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Attitudes of Learning Disabilities Teachers towards Use of Augmented Reality Technology

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Abstract

The study aimed to identify: the attitudes of learning disabilities teacher's towards using augmented reality technology as a means to facilitate learning process for students with learning disabilities in the Eastern Region of Saudi Arabia and the extent effect of variables (i.e. gender, qualification, experience) on the attitudes of learning disabilities teachers towards using augmented reality technology. To achieve the objectives of the study, a descriptive approach by the researcher through using a questionnaire as a research tool to measure the teachers' attitudes towards the use of augmented reality technology. A sample was 148 learning disabilities teachers, males and females, was selected randomly from the Eastern Region of Saudi Arabia. Concerning statistical techniques used, the research tool was standardized using Cronbach Alpha and Pearson Correlation Coefficient, and other techniques such as Frequencies (F), Percentages (P), Means (M) and Standard Deviations (SD) were then calculated. Based on data analysis, the study revealed a number of findings, most notably: The attitudes of using augmented reality technology by the resource room teacher were positive from the sample's point of view positing ,there were no statistically significant differences between the attitudes of resource rooms teachers towards the use of augmented attributed to the variable of gender; there were no statistically significant differences between the attitudes of resource rooms teachers towards the use of augmented reality attributed to the variable of qualification; and there were statistically significant differences between the attitudes of resource rooms teachers towards attributed to the variable of experience in favor of 1- 5 years.

Introduction

Current era is witnessing a huge progress in education field that goes straight in line with the rapid development that we have in various aspects of life, as it was necessary to teach students the requirements of this era.

Recently, the educational process is searching for modern educational methods and technologies, to combine them with traditional education in the classrooms. This will contribute to make the learning process more advanced, more enjoyable and interesting for the student.

In the recommendations of the first scientific conference of the Arab Society for Educational Technology, it was stated that it is necessary to benefit from local and international experiences in technological development and applications of education and communication technology to improve the educational process, as well as to establish model centers in universities to train teachers on the latest technological application models (Nofal, 2010). Electronic Learning is the modern revolution in educational methods and technologies, which harnesses the latest technology in terms of hardware and software in educational processes, starting with the use of electronic means to deliver lessons in the traditional classroom and using multimedia in educational processes, and ending with building learning environments. Virtual education is that education that relies on the use of electronic media in communication between teachers, learners and the educational institution, and there are many terms to denote this type of education, including virtual reality or augmented reality (Al-Baghdadi, 2011; Alper et al., 2021; Brown et al., 2020; Flynn-Wilson & Reynolds, 2021; Hutson & Olsen, 2021; Johnson & Westbrooks, 2021; Kozcu Cakir, Guven, & Celik, 2021; Tucker et al., 2017).

One of the electronic education forms begun to appear is education by means of augmented reality technology, as this technology represents an advanced technology in the classroom, as this technology provides virtual scenes of the lesson in the student's real classroom environment. Anderson (1989) indicated that those who have good knowledge of the subject are in need of an appropriate technology to convert it into a learnable material. Shulman (1986) argued that it is not sufficient for a teacher to have good teaching skills in order to be an effective teacher, but rather he must use successful teaching techniques to convey information and clarify it to learners.

Whereas teachers of learning difficulties in resource rooms are indispensable for using easy-to-use teaching aids for the process of teaching this class, the use of augmented reality technology is an appropriate option that touches the student's learning difficulties' worlds and his imaginations, and simulates his sensory experiences through the use of special and high-quality techniques and means that contribute to achieving learning objectives to be achieved with the student. It is noticeable that the augmented reality technology has great benefit in education, especially when teaching some information that is difficult to understand for students with learning difficulties, as it is possible to enter the sound on the static and moving three-dimensional image so that the student can simulate the learning process of the lesson in the classroom environment.

Research Problem

Students with learning difficulties are among the most important groups for which it is necessary to activate and use modern technology with them, as it is known that these students face difficulty in learning in the normal and traditional way of explaining as their peers, but they need tools and tools that simplify the learning process for them. Augmented reality technology is one of those methods that contribute to simplifying the learning process, as Al-Otaibi et al. (2016) explained in their study, which aimed to know the effect of augmented reality as a natural method in teaching integration children in kindergartens, that augmented reality greatly contributed to achieve individual session's goals of integration children with less time and high efficiency, which led to an improvement in the performance of the teacher in the teaching process, and this was reflected in the child's

motivation towards the learning process. Researchers noted through her field experience the importance of using technology in facilitating the delivery of information to students with learning difficulties in resource rooms, as there is a lack of use of technological means in the process of teaching students with learning difficulties in resource rooms by teachers, so this research comes to find out the directions of teachers Learning difficulties towards the use of augmented reality technology as a way to improve learning outcomes for students with learning difficulties.

Research Questions

What are the attitudes of learning difficulties teachers towards using augmented reality technology as a means to improve learning outcomes for students with learning difficulties?

It splits into the coming sub-questions:

1. Are there differences in the attitudes of learning difficulties teachers towards using augmented reality technology as a means to improve learning outcomes for students with learning disabilities due to the variable of gender?
2. Are there differences in the attitudes of learning difficulties teachers towards using augmented reality technology as a means to improve learning outcomes for students with learning difficulties due to the scientific qualification variable?
3. Are there differences in the attitudes of learning difficulties teachers towards using augmented reality technology as a means to improve learning outcomes for students with learning disabilities due to the variable of teaching experience?

Research Objectives

This study aims at exposing attitudes of learning difficulties teachers towards using augmented reality technology as a means to improve learning outcomes for students with learning difficulties in the Eastern Region. Thus, it measures the differences of the variables (gender, academic qualification, and experience) on the attitudes of teachers of learning difficulties towards the use of augmented reality technology.

This research comes in response to recent trends in the education system at Kingdom of Saudi Arabia, and to bring this system to further development in digital education for students according to the Kingdom's vision 2030. It comes in response to recent trends in the field of special education and the expansion of the concept of using technology, as the concept of augmented reality technology in teaching is relatively new in the field of learning difficulties specifically. It is hoped that the current research will serve as a reference for teachers of learning difficulties about the use of augmented reality technology in teaching students with learning difficulties. This research, with its findings and recommendations, will serve to inform educational administrations and teachers of teachers' attitudes from their point of view on the use of augmented reality technology in teaching as a means to improve learning outcomes for students with learning difficulties in resource rooms.

Research Terms

Augmented Reality: "a technology that allows transforming real two dimensions images into virtual three dimensions images and paints on smart devises, which means that it merge real world with virtual information" (Ahmed, 2016).

Procedural definition: The researchers defines augmented reality procedurally as a technique and a modern educational method that can be used by teacher of learning difficulties to facilitate the process of teaching to students, as he can integrate actual reality with virtual reality through a camera that passes over the images in the textbook, through which three-dimensional shapes appear, whether image or video Or a voice that facilitates the learning process for him, and allows him to interact with the learning process, and this is what the research tool measures.

Attitude: "An organization of knowledge with positive or negative associations, that the person's Attitude towards a specific topic, whether it is an object, person or group, is a willingness to raise his motives in relation to the topic" (Melhem, 2005). The researchers defines it procedurally as: the amount of emotional intensity that the teachers of learning difficulties express towards their opinions in the use of augmented reality technology in the process of teaching students with learning difficulties, where the opinion expresses the approval with power or without, or rejection with power or without, which is measured by the research tool**.**

Literature Review

Given to the novelty of using augmented reality concept in education, the researchers found a scarcity of studies related to research variables with each other, as the Arab literature, and the educational one in particular, still needs more research on the uses of augmented reality in education. The researchers examined the following previous studies.

Al-Huwaiti and Al-Balawi (2019) study aimed to uncover attitudes of mathematics teachers about use of augmented reality technology in teaching, and to reveal the obstacles that limit its use. Researchers used a descriptive and analytical approach. The study conducted on (55) middle school mathematics teachers in Tabuk, with a questionnaire for data collection. The study found that teachers' attitudes about the use of augmented reality technology were high and positive. It also revealed that there are obstacles prevent the widespread use of augmented reality technology at the same time.

Study of Al-Sayed and Al-Luaimi (2019) aimed to reveal the effectiveness of using augmented reality applications in developing the academic achievement of first-grade intermediate students in the jurisprudence course on a sample of (30) students of Princess Noura University schools in Riyadh, divided equally into two groups: experimental and control, the two researchers used a quasi-experimental approach. Results revealed differences between the two groups in favor of the experimental group, and the effectiveness of using augmented reality applications with students in the subject of jurisprudence, as this contributed to increasing the

achievement of the achievement test for the subject, in addition to enhancing the educational effect of the subject of jurisprudence among students when using reality Augmented in the course.

Al-Shehri (2019) conducted a study to reveal the degree of awareness of mathematics teachers in the middle stage of the concept of augmented reality technology and its uses in teaching from their point of view in Tabuk on a sample of 207 male and female teachers using a questionnaire to collect data. Results concluded that the teachers 'awareness of augmented reality technology was low, and there were no statistically significant differences attributed to the sex variable, in contrast, there are statistically significant differences attributed to the variable of teaching experience in favor of teachers with less than 7 teaching experience Years. The researcher recommended providing training programs for middle school teachers on how to use augmented reality technology in teaching.

Al-Aboudi and Al-Saadoun's (2019) study aimed to identify the availability of professional and ethical competencies for science teachers in Al-Kharj city to use augmented reality technology. The sample consisted of 134 female teachers of the intermediate and secondary stages using a questionnaire as a tool for data collection. Results concluded that most of the study sample do not have previous knowledge of augmented reality, and that the competencies of using the computer and dealing with the Internet are available at a medium level, while the competencies of designing educational software are available at a weak level, competencies of computer ethics are available when using educational materials from the Internet at a high level.

Goudah's (2018) study aimed at researching the effectiveness of using augmented reality in developing mathematical problem-solving skills and emotional intelligence among a sample of primary school students who suffer from learning difficulties in mathematics in the city of Tabuk on a sample of 30 students with learning difficulties divided equally into two groups: experimental and control. Results revealed the effectiveness of using augmented reality with students in developing solving mathematical problems skills, and the effectiveness of augmented reality in developing emotional intelligence for the benefit of the experimental group.

Al-Amraji (2017) conducted a study aimed to find out the effectiveness of augmented reality technology in teaching history. He chose a unit (influencing global events in the world) and taught it to a sample of 72 students of the first grade of secondary school; they were divided into two groups, an experimental group that studied the unit using augmented reality technology, and a control group that studied using the traditional method. Several measuring tools were used in this study, including the achievement test and the measure of motivation to learn. Results found the superiority of the experimental group in the post application of the achievement test over the learners of the control group, and the superiority of the experimental group in the post application on the measure of motivation to learn, and the study also found that the augmented reality technology has a significant impact on the development of motivation to learn and the development of academic achievement among the Experimental group learners.

The study of Al-Otaibi and colleagues (2016) aimed to find out the effect of augmented reality technology on the education of integration children in kindergarten in Riyadh, where the study was applied to a sample of

kindergarten children who have speech disorders. In this study, the researcher relied on the use of augmented reality technology on tablets and computers, tools consisted of a questionnaire and evaluation forms. The results found that the use of augmented reality greatly contributed to the success and achievement of the goals of individual sessions for children with high efficiency and less time, and contributed to save concepts for a longer period of time, in addition to its contribution to increasing children's motivation to learn, and improving the performance of the teacher in that.

Musavi et al. (2014) sought to explore the effect of using augmented reality technology on learning mathematics from the teachers' perspective on a sample of 329 mathematics teachers. Tool consisted of a questionnaire developed by the researcher that measures the teachers' perceptions about the subject of study. The results of the study revealed that the teachers' perspectives were positive in motivating students to learn, and they also found a statistical difference between the effect of augmented reality and motivating students to learn. It also found that the relationship between mobile learning and the diversity of teacher training methods was positive and important.

Vinumol et al. (Vinumol et al., 2013) aimed to find out the effect of an interactive program based on augmented reality technology on a sample of students with reading difficulties in in primary schools in India. The program was an interactive book based on augmented reality technology, identical to the normal reading curriculum for students, as when the camera was directed at the text or image in the book, three-dimensional images and shapes, sounds and videos would appear that explain the text to the student in a simple graphic form. Results showed that the application of the program made the learning process easier and the ability of the students to whom the program applied became better in understanding the reading texts than they were before its application.

Previous Literature Feedback

After reviewing the previous studies, we found that the current research matches both: Goudah (2018) and Vinumol et al., 2013, in terms of the main variables the research deals with (augmented reality – learning difficulties). We also find that Al-Huwaiti and Al-Balawi (2019), Al-Aboudi and Al-Saadoun (2019), Al-Shehri (2019) and Musavi (2014) is consistent with the current research in its Objectives, which is to know the attitudes and perspectives of teachers about use of augmented reality technology. In addition, they are consistent with the current research in the use of the descriptive method and the use of the questionnaire as a tool for data collection. As for Al-Sayed and Al-Louaimi (2019), Joudeh (2018), Al-Otaibi and others (2016), and Vinumol and others (vinumol et al., 2013), they all used the experimental method, and all of them aimed to measure the effectiveness of augmented reality with students.

It is clear from the results of these studies that all of them agreed in the results on the effectiveness of augmented reality technology in the educational process with students, in addition to its contribution to raising students' motivation towards learning. It is also evident through research and knowledge that there are few studies that have addressed teachers' attitudes to the usage of augmented reality technology with students,

especially with those with learning difficulties. Our research benefited from reviewing previous studies in enriching the theoretical framework and choosing the appropriate method

Methodology

This section will show the research field procedures the researchers took to achieve the study aims, it contains the approach we used, research community, sample and tools, in addition to the tool's statistical validity and statistical methods that used to analyze results. We used the descriptive approach that it appropriates the nature of our research. The research community consisted of all teachers of learning difficulties for the primary stage in the Eastern Province, KSA with 288 male and female teachers at the primary stage (115) males and (173) females.

Study Group

The sample included a group of teachers of learning difficulties for the primary stage in the Kingdom of Saudi Arabia in the Eastern Province, where the conditions for their recruitment were as follows:

1-Teacher works as a teacher for students with learning difficulties in the resource room.
2- The school in which he teaches is applying the learning difficulties program.
3- That the teacher's experience not less than one year.
4- The teacher uses traditional and technological means in the resource room.

The research tool was applied to an exploratory sample of 40 teachers of learning difficulties, they were chosen from the basic sample of the research to ensure the validity and reliability of the search tool. The basic research sample consisted of 148 teachers of learning disabilities in the Eastern Province, they were chosen by the simple random method.

Questionnaire

To achieve the research aims, the researchers made a questionnaire which tests learning disabilities teachers' attitude towards the use of augmented reality technology in teaching students with learning disabilities in the resource room in the Saudi Arabia, and the questionnaire was identified as a research tool given its suitability for research purposes. The time period for applying the research tool: The questionnaire was applied in the second semester of the year 2020.

Development of Questionnaire

The researchers prepared the research tool by reviewing the theoretical literature that dealt with augmented reality and making use of it and reviewing recent studies that dealt with the topic of augmented reality such as: Al-Shehri (2019), Al-Tuwairqi (2019), Al-Hussaini (2014), and other studies dealt with the topic. The research tool was designed by the researchers, as the questionnaire consisted of two main dimensions to serve the

research aims, as follows:

- The first dimension: attitudes of teacher of learning disabilities towards using augmented reality, and it consists of 9 items.
- The second dimension: attitudes in using augmented reality as a means to improve learning outcomes for students with learning disabilities, and it consists of 9 items.

Items of the search tool have been formulated as follows:

- Taking into account that these paragraphs serve the objectives of the research to be achieved. The paragraphs of the questionnaire are drafted so that they are clear, understandable, and suitable for all respondents in the research sample.
- Preparing the search tool in its initial form.
- Presenting the search tool to a group of experts in the field to express their opinions regarding the clarity of the wording and the degree of importance and amendment.
- Amending the search tool according to the opinions of the expert so that the tool is ready in its final form for scientific usage.

Validation of Questionnaire

As we confirmed the apparent validity of the research tool (the questionnaire), we calculated Pearson's correlation coefficient. To find out the validity of the internal consistency of the questionnaire, the correlation coefficient between the degree of each of the questionnaire statements and the total score of the axis to which the statement belongs were calculated on an pilot sample consisting of 40 people. The results were positive and statistically significant Pearson's correlation coefficient values at a level of significance (0.01) and (0.05). This indicates the validity of the internal consistency of the questionnaire statements and their relevance to measuring what they were prepared to measure. *Search tool reliability:* We used Cronbach'a Alpha equation to confirm research reliability, results were that the reliability coefficients by the Cronbach alpha method were suitable for scientific research purposes, whereas, the value of the reliability coefficient, for Cronbach alpha was high, reaching (0.892). This means that the instrument items are reliable and field applicable.

Findings and Discussion

This section presents findings of the current research starting from showing responses of the individuals of the research sample to the tool items, then statistical treatment of it, ending with results analyzing and interpreting in light of the theoretical frameworks and previous studies related to the topic of the research, and discussing these results and their interpretation through the answers of its questions.

Demographics Variables

To recognize the attitudes of teachers of learning disabilities towards the use of augmented reality as a technique for teaching students with learning disabilities the arithmetic means, standard deviations, the order, and the

degree of agreement with the research dimensions were calculated and given in Table 1.

Table 1. Means and Standard Deviations of the Questionnaire Dimensions

Dimension	Mean	Slandered deviation
The first dimension: Attitudes of learning difficulties teachers towards using augmented reality technology.	0.99	3.71
The second dimension: Attitudes in the use of augmented reality as a means to improve learning outcomes for students with learning disabilities.	0.87	3.83

Table 1 shows that the Attitudes in the use of augmented reality for the teacher of learning difficulties has a large degree of agreement among members of research sample viewpoint, with general average 3.71 and a degree of agreement (large), with a standard deviation 0.99, which is a value Low, indicating the homogeneity of the opinions of the study sample about the Attitudes in the use of augmented reality for the teacher of the resource room. The values of the standard deviations ranged between 1.182 – 0.772, and all the items were of high values, which explains the disparity in the opinions of the individuals of the research sample about those items except items number 6, 2, 9 and 1. The researchers see that the attitudes of teachers of learning difficulties towards the use of augmented reality technology were positive from viewpoint of the research sample members, and this indicates that teachers of the resource room have a need to know a lot about the augmented reality technology.

Attitudes of Learning Difficulties Teachers towards the Use of Augmented Reality Technology based on the Gender Variable

To check for differences in the attitudes of learning difficulties teachers towards using augmented reality as a means to improve learning outcomes for students with learning difficulties due to the sex variable; we used An Independent Sample t-test, and the results were presented in Table 2.

Table 2. Independent Sample t-test for sex variable

Gender	Number	Mean	SD	Level of significance	t-value
Males	50	3.8435	.43574	.118	1.574
Females	98	3.7347	.37709		

Table 2 shows that there is no significant differences in the attitudes of learning difficulties teachers towards using augmented reality as a means to improve learning outcomes for students with learning difficulties due to the gender variable, that level of significance comes the same for both sexes 0.118 which is a larger value than 0.05, it indicates that there is no significant differences. We conclude that the responses of the sample members (male and female) agree on the attitudes of teachers of learning difficulties towards using augmented reality as a technique for teaching students with learning difficulties.

From the researchers point of view this no differences among males and females in attitudes towards using augmented reality as a technique for teaching students with learning difficulties may contributed to many reasons such as: Male and female teachers strive to keep pace with the development in the educational system, in addition to the work of male and female teachers under the same education system, and their commitment to the trends that are concerned with using the latest technological means in the teaching process.

Attitudes of Learning Difficulties Teachers towards the Use of Augmented Reality Technology based on the Scientific Qualification Variable

To check for differences in the attitudes of learning difficulties teachers towards using augmented reality as a means to improve learning outcomes for students with learning difficulties due to the scientific qualification variable; we used An Independent Sample t-test, and the results were given in Table 3.

Table 3. Independent Sample t-test for Scientific Qualification Variable

Scientific qualification	Number	Mean	SD	Level of significance	t-value
Bachelor	117	3.7783	.36737	.686	.405
Post graduate studies	31	3.7455	.51014		

Table 3shows that there are no statistically significant differences in the attitudes of teachers towards the use of augmented reality as a means for teaching students with learning difficulties attributable to the scientific qualification variable, where the level of significance was 0.686, a value greater than (0.05), which indicates no significant differences. Then we conclude that the respondents agree on the attitudes of resource rooms' teachers towards using augmented reality as a means to improve learning outcomes for students with learning difficulties due to the scientific qualification variable.

This result can be explained by that scientific qualification is not considered a measure of the use of techniques and educational aids with students with learning difficulties, but rather it is measured by the teacher's own desire to develop himself, and his care to train himself to use the latest methods in the education process, regardless of his educational qualification. This result is consistent with the study of Al-Huwaiti and Al-Balawi (2019), which showed that there are no differences in the attitudes of teachers of learning difficulties towards the use of augmented reality technology due to the scientific qualification variable.

Attitudes of Learning Difficulties Teachers towards the Use of Augmented Reality Technology based on the Teaching Experience Variable

To check for differences in the attitudes of learning difficulties teachers towards using reality technology as a means to improve learning outcomes for students with learning difficulties attributed to the teaching experience variable, the analysis of variance (One –way ANOVA) test was used, and the results are provided Table 4.

Table 4. Variance Analysis Test (One –way ANOVA) for Teaching Experience Variable

Source	Sum of squares	Number of Free degrees	Squared the mean	F	Significant value
Between groups	2.390	3	.797	5.436	.001
Inside groups	21.099	144	.147		
Sum	23.489	147			

Table 4 shows that there are significant differences in the attitudes of teachers towards using reality technology as a means to improve learning outcomes for students with learning difficulties attributed to the teaching experience Where the significance level was 0.001, which is a value less than (0.05) that indicates the significant differences. To check the existence of differences in favor of any category of experience level; we used L.S.D test, and the results were given Table 5.

Table 5. L.S.D Test to Identify Direction of Differences in the Teaching Experience Variable

Years of the teacher's experience (I)	Years of the teacher's experience (J)	Difference of means	Significance value
1-5 years	5-10 years	-.26761*	.004
	10-15 years	-.27129*	.005
	More than 15 years	-.33192*	.000
5-10 years	5-10 years	.26761*	.004
	10-15 years	-.00368-	.969
	More than 15 years	-.06431-	.449
10-15 years	5-10 years	.27129*	.005
	10-15 years	.00368	.969
	More than 15 years	-.06062-	.495
More than 15 years	5-10 years	.33192*	.000
	10-15 years	.06431	.449
	More than 15 years	.06062	.495

*: $p < 0.05$

Table 5 shows that there are significant differences between the level of experience (from one to 5 years), and each of: (from 5 years to 10 years - from 10 years to 15 years - more than 15 years in education). So, we conclude that there are significant differences in the attitudes of the teachers towards the use of augmented reality as a technique for teaching students with learning difficulties attributed to number of years of experience variable, and this difference was in favor of years of experience from 1 to 5 years. The result of this hypothesis can be attributed to the caring of newly hired male and female teachers to be aware of the most important and latest means to benefit from and use them in the field of teaching, and also it may be due to the novelty of the concept of augmented reality technology and its use in the field of teaching students with learning difficulties.

Conclusions and Recommendations

Based on the research findings, the following conclusions and recommendations are made:

- Providing training programs and courses for teachers of learning difficulties on how to activate and use augmented reality technology in the learning process.
- Providing resource rooms with modern technologies in the educational field by the school administration because the use of technology has become an essential issue in the educational system.
- Encouraging teachers to use modern means based on technology instead of relying on traditional means.
- Providing teachers of resource rooms with updated lists at the beginning of each school year that contain the most important modern technological applications that can be used with students with reading and mathematics learning difficulties.
- Encouraging the use of augmented reality technology in clarifying mathematical problems for students with mathematics learning difficulties.
- Conducting similar studies in different regions of KSA.
- Conducting experimental studies to actually use augmented reality software on a sample of students with learning difficulties in KSA.
- Conducting studies to measure the effectiveness of the impact of augmented reality technology with students of reading and mathematics learning difficulties in KSA.

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