educational environment: is a collection of educational tools and content available on the Internet that allow students to connect and communicate with their peers and teachers at any time and from any location.

Augmented reality: is the technique of merging digital data for real-world reality in the form of digital media, allowing interaction via portable electronic devices and working to increase students' fun and creativity.

Achievement Motivation: is a state of mind that a student has that drives and inspires him to carry out his educational and cognitive responsibilities, allowing him to attain his goals.

2. Literature Review

This section discusses the research, which includes the theoretical foundation and past studies. The study focuses on two themes. The first is augmented reality-based instructional environments. The second topic is the achievement deduction. Finally, the theoretical framework will include a collection of previous studies that support the current research topic.

2.1 Augmented reality-based learning environments

2.1.1 Augmented reality Definition

The virtual learning system is one of the most modern educational instruments for organizing and facilitating instructional situations at all levels of education. The educational environment is also one of the most essential variables influencing learners' knowledge and skills acquisition.

The educational environment is defined as the school atmosphere, which comprises all instructional instruments and materials, and it works to establish skills and concepts for pupils. The value of virtual learning has also become apparent, particularly during the Corona pandemic.

Virtual learning environments include a variety of tools and software packages designed to assist teachers in managing the various educational processes. This is accomplished through electronic communication between students and professors via Internet networks and portable electronic devices.

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2.1.2 Components of virtual educational environments virtual learning environments systems

2.1.2.1 Virtual learning environments systems

Systems that enhance and support the educational process can be found in virtual learning environments. Among these systems are the following:

1) A Learning Management System (LMS) is a collection of tools that are used to plan, monitor, and evaluate educational activities.

2) A Learning Content Management System (LCMS) is a software program that develops and manages virtual educational content.

3) Learning Activities Management System: These programs create an ideal environment for interaction and involvement for students and teachers.

4) E-learning environments of the second generation: It is a free environment in the Kingdom of Saudi Arabia that combines the use of social networks and personal learning environments, such as learning agents and (ACADOX).

5) Social Learning Networks: These are programs that use social networks to publish and manage learning resources. They are built on splitting students, assigning them tasks, and monitoring their progress.

6) Personal learning environments: allow students and teachers to select the tools that are best suited to their needs for publishing and managing educational information.

7) 3D Virtual Learning Environments: instructional content is uploaded and shown via a barcode on mobile devices in an augmented reality platform.

2.1.2.2 Interactive authoring software

This software enables students to record educational lessons in the form of video clips, design interactive educational software, and conduct electronic tests, such as adobe Flash and Adobe Captivate.

2.1.3 Characteristics of virtual educational environments

Share your knowledge and experiences.

- Education through indirect means. - Real-life experience simulation.
- Immersion via programs and tools that operate on various virtual networks.
- The educational institution and teachers ensure control of the educational process.
- Privacy and confidentiality are guaranteed.
- A collection of tools and systems is hidden beneath the surface.

2.1.4 Advantages of virtual educational environments Possibility to perform multiple activities

- A virtual environment is an excellent option for learning and training.
- Giving pupils interactive and educational control, which improves their learning experiences.
- Increase your drive and enthusiasm in learning.
- Assist in continuing to learn.
- The freedom to choose when and where to learn.
- Creates a lively, exciting, and suspenseful atmosphere.

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- Encourages students' inventiveness.

2.1.5 Forms and uses of virtual educational environments

As virtual environments include tools to enhance the learning process, they give technology that is a crucial support for achieving this form of education. It also offers the student a choice of virtual learning environments in which he can think about and visualize abstract subjects that are difficult to study in real life.

Virtual games, virtual theaters, virtual laboratories, training rooms, virtual space, virtual courts, virtual criminals, virtual universities, virtual study libraries, virtual conferences and meetings, virtual museums, and virtual educational environments are all examples of virtual environments used in education and training. Azmy Sharaf El-Din (2013) and Sharaf El-Din (2013) (2015).

2.1.6 Learning theories in virtual educational environments

According to Nofal (2010), Al Yazigi (2015), Halfawi and others (2017), the virtual learning environment is the best environment for implementing most educational theories, and these theories are depicted in the Figure (1) below:

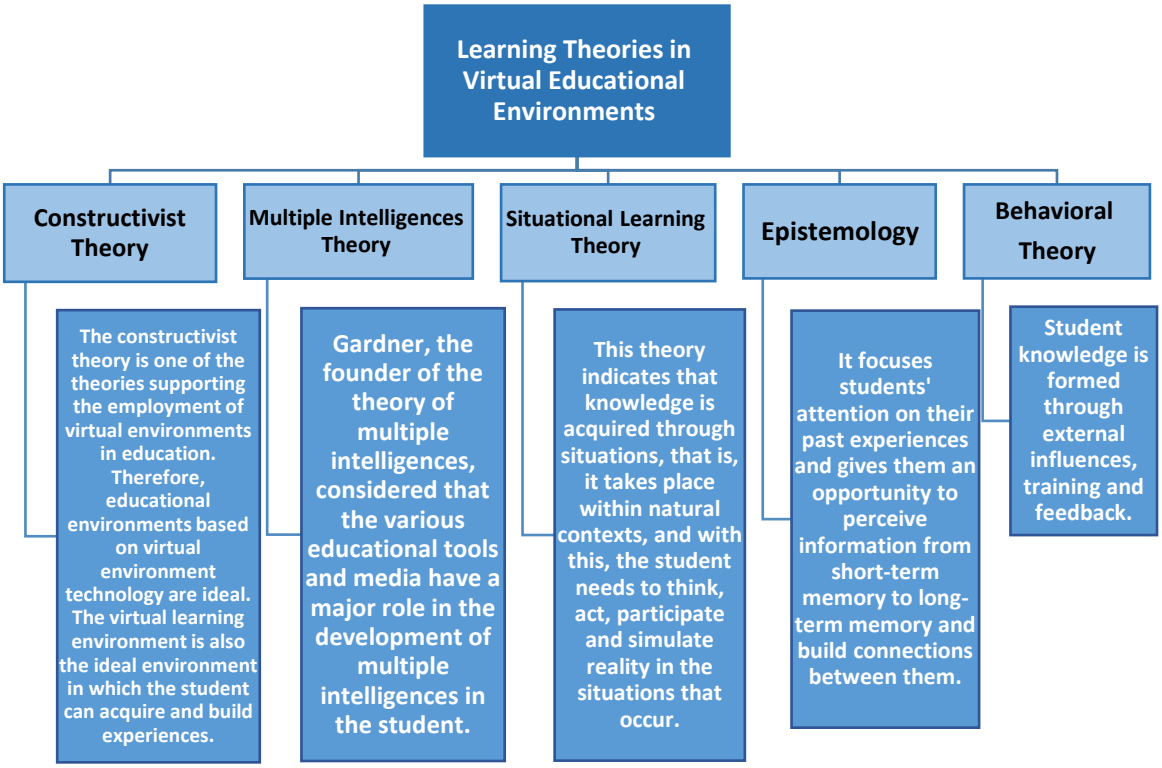

Figure (1): Illustrating Learning Theories in Virtual Educational Environments

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2.1.7 Learning strategies in a virtual learning environment

Learning strategies in virtual environments do not differ from those in real learning environments, so learning methods and strategies in virtual environments vary according to the diversity of virtual environments. Here are the most important strategies:

- Active learning - Simulation - Cooperative learning
- Role play - Problem Solving - Discovery based learning

2.2 Augmented Reality

Since the late nineteenth century augmented reality began to appear, after which developments continued in the technology of augmented reality, and it was used by many companies for simulation, training, international seminars, and others. It has been shown that augmented reality helps to increase interactivity and mix between virtual realities in a real environment, facilitates complex procedures, provides clear and accurate information, helps students in solving educational problems, and provides the element to be clarified in explaining abstract terms. Augmented reality is defined as a 3D technology made through a composite rendering that integrates the real scene seen by users and a computer-generated virtual scene that multiplies the scene with additional information.

There were many experiments that centered on augmented reality technology to benefit from it in the educational process. There were foreign experiences such as the American experience at East Carolina University and the Spanish experience. As for the Arab experiences, they were like the experience of "Adnan Al-Ahmadi" and "Wafa Al-Wadhyani". All of these experiments concluded that the application of augmented reality effectively contributes to encouraging students to be creative and innovative by developing their various skills and their motivation to achieve.

2.2.1 Augmented reality features

- It provides a suitable learning environment.
- Motivates students to discover.
- Increase understanding of educational content.
- It encourages students and increases their motivation.
- Promotes cooperation between students and teachers.

2.3 Achievement Motivation

Many experts are interested in achievement motivation since it is the primary driver of human behavior. According to a group of scientists and researchers in previous studies, achievement motivation is the sufficient desire and willingness on the part of the student to achieve a specific goal or task. Motivation for achievement assists the student in directing his conduct, being aware of events, integrating into the educational process, comprehending self-behavior and the behavior of others, and performing at a high level owing to enjoyment while doing it. However, three major components are required for it to happen: (cognitive motive, self-motivation, and affiliation motive).

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2.4 Previous studies

Virtual educational environments

Marwa Hassan Study (2012)

This study aimed to prove the effectiveness of a three-dimensional learning environment, and to show its impact on educational technology students and to measure their attitudes towards it. The researcher used the experimental and descriptive approaches to achieve the objectives of the study, and the research was applied to 25 students. The study concluded that interest in designing and building virtual learning environments in university and pre-university education is necessary to obtain distinguished academic levels.

Samiha Al-Zahrani Study (2017)

This study aimed to reveal the effectiveness of using the proposed electronic programs based on the virtual environment in acquiring the skills of designing and employing infographics for primary school teachers. The study used the descriptive and experimental approaches, and the study concluded that electronic programs based on the virtual environment have great effectiveness in developing the skill side of employing infographics in education for primary school teachers.

Mohamed Abdel Wahab (2018)

This study aimed to identify the effectiveness of using a virtual learning environment in developing the cognitive and skill side of some scientific research skills among graduate students at the Islamic University. In this study, the researcher used the quasi-experimental method, which consisted of a sample of 56 students. The study found that there are differences between students who studied in the traditional way and those who studied using the virtual environment.

Augmented reality studies

Wedad Al-Shethry Study (2016)

This study aimed to identify the effect of using augmented reality technology on the achievement of secondary school students in a computer and information technology course in Riyadh. The study found a positive effect of teaching using augmented reality technology on the academic achievement of female students in the secondary stage of the computer and information technology course.

Hussain Paysen and Arkan Pal Study (2016)

The study aimed that learning using augmented reality in the classroom affects students' opinions. The researchers selected a sample of 97 university students. The results of the study found the students' opinions affected by the teaching methods and the content of augmented reality in a positive way in the classroom. The students also believe that using augmented reality in the classroom makes learning more enjoyable.

Motivation for achievement studies

Estapa and Nadolni Study (2015)

It aimed to identify the impact of augmented reality on the achievement and motivation of students in mathematics lessons. The researchers also used the quasi-experimental approach, and the sample consisted of 61 high school students in the United States of America. The study concluded that the use of augmented reality in

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mathematics education increases students' achievement as well as increases students' motivation, interaction and interest.

Abdul Raouf Ismail study (2016)

The study aimed to identify the effectiveness of using the technology of augmented reality, projective and planned in developing the academic achievement of computer networks course among students of educational technology. The researcher used the quasi-experimental method, and the study sample consisted of 60 male and female students. The study found that there are differences in the achievement of male and female students and the increase in their effectiveness towards learning between students in environments that use augmented reality and traditional learning environments.

3. Methodology

Research tools

In order to achieve its objectives, the current research relies on the following two approaches:

Descriptive analytical method:

This approach was used in the current research in the phase of study and analysis of the research literature, and research that dealt with virtual educational environments, and augmented reality technology to improve the educational process, and the use of augmented reality in developing the achievement motivation among students, and the motivation for achievement.

The quasi-experimental curriculum with an instructional design based on one group with measurement (pre/post) One Group Pre-Post Test:

The current research used the quasi-experimental approach with an educational design based on one group with measurement (pre/post). This is shown in table (1) below:

Post-test	Processing method	Pretest
A cognitive test to measure the cognitive aspects of achievement motivation skills.	Exposure to the augmented reality educational environment + continue in the lecture	A cognitive test to measure the cognitive aspects of achievement motivation skill.
A follow-up card to measure the performance aspect of achievement motivation skills.		
Skill score card for achievement motivation .		
A measure of achievement motivation		A measure of achievement motivation towards achievement motivation

Table (1): Illustrate the Post/ Pre tests where the skills of achievement motivation are taught to the group

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The experimental curriculum with an instructional design based on one group with measurement (pre/post); One Group Pre-Post Test; where the skills of achievement motivation are taught to the group, through the educational environment based on augmented reality. As the cognitive test and the achievement motivation scale were applied before and after the research group, while the follow-up card and the achievement motivation assessment card.

A measure of students' achievement motivation

The achievement motivation scale towards three-dimensional environments was built after reviewing many literature that dealt with measures of attitudes, and how to construct them.

Achievement Motivation Scale Content

The researcher reviewed many literature that discussed the preparation and construction of the achievement motivation scale in order to identify the axes and expressions of the scale, which consisted of four axes (perseverance, goal setting, level of ambition, perceived efficiency). To accomplish this, the researcher used Liker Type model of five scale (strongly agree, agree, neutral, disagree, strongly disagree). The instructions for the achievement motivation scale have also been prepared clearly and specifically, where the researcher clarified on the first page of the scale the name of the scale, its purpose, and the instructions for answering it, such as: placing a mark **(√)** in only one of the five response boxes that the student finds appropriate and expresses them; There is no right statement, or wrong statement; The aim of the scale is to know the tendencies and abilities, not the test, and the meaning of each response was clarified: response (strongly agree) means strong agreement with the statement, response (agree) means approval only of the statement, response (neutral) means that there is no agreement with the statement and that There is no disagreement with it, response (disagree) means disagreement with the statement, and response (strongly disagree) means strong disagreement with the statement. An example was also developed showing how to respond to the scale, specifying the time needed to respond, and warning not to leave any statement without a response.

The research community

The research community consisted of all female students of the College of Computer Science and Engineering in the Department of Information Systems and Technology - Level Seven - at the University of Jeddah for the second semester 1440-1441 AH, and those registered in the human-computer interaction course, and their number is (35) students, divided into two divisions, according to the information obtained.

Validation of the cognitive test

The validity of the test is verified if it proves its ability to measure what it was designed to measure as follows:

1. Content Validity

The validity of the content is verified from the test items prior to application, which determines the test's quality in terms of linguistic construction, vocabulary appropriateness for the age stage, school stage, target objectives and their representation of the target structure, and procedural definitions.

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2. Trustees Validity

This type of honesty was based on the opinions of the students, where the students explained the clarity of the test instructions, the clarity and appropriateness of the questions and their achievement of the research objectives, their comprehensiveness, the diversity of their content, and the evaluation of the level of language formulation and output. In addition, they could provide feedback as they saw fit with regard to modification, addition, or deletion SPPS tool is used for this.

4. Research Results & Discussion

Question (1): "What is the image of the educational environment based on augmented reality (AR) in developing the skills of achievement motivation among female students of the University of Jeddah?"

The proposed augmented reality educational environment is designed in accordance with the standards of the augmented reality educational environment and using educational design models. The researcher used the criteria of Al-Swaify and others (2018) to create an augmented reality learning environment, and for educational design, and it became clear that most of the basic stages of design and production processes in most educational design models for virtual environments are consistent with what is secondary. Differences according to the type, shape and capabilities of the virtual environment. The researcher used the "Aql" model (Aql, 2017) with the addition of some features of augmented reality (p. 124).).

Question (2): "How does an augmented reality-based teaching environment affect the growth of achievement motivation among female students at the University of Jeddah?"

Validating the hypothesis of the study, which states, "there is no statistically significant difference at the level of significance (α≥0.05) between the mean scores of the female students (the research sample) in the pre and post measurement of the achievement motivation scale."

To achieve this, the researcher used the Kolmogorov-Smirnov Z test. The Paired Samples Test (T) was also used. Cohen's equation (d) was also used. Based on the above, the answer to the question was determined: What is the effectiveness of an educational environment based on Augmented Reality in developing the motivation for achievement among Jeddah University students?" The null hypothesis was rejected, which stated: "There is no statistically significant difference at the significance level (α≥0.05) between the average scores of the female students." (Research sample) in the tribal and remote measurement of the achievement motivation scale." The alternative hypothesis was accepted, which states: "There is a statistically significant difference at the significance level (α≥0.05) between the mean scores of the female students (the research sample) in the pre and post measurement of the achievement motivation scale."

5. Conclusion & Recommendations

The current study demonstrated the correlation of its aims with the primary axes of Vision 2030 by using an educational environment based on augmented reality to acquire the abilities of constructing three-dimensional settings. The educational

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environment based on augmented reality was found to be beneficial in developing accomplishment motivation towards the construction of three-dimensional settings among female students at the University of Jeddah in this study. The current study found statistically significant differences at the significance level (0.05) between the average scores of information systems and technology students (the research sample) in the two applications, before and after, of the achievement motivation scale towards the production of three-dimensional environments, at the total score of the scale, in favor of dimensional application.

Recommendations

Based on the findings, the current study makes the following recommendations:

1- Holding workshops and training courses for faculty members in certain areas; developing motivational strategies for achievement.

2- Providing infrastructure in select specialized institutions, as well as updating computers in laboratories in compliance with manufacturing program standards.

3- Using augmented reality-based educational settings to teach complicated and challenging productive skills; due to its effective impact on the development of many cognitive and performance characteristics.

4- Using current research findings to activate educational environments based on augmented reality to teach productive abilities in some academic areas.

1. 5- Making use of current research in the production of educational content for usage in augmented reality educational environments.

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