

Designing an Educational Unit Using Hologram Technology in science and Measuring its conceptual understanding

Mohamed Suleiman Alkhatatbeh^{1*}, Odai Awad AlTaani², Maryam Abdelmunem Mahmoud Almalkawi³, Amal Saleh Mahjoob AlMaharmeh⁴, Saad Mohamed Bani Hani⁵)

¹ Yarmouk University, Department of Curricula and Methods of Teaching, Jordan.

² Ministry of Education, Science teacher, Jordan.

³ Yarmouk University, Phd student in social studies, Jordan.

⁴ Ministry of Education, Jordan.

⁵ Yarmouk University, Department of physical education, Jordan.

abual3ez1991@gmail.com

hassankulaep@gmail.com

Maryammalkawi740@gmail.com

Mnsoub@gmail.com

ptl_saad.banihani@yu.edu.jo

ABSTRACT

The study aimed to design an educational unit with stereoscopic photograph technology (Hologram) in the subject of science and measuring its impact on understanding concepts, in order to achieve the objectives of the study, the conceptual comprehension test was prepared and consisted of (30) items distributed over six dimensions (concept discovery, determining the conceptual significance, applying of the concept in educational situations, interpretation of observations and observations, use of the concept) In solving problems, using the concept in inferences), and the sample of the study that was chosen by the intentional method consisted of Zaha al-Din Al-Hamoud Secondary School for Boys of (60) students from the eighth grade students. The study sample was distributed randomly into two groups: an experimental group consisting of (30) students who were taught using the stereotaxic imaging technique. Hologram), And a control consisted of (30) students who were taught in the traditional method, and the results of the study showed that there was a statistically significant difference in the overall performance of the students of the two groups in the overall conceptual comprehension test, and in each dimension of the conceptual comprehension test, in favor of the performance of the experimental group students who studied the unit educational stereotaxic photograph technique.

Keywords

Stereoscopic Photograph Technique, Conceptual Comprehension.

Introduction

There is no doubt that technological and scientific development has a essential role in increasing science fiction day after day in order to cope with the progress resulting from the technological revolution that the world has been witnessed, which requires keeping pace with the changes that occur in the science

field, especially in the curricula and teaching methods, in order to copewith the challenges in the twenty-first century, the responsibility lies on scientific education and science instruction in preparing the citizen who is able to assimilate information and understand it deeply, by reconsidering the science

instruction and searching for modern methods and strategies that increase the conceptual comprehension and facts.

The curriculum is the effective tool in building the learners' personality and it seeks to meet generations' hopes of future. Globally, science instruction has been witnessed clear development to cope with scientific and technological developments that have been occurred, and this progress is derived from science features, knowledge has its structure that distinguishes it from other branches (Musleh , 2010)

Science curricula play a major role in the progress and development of nations in all life fields that are concerned with individuals and societies, as the progress, development and progress of any nation depends basically on its educational system. In recent times, the world has been witnessed many developments and efforts to develop curricula and reform the educational system, starting with the goals, through the content and teaching methods, and ending with their evaluation, and the evaluation of their educational outcomes (Zaitoun, 2010).

Science education aims to provide learners with experiences that support them to become scientifically educated, as the modern view of learning includes mathematics, science, technology and social sciences, and there is no doubt that the modern view of science programs encourages us to take into account the development of knowledge, and that the reports that have been written about programs science from the forties to the end of the last century included the call for a high intellectual effort, deepening the teacher's expertise in the field, and increasing instruction time (Al-Huwaiti, 2008).

Science education is an important process in all countries, and is a field of multiple and increasing changes, and despite the diversity of science education sources, the science teacher still has a major role in teaching the scientific and moral responsibility to create positive conditions for reform, and to overcome the accelerating challenges and obstacles facing education (Al-Hawamdeh and Bani Khalaf, 2018).

The use of educational technology has become one of the basics of the educational process, as it has a great importance in the educational process as many educational methods and systems have emerged that depend on the use of technology, and modern technologies have entered all educational fields, such as distance learning, e-learning, platformd and so on, which reflect on the increasing in the quality of the educational process, and that the process of introducing technology into education contributes to achieving student-centered interactive learning, which helps to achieve an attractive and effective environment within the educational process, enhances strengths and improves weaknesses, and many problems emerged as a result of technological progress, such as the lack of educational institutions ; To employ technology tools and the lack of equipment and capabilities for teachers, it was more appropriate to spread technology and apply it in education, and the successful teacher should keep pace with the changes that occur in the educational arena, by integrating technology and employing it in educational situations and teaching procedures to achieve educational goals (Al-Omari, 2015).

Hence , it is necessary to use the means and methods of modern and more

advanced technology, particularly those that depend on the awareness, and experience the sensible, and encourages of students' participation more in the educational process, which calls for search for new programs and methods that promote the use of technology in education (Ahmad, 2019).

The rapid developments in information and communication technology have caused tremendous changes in many areas of life, so educational institutions have been quick to benefit from technological services by integrating information and communication technology into education, and this in turn has produced new models of education that have changed the face of learning, and in recent times developments have advanced. Technology has an important role in improving education, for example many educational institutions use advanced technology, such as touch screens, and here hologram technology came as a new tool that can support teaching and learning in educational institutions) Ghuloum , 2010

Despite the recent application of hologram technology in education, its roots go back to the illusion known as the "pepper ghost", which was used in Victorian theaters in the sixties of the nineteenth century to produce realistic ghosts, through a series of visual projections ,such as placing a huge sheet of glass plate On stage at a 45 degree angle with its own screens and lighting (Lee, 2013).

And in the nineteenth century, specifically in the year 1862, several

attempts emerged to obtain a three-dimensional image, as the British scientist "John Henry Piper " succeeded in presenting his theory of the formation of three-dimensional optical objects, which call with his name " "" Pepper's Ghost because they rely on the use of mirrors tilted angles ,to share reflections image objects appear floating in the air (Awad.2017).

It can be said that the date of the emergence of "hologram" technology goes back to 1947, by the Hungarian engineer, "Denis Gabor ," in an attempt to improve the magnification power in the electron microscope .And because the light resources available at that time were not really coherent and monochromatic, hence the advent of holographic imaging until the time of the advent of lasers in 1960 AD, and in 1962 scientists from the United States and the Soviet Union invented stereoscopic imaging technology (Hariharan , 2002).

Experiments followed, so the first hologram was shown to a person in 1967, and in 1972 the scientist Loyd Cruz was able to manufacture the first hologram that combines three-dimensional holograms and two-dimensional graphics cinema, and in the early eighties of the twentieth century, laser light was used to record holograms in the United States of America and the Soviet Union at the same time, and since that time, the interest in developing hologram technology has begun to enter into multiple scientific and industrial applications (Awad, 2017).

accordingly, that the hologram technology is new, but the idea was old, and it developed clearly with the development of research on hologram technology .The hologram is a term from the Greek language consisting of two

syllables holos Meaning "full vision "gramMeaning "written" and the hologram is a three-dimensional record as a result of the positive interference between the laser waves)Universal Hologram , 2009 .(The principle of the hologram is holographic imaging, which is a package of light waves that collide in the body to be photographed and maps it, then the light waves transmitthebody'sdata(Al-Qahtani and Muaither, 2016a: 234)

And it is defined technology holograms as a" three-dimensional image is formed by the light of the object that shot down in a vacuum and can be seen directly in a three-dimensional, which can be displayed on a plate or foil aluminum) " (Anil& Lobo, 2016: 16661).

The hologram technique can be defined in this study as: a three-dimensional hologram resulting from the reflection of laser rays in a vacuum, so that it can be seen from all directions and clearly to facilitate the teacher who instructs the models that are difficult to display in front of students.

The distinction between hologram technology and other virtual reality technologies is that the hologram image is formed in space in the form of a three-dimensional illusion, not on a wall or object, and is clear to see, as if the image in front of you is completely opposite to virtual reality technologies (Zaki, 2017).

The hologram image is formed by creating an illusion of a three-dimensional image, where the first light source illuminates the figure, the second light illuminates, and the two light sources interact with each other, and the interference causes a three-dimensional image to be created . That the idea consists of a three-dimensional

image and is implemented using a laser beam through an object that projects a second beam on the reflection of the first ray, which allows to create a three-dimensional optical illusion image.(Orocs, 2018) .

While the idea of stereoscopic photography (The hologram) as mentioned by Gollam (Ghuloum , 2010) As follows: directing the laser beam to a beam splitter that separates the laser beam into two beams, and mirrors are used to direct the path of the two beams to the specified target, and both beams pass through a dispersed lens to turn the focused light beam into a wide beam, and direct one of the two beams to the object to be photographed and we call this beam The ray of the body, the ray is reflected from the body and falls on the film.

Al-Qahtani and Al-Muaither (2016) mentioned how the hologram works in the following: directing the laser beam to the light splitter that divides the laser beam into two beams, and directing the path of the two beams to the target specified for you using mirrors, and both beams pass through a dispersed lens, so the focused transmitted light beam turns into a light beam. Wide, and direct one of the two rays to the object to be photographed, and it is called the ray of the body"Object Beam" The ray is reflected from the body and falls on the film, while the ray that is directed at the film using mirrors is called the reference beam.

Regarding the importance of employing the hologram technology, many researchers have indicated that it can be employed in the field of education, especially after it has proven effective in the fields of marketing, advertising, media, medicine and engineering, where

this technology can be used (Orocs , 2018) that technology plays a positive role in acquiring new educational applications, and that the potential of hologram technology is an undeniable reality in science and learning contents .He mentioned to me) Lee, 2013 (That hologram technology has the potential to revolutionize the aspects of teaching and learning, and hologram technology may become a resource that can change the way knowledge is created and exchanged, and 3D holographic technology can be effective in learning and teaching, and this type of technology enhances a student-centered environment where students were able to interact with their own learning environment and build their knowledge - based educational experiences.

Hologram technology contributes to the field of education in various ways: the ability to present a convincing and realistic presentation to the user, the ability to communicate with users in different locations, and the ability to communicate attractively .(Kalansooriy , Marasinghe , & Bandara , 2015) .The hologram technology also contributes to increasing the mutual interaction between the teacher and the learner in the educational process ,in acquiring new teaching skills, increasing the motivation to learn, and helps to employ modern technologies in teaching, as well as contribute to highlighting the experiences of scientific thinking.

And hologram many of the features that can be utilized in the field of education, including technology provides access to space for students to watch a video scientific experiment in a three - dimensional, and give them a virtual tour of a three-

dimensional historical sites are difficult to visit in fact (Abdul Hadi 0.2017) . It also avoidesthe learner from feeling bored during the learning process. Rather, it makes him part of the scientific event through his sense of control over the body .This generates motivation, focus and attraction to educational content)Muhammad, 2019 .(And enable him to see the stereoscope from all directions, and then produce a realistic picture of the learner .Because it is an accurate recording of the light waves reflected from the object (Ahmad, Abdullah &Abubakre, 2015) It is an advanced technology through which the resulting images can be viewed easily without the need for glasses, as it attracts the learner to the 3D hologram (Hayek, 2015).

The hologram technology has been recognized as a tool to enhance the educational process, as it does not need a display screen to view the holograms, and to see the whole body from all directions, and when you see one of the sides, the other side disappears, for example if we see the right part of the body, the left part disappears, and it saves Memory to store the pictures and shapes you want to view(Baby, 2013).

"The reflection hologram "

This is the most common type in exhibitions, in which the reflective image appears in a three-dimensional form of incandescent light (a hologram image)and this type in the educational context has recently gained the interest of researchers in conducting experiments that visualize students, as they do not need internet to display them, so that the device contains memory to store the video or image you want to watch, so that it appears in a space in 3D (Barkhaya & Halim, 2016) .

Transmission holograms

The typical holographic image transmitted is viewed with laser light of the same type used in the recording, where the penetrating laser light is directed from behind the three-dimensional image and the hologram image is transmitted to the side of the viewer, and the hologram transmitted in this way is characterized by depth, and this type can be used in The field of education by broadcasting a direct picture of the teacher explaining the lesson anywhere in the world, where a number of students are present and feel as if the teacher is already with them and they start to interact with him (2016,Lobo & Anil).

Computer Generated Hologram

It is capable of images to create a lot of reality imaginary Alholograma output monitor sizes of objects by the naked eye, have pointed out my door) Baby, 2013 That the hologram image through the computer is distinguished by the fact that the things that a person wants to show, and he should not have any physical reality to show it, should not have any physical reality for it at all , and in this case it is called (the completely artificial holographic generation

Although the hologram technology is of great importance in the educational process, it faces, like other technologies, some challenges .(Bobolicu , 2009)However, hologram technology faces some challenges, including: its high cost, its need for high-speed internet, and the need for the availability of appropriate tools and equipment for its application .It indicated the questionnaire conducted by Al - Qahtani and Muaither (2016 a that the difficulties facing

the application of this technology in teaching "lack of awareness of the role of technical officials in education and financial hologram and material costs that are difficult to integrate technology in the educational process.

That despite the high cost of the technology, it is possible for students and teachers to accept that cost in exchange for obtaining some advantages, including: forming realistic and convincing views of the study materials, placing holograms within the reach of the teacher, and securing an environment of attractive and effective interaction between the teacher and his students Pradeem & Ashu , 2015)

The researcher believes that these challenges were influential in the past, but nowadays they have little impact, as the Internet is available to everyone at the present time and very quickly, and also the use of this technology has become inexpensive nowadays, which prepares students to view pictures in an enjoyable way with saving time and effort, and feeling the desire to see the solid modle in science.

In light of what the theortical framework indicates in the field of learning and education that the educational system in Jordan is based on the traditional method that includes providing information to students by indoctrination without provoking their thinking and contemplating the information provided to them, especially since we are in the age of technology, and this requires reflective thinking about the problems and experiences facing students In their school life, it requires improving the quality of thinking and its capabilities among students at all levels of education in the sciences ;Because the greater the learner's ability to think in a correct, scientific and logical manner, the more

increased his ability to work effectively in society (Al-Sa`ida, 2016).

Studies indicate the reality of science teaching to the low level of students in their learning of scientific concepts among a large number of students in various scientific fields, and attribute this decline to the fact that the usual teaching methods used by many teachers consist in presenting scientific concepts in an abstract manner. Students retained what was learned, and this also led to a decrease in the level of teaching and learning of science, which calls for the development of new methods and strategies of teaching that are well-planned and effective (Al-Momani, Al-Khattaba and Al-Qudah.(2015)

Statement of the Study

The statement of the study is represented by the following main question:

What is the effect of designing an educational unit with stereoscopic photography ?HOLOGRAM) (In science and measure its impact on the conceptual comprehension of the students the basic eighth grade ? The main question originated the following sub-questions:

The first question :What is the effect of designing an educational unit with stereoscopic technology?HOLOGRAM)(In developing the understanding of concepts among students of the eighth grade basic?

The second question : What is the effect of designing an educational unit with stereoscopic photograph technology?HOLOGRAM)(In developing the dimensions of

understanding concepts) discovering the scientific concept, determining the verbal significance, applying the scientific concept, interpreting observations and observations, solving problems, and concluding (among students of the eighth grade?

Hypotheses of the study

The first hypothesis :There is no statistically significant difference at the level of significance ($= 0.05 \alpha$) (Between the two arithmetic averages of the performance of the eighth grade students in the two study groups on a conceptual comprehension test attributed to the teaching method (designed with stereoscopic

photography) HOLOGRAM) ,(Normal.(

The second hypothesis :No no difference is statistically significant at the significance level ($= 0.05 \alpha$) (Between the mean score of the performance of the basic eighth-grade students in the two study groups on the dimensions of the conceptual comprehension test)discovering the scientific concept, determining the verbal significance, applying the scientific concept, interpreting observations and observations, solving problems, concluding (attributed to the teaching method (designed with stereoscopic photography(HOLOGRAM) ,(traditional).

Significant of the study

The significance of this study follows from two aspects:

First : The theoretical aspect :This study is expected to design an educational unit based on stereoscopic imaging technology, with the aim of contributing

to the process of innovation and diversification in the method of learning and teaching that teachers use in classrooms through a technological technology that raises their interest in reviewing traditional practices in education, and also contributes to Filling the deficiency in Arab studies, and

contributing to the enrichment of teaching through hologram technology in Arab studies and research in general and in Jordan in particular, as the subject did not take its right appropriately in Arab studies and research within the limits of the researcher's knowledge in the curricula and methods of teaching science.

Results	a sample	Goal	Studying
The barriers facing hologram technology are that it is expensive and needs high-speed internet. (60.8%) of the respondents emphasized the importance of the hologram as an effective educational tool for teachers, and (45.5%) believed that it would be an effective educational tool in .the future	teachers work at (400) various levels of education in the United Kingdom	Understand the importance of hologram technology in our lives and in the learning and education environment in particular, and identify the strengths and weaknesses of technology as an .educational tool	(Ghuloum , 2010)
The presence of statistically significant differences between the mean scores of the two experimental groups in the cognitive achievement of scientific concepts when presenting the content through educational, multi-media programs based on three-.dimensional graphics	students in two (50) experimental and control groups	The effect of the interaction between the pattern of displaying three-dimensional graphics and the method of controlling them in educational computer programs on achievement and correcting wrong perceptions of scientific concepts in the biology course for high school students in Egypt	Abdul Rahim (2012)
Holography can be used in education, and that there is a positive relationship between holography and the promotion of teaching and learning, and that hologram technology can be a	teachers are (100) distributed over (12) educational institutions in Nigeria	Introducing innovative methods, such as stereoscopic photography that can be applied in education, and	(Ahmad, et al, 2015)

future tool in all human .endeavors		knowing the acceptability of holograms in teaching among Nigerian colleges of education	
Increasing students' interaction with the scientific material in the presence of three-dimensional technologies, and digital educational media, and that students use them better than traditional books	students (500)	Applying three-dimensional techniques to designing educational media to raise their effectiveness	Al-Fiqi, Saleh and (2014) Saeed
Hologram technology is important in instruction , expressing their satisfaction with the ability of hologram technology to improve the .classroom	categories of (50) university academics and IT-related professionals from Sri Lanka	Evaluate the applicability of hologram technology as an enhancer for distance learning	(Kalansooriya et al , 2015)
A slight increase in the average of the experimental group results on the results of the control group, and that most students are looking for new methods of learning	students from the (70) first year in medicine USA ,University Keizer at	Determine whether the use of holograms in the educational process increases students' learning outcomes	(2016 ,Golden)
There was no statistically significant difference between the mean scores of the experimental group and the control group members in the post application, the logical reasoning test, and the technological enlightenment scale	a female student (80) from middle school in Egypt	The impact of a proposed unit strategy in science education reinforced by hologram technology and its impact on conceptual comprehension, development of logical thinking and geological enlightenment among first-grade middle school students	(2017) Zaki
An improvement in perception skills of students the when using and , Alholograma pyramid the	fourth-year students (50) from a local school (36 males, 14 females)	Training students on spatial visualization skills using the hologram pyramid for	(Ahmad, 2017)

pyramid hologram has that the perception positive effect on the a students, and skills of the of the ability to use them in have the classroom the		students of (10) years old	
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Second: The practical aspect: the study is that it will help curriculum planners in planning science curricula in light of hologram technology, preparing study units by curriculum developers based on hologram technology, and directing teachers to the necessity of teaching science according to the approach of hologram technology in order to develop students' scientific and mental capabilities.

Operational Definition of terms

Hologram technology :a three-dimensional holographic imaging with a very high degree of accuracy and clarity, as it is a bundle of light waves that collide with the object to be photographed and plan it, then the light waves transmit the body data that the tool has planned on the three-dimensional layout (Universal Hologram, 2009).

It is defined as a procedure :a three-dimensional imaging, so that this three-dimensional imaging is transmitted in front of the student, through which the learner can see the image as if it is in front of him, but he cannot touch it, and the educational material (genetics) for the eighth grade has been transformed into light in the form of a three-dimensional image.

Comprehension concepts: It is the individual's knowledge of the relationships that explain the behaviors of the natural world, and link the observed behavior with the more abstract scientific concept (Zaitoun, 2004).

It is defined as practical: the student's understanding of the concept in its correct form, which enables him to describe that concept and explain the phenomena associated with it. It is expressed in the grades obtained by the student in the conceptual comprehension test of the inheritance unit of the class of heredity.

The eighth grade: It is the class that includes students of the basic intermediate stage, whose ages range between 14-15 years.

Table (1) previous studies

Design of the study

The current study was conducted with a quasi-experimental design ;And according to the design of the experimental and control groups, where the experimental group was subjected to a study unit using stereoscopic technique, while the control group was taught the same educational unit in the traditional way.

Sample of the study

The sampe ofstudy of consist of the basic eighth grade students all in the Directorate of School Education Brigade Bani Obeid in Jordan's (890) students b according to their statistics for the academic year (2021/2020) and the study sample was purposfully determined of about Din Al - Hamoud Secondary School for Boys of Directorate of Education for Bani Obeid, distrect because of the fact that the researcher isteaching in this school ,was the selection of two divisions of

the eighth grade students randomly from among the available school people, and identified one of them to be an experimental group and the number of students (30 students), and the other control group was 30 students.

The two study groups are equivalent in the conceptual comprehension test

To achieve the parity of the two study groups in the pretest, the two averages and the two standard deviations were calculated to perform the pre-post

sample on the conceptual comprehension test scores according to the educational unit) stereoscopic photograph technique , standard), and Table (2 (shows that.

Table(2)

The two means score, and the two standard deviations "of the performance of the pre-post sample on the sections of the comprehension of concepts test according to the teaching method.

standard deviation	SMA	the group
3.922	10.0	Experimental
3.720	9.57	Traditional

Table (2 (shows an apparent difference between the two means scores of the pre-post sample performance on the conceptual comprehension test according to the teaching method .To find out the statistical significance of the apparent difference ;Use the T-test for two independent groups.t-test for Two Independent Test ,(As shown in Table (3.(

Table(3)

Results of (T) test for two independent groups to compare the two means score of the performance of the post test sample on the conceptual comprehension test, according to the teaching method

Statistical significance	Degrees of freedom	"T" value	standard deviation	SMA	the group
662	58	0.439	3.922	1000	Experimental Regularity
			3.720	9.75	

Regarding at the results in Table (3 ,(we notice that the value of (T (for the teaching method amounted to (0.439) in statistical terms (0.662), which is greater than the level of Statistical significance) α ,(0.05 =which indicates that there was no statistically significant difference in the pre-performance of the two study groups on the conceptual comprehension test .Meaning the equivalence (differences

of experimental control(of the two experimental groups on the conceptual comprehension test. For more statistical control, the accompanying analysis of variance was used(A N COVA). study design

The study has one independent variable, so the study design is a quasi-experimental design of the type of design based on the presence of an experimental group, a control group,

pre-test and post-test, and the study design elements can be represented as follows:

EG: O1 O2 O3 X O1 O2 O3

CG: O1 O2 O3 - O1 O2 O3

Where:

EG :The experimental group of males who are studying using imaging stereotaxic technique, and underwent testing before me to reveal about grasping the concepts and dimensions in the same test.

CG :The control group of males who study using the traditional way, and underwent a pre -test to reveal the understanding of concepts and after the test itself.

O1: Pre / post conceptual comprehension test

Presenting of the results of the first question :What is the impact of designing an educational unit with stereoscopic technology?HOLOGRAM)(In developing the of conceptual coprehention among students of the basic eighth grade?

This question emerged from the following null hypothesis “ : There is no statistically significant difference at the level of significance $.(0.05 =) \alpha$ (Between the two mean scores of the performance of the eighth grade students in the two study groups on a conceptual comprehension test attributed to the teaching method (designed with stereoscopic photography (HOLOGRAM) , (traditional).

To answer this question and verify his accompanying hypothesis, mean scores and standard deviations were calculated for the performance of the pre- and post-study sample in the overall conceptual comprehension test, according to the teaching method (the usual stereoscopic imaging technique), as shown in Table.(4)

Table(4)
Mean scores and standard deviations of conceptual comprehension test in the the two instrument pre and post depending of teaching) methodtechnical Stereoscopic, photograph, traditional method

Post performance		Tribal performance		Teaching method
standard deviation	SMA	standard deviation	SMA	
1.710	25.20	3.922	10.00	Stereoscopic technique
3.264	10.63	3.720	9.57	Traditional method

It is shawn from Table (4)that there is an apparent difference between the pre and post mean scores of the students' performance of the experimental group that studied with stereoscopic photograph technology, and the existence of apparent differences between the post meanscore of the teaching method) stereoscopic photograph

technique , the traditional method (between the two study groups .To find out whether these apparent differences were statistically significant, the accompanying one-way analysis of differences was used (One way ANCOVA)Dimensional measurement to test the absorption of concepts according to a method of teaching) imaging stereotaxic

technique, normal (after neutralizing the impact of tribal measurement have, the following presentation of these results as shown in the table(5)

Table(5)
The results of the unilateral analysis of variance associated)One way

ETA box η^2	Indication level	Values P	Average sum of squares	Degrees of freedom	Sum of squares	The source of the contrast
100.	015.	6.300	39.191	1	39.191	Tribal
.898	.000	503.456	3131.812	1	3131.812	the group
			6.221	57	354.576	The error
				59	3576.583	Macro

It is shawn from Table (5)that there are statistically significant differences at a significant level) $\alpha = (0.05$ on the conceptual comprehension test according to the group (experimental, control , (the value of (P) was (503,456) with a statistical significance of (0.000 ,(which is a statistically significant value, which means that there is an impact on the development of conceptual comprehension attributed to the method of teaching with imaging technology Stereotaxic photograph.

It is also shawn from Table (5) that the impact of conceptual comprehension was large .It has interpreted the value of the square of ita) η^2 (Accounted for (% 8 .89) of the variation Expositor (by forecaster) in

ANCOVA (For post-measurement to test the comprehension of concepts according to the teaching method) stereoscopic technique , the usual (after neutralizing the effect of the pre -measurement they have.

the dependent variable which is the development of grasping the concepts of students in the eighth grade due to the method of teaching stereotaxic photography technology.

In order to determine in favor of whom the differences were attributed, the mean scores and their standard deviations were extracted according to the group, as shown in Table. (6)

Table (6)
Adjusted mean scores and standard error to accommodate the concepts as a whole according to the teaching method) stereoscopicphotograph technique , traditional methodmethod

Standard error	Adjusted meanscores	Teaching method	Skills
0.456	25.153	Stereoscopicphotograph technique	The test as a whole(conceptual
0.456	10.680	Traditional method	)comprehention

The results in Table (6) indicate that the differences were in favor of the students who were exposed to the teaching method by means of stereotaxic photograph technology compared to the control group.

This may be attributed to the fact that the use of stereoscopic photograph technology increased the student's suspense, attracted his attention to the lesson, stabilized the scientific material in his mind, and worked to develop aspects of intelligence, and that the presentation of topics facilitated the students' comprehension process, and helped them understand the scientific concepts of what required attention, follow-up and prediction. This may also be attributed to teaching students through the educational unit designed with stereoscopic photograph technology that seeks to reach the stage of understanding concepts that are more effective than facts in a piecemeal fashion and help them form a holistic picture of scientific facts and concepts, adopting Hall's impressions of the importance of topics, and linking them to the realities of their lives by providing examples linked to this reality, and that students remember these concepts and relate them to reality and their previous experiences and thus make sure of their logic and extent of validity, and thus create new experiences, as teaching students with stereoscopic imaging technology enriches and enhances conceptual comprehension skills to bring about deep understanding and lead students to higher levels of understanding and the ability to analyze knowledge and its application in their diverse life situations and its application in the problems facing them now and in the future.

This result can be attributed to the fact that the use of hologram technology helps in creating three-dimensional illustrations of scientific concepts, by getting rid of the traditional situation in which students see images of scientific concepts, and the use of hologram technology in teaching enables the student to perceive meanings from by translating them from one picture to another, interpreting and explaining them, and predicting through them certain results and effects based on the paths and trends involved in these ideas, clarity of ideas and their application in new situations, depicting the problem and solving it in different ways, and this is done through the use of hologram technology that helps students understand and comprehend where the images that display in 3D look like; This made the students interested in studying, eager to see all the hologram images; This led to the level of conceptual comprehension among the students of the experimental group, and the use of this method makes the lessons unconventional as students are accustomed to. So for them it represented a kind of enjoyment of the practice of science (Zaki, 2017).

This study is consistent with the results of Zaki's study (2017), as this study indicated the effectiveness of teaching using hologram technology in conceptual comprehension, and this result is in agreement with the results of Salem and Farhud (2018) study, which aimed to know the effect of the timing of providing guidance (before - during -) After -) in hologram technology and its effect on the development of some social concepts and the survival of learning among kindergarten children, which showed a statistically significant difference between the mean scores of the three

groups in favor of the post application due to the primary effect of the difference in timing of providing guidance (before, during, after) in the hologram movie In developing an understanding of social concepts.

This result differed with the result of Zaki's study (2017), which aimed to find out the impact of a proposed unit strategy in science education reinforced by hologram technology and its effect on conceptual comprehension, development of logical thinking and geological enlightenment among first-grade middle school students, which indicated that there was no statistically significant difference between the average degrees. The experimental group and the control group members in the post application of conceptual comprehension, logical reasoning test, and technological enlightenment scale.

The second question :What is the effect of designing an educational unit with stereoscopic photograph technology ?HOLOGRAM)(In developing the dimensions of understanding concepts) discovering the scientific concept, determining the verbal significance, applying the scientific concept, interpreting observations and observations, solving problems, and concluding) among students of the eighth grade ?

Has emerged from this question the following null hypothesis " : No difference is statistically significant at

the significance level (= 0.05 α (Between the two mean score of the performance of the eighth-grade basic students in the two study groups on the dimensions of the conceptual comprehension test)discovering the scientific concept, determining the verbal significance, applying the scientific concept, interpreting observations and observations, solving problems, concluding (attributed to the teaching method (designed with stereoscopic photography(HOLOGRAM) ,(The usual (."

To answer this question, and verify its accompanying hypothesis ,where the mean scores and standard deviations of the performance of the pre- and post-experimental sample adjusted on the dimensions of the conceptual comprehension test) discovering the scientific concept, determining the verbal significance, applying the scientific concept, interpreting observations and observations, solving problems, conclusion (According to the teaching method) stereoscopic imaging technique, the usual ,(as shown in Table (7.(

Table(7)

Mean score and standard deviations of the dimensions of scientific concepts to test the dimensions of grasping concepts in the the two instruments pre and post depending on the method of teaching) imaging stereotaxic photograph technique, traditional methode

Telemetry		Pre-analogy		Teaching method	Skill
Standard deviation	The arithmetic mean	Standard deviation	The arithmetic mean		
.805	4.20	1.022	1.70	Stereoscopic technique	Discover the concept

Telemetry		Pre-analogy		Teaching method	Skill
Standard deviation	The arithmetic mean	Standard deviation	The arithmetic mean		
765	2.03	1.055	1.70	Regularity	
.774	4.23	.898	1.77	Stereoscopic technique	Determine the semantics of the concept
.830	2.00	.952	1.70	Regularity	
.535	4.70	1.098	2.03	Stereoscopic technique	Application of the concept in educational situations
.890	1.97	.828	1.93	Regularity	
.466	3.70	.765	1.37	Stereoscopic technique	Interpretation of observations and observations
.681	1.53	.774	1.23	Regularity	
.466	3.70	.648	1.17	Stereoscopic technique	Use the concept to solve problems
.629	1.13	.669	.97	Regularity	
.479	4.67	.964	1.97	Stereoscopic technique	Use the concept in inferences
.964	1.97	.765	2.03	Regularity	

It is shown from Table (7) that there is an apparent difference between the pre and post mean scores of the performance of the students of the experimental group that studied the stereoscopic photograph technique on each dimension of the conceptual comprehension test, and the existence of apparent differences between the post arithmetic mean of the performance of the two teaching methods (stereoscopic imaging technique, the usual). (To find out whether these apparent differences were statistically significant, the accompanying one-way analysis of variance was used (One way ANCOVA) For post-

measurement to test the dimensions of understanding the concepts according to the teaching method) stereoscopic technique, the usual (after neutralizing the effect of the pre -measurement they have, and the following is a presentation of these results as shown in Table:(8)

Table(8)

The results of the unilateral analysis of variance associated)One way ANCOVA (For post-measurement to test the dimensions of understanding concepts according to the teaching method) stereoscopic technique, the usual (after neutralizing the effect of the pre -measurement they have

ETA box η^2	Indication level	Ph value	Average sum of squares	Degrees of freedom	Sum of squares	The source of the contrast
663	.000	114.189	70.417	1	70.417	Discover the concept
667	.000	116.129	74.817	1	74.817	Determine the semantics of the concept
782	.000	207.885	112.067	1	112.067	Application of the concept in educational situations
781	.000	206.619	70.417	1	70.417	Interpretation of observations and observations
.848	.000	322.591	98.817	1	98.817	Use the concept to solve problems
765	.000	188.572	109.350	1	109.350	Use the concept in inferences
			6.789	58	393.767	The error
				59	3576.583	Macro

It is shown from Table (8) that there are statistically significant differences at a significant level) $\alpha = (0.05$ for the dimensions of the conceptual comprehension test according to the group (experimental, control) ,in statistical terms for all dimensions, the amount of) .000 ,(Which is a statistically significant value, which means that there is an effect of the test dimensions on developing the understanding of concepts attributed to the teaching method.

It is also shown from Table (8) that the size of the impact of the conceptual comprehension test dimensions was large .It has interpreted the value of the square of It η^2 (With high rates of the interpreted (predicted) variance in the dependent

variable, which is the development of understanding concepts among eighth grade students of the method of teaching by means of stereoscopic imaging technology.

In order to determine in favor of whom the differences were attributed, the modified arithmetic averages and their standard error were extracted according to the group ,as shown in Table (9).

Table (9)

Mean scores adjusted and a standard error for each dimension of the test dimensions accommodate concepts as a whole , according to the method of teaching) stereotaxic photograph technique, traditional(

Standard error	Adjusted arithmetic mean	Teaching method	Skills
147.	4.224	Stereoscopic technique	Discover the concept
147.	2.009	Regularity	
147.	4.253	Stereoscopic technique	Determine the semantics of the concept
147.	1.980	Regularity	
141.	4.694	Stereoscopic technique	Application of the concept in educational situations
141.	1.972	Regularity	
106.	3.710	Stereoscopic technique	Interpretation of observations and observations
106.	1.524	Regularity	
105.	3.699	Stereoscopic technique	Use the concept to solve problems
105.	1.134	Regularity	
145.	4.639	Stereoscopic technique	Use the concept in inferences
145.	1.994	Regularity	

The results in Table (9) indicate that the differences were in favor of the students who were exposed to the method of teaching by means of stereotaxic photograph technology compared to the control group members who studied in the usual way and on each dimension of the conceptual comprehension test.

This may be attributed to the fact that the building of knowledge among students directly affects the effect of the required adaptation, which causes confusion and contradictions in its cognitive construction in students, which makes students in a state of imbalance. In order to be able to adapt to reality and its requirements, as the stereoscopic imaging technique tries to reconstruct the cognitive structures that they have to make sense by carrying out the active and continuous structural process with the aim of self-regulation of assimilation and adaptation. A result or event or ideas, while supporting them with appropriate justifications, facts and data, which helps in discovering the scientific concept and

removing ambiguity among students. It also enhances students' abilities to provide appropriate interpretations and translations, i.e. the goal is to understand and not explain or clarify. They present their interpretations through narration, commenting on them, giving meaning to something, or an explanation of the facts that they have reached on the aspect of clarification during their learning with the technique of Stereotaxic photograph.

This may also be attributed to the applied aspect that the stereoscopic technique provides by effectively using knowledge in new and real situations, and forming a view of things from a critical, meaningful, unemotional or biased perspective, that is, students separate themselves in order to see more objectively, and do not address any. A previous study The effect of teaching by hologram purification on examining the dimensions of learned concepts in conceptual comprehension, so the researcher was unable to compare this result with the results of other previous studies, so this study may be unique in dealing with this aspect.

The result of the higher improvement in the student's ability to solve problems and apply the concept in educational situations can be attributed to the two highest percentages of the size of the effect, in descending order (84.8%, 78.2%) ;Through the use of hologram technology that helps students to comprehend and comprehend, and develop students' ability to apply the scientific concept studied by the student in new educational situations such as making a model of chromosome structure, or panels ,three-dimensional holograms provide learners to generalize some models and apply them in new educational situations .On the other hand, the emergence of a result of an improvement in students' ability to interpret observations and observations, and deduction as average proportions in the size of the effect, in descending order(78.1%, 76.5%) ;Returning to the careful observation of everything that is presented to the student and contemplates it, whether it is a three-dimensional stereoscopic film by means of a hologram, or three-dimensional models and models so that the learner gets what is presented to him, and the hologram technology produces very realistic images ;Because it is an accurate recording of the light waves reflected from the body, and it allows the learner to describe a complex topic into a form that is easier to understand, because it is possible through hologram technology to disassemble the complex topic into the simplest form that improves the understanding of the student .On the other hand, the result of the lowest improvement in students' ability to determine the verbal significance and discover the concept can be traced back

to the lowest two ratios in the size of the effect, in descending order(66.7%, 66.3%) ;Due to the fact that the discovery of the scientific concept falls within the fifth level (the level of composition) of the Plume levels ;Consequently, the ability to discover the scientific concept facing students needs students with higher levels of thinking.

Recommendations

In light of the results of the study, the following is recommended:

- Teachers urged to use the teaching method for stereotaxic photograph technology when developing the skills of conceptual comprehension among students ,and work on photography stereotaxic by all teachers of technical application of science in order to help them to increase the engagement of different concepts among students, and urged teachers science to continue to use technology Stereoscopic photography to develop the dimensions of students' conceptual comprehension.
- Conducting studies to apply stereotaxic photograph technology to develop the comprehension skills of concepts on a sample different from the sample used by the study, and designing another

educational unit for different grades.

- Make efforts to establish courses for teachers and learners to learn about the role of stereoscopic

purification in increasing students' learning motivation and its ability to motivate them towards learning.

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