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Developing an Educational Unit in Biology based on Visual Learning and its Effect in Enhancing Scientific Images Reading Skills for Ninths Grade Students

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Abstract--- *This study aimed to develop an educational unit in the light of visual learning, and to know its effect in improving the skills of reading scientific images among the ninth grade students in the Eastern Badia schools. To achieve this, the cell unit and human body tissues were developed from the biology book for the ninth grade in the light of the principles of visual learning. Applied. To measure the skill of reading pictures, an objective test was prepared, in its final form of (25) items of a multiple choice type. School year 2019/2020 AD. Where two groups were chosen randomly as an experimental group, and the number of its members reached (22) students and (26) students, studied using the developed educational unit, and the other two divisions were considered as a control group, the number of its members reached (19) students and (23) students, were studied using the regular unit. The results of the study showed that there is a statistically significant difference in developing scientific image reading skills between the performances of the members of the two study groups in favor of the performance of the members of the experimental group. The researchers recommend the use of visual learning in science education in general and biology teaching in particular as one of the effective learning methods that work to achieve many goals of science education. And training teachers to use more effective strategies and models in meeting the needs of students so that they have an impact in developing the skills of reading scientific images, conducting more research and studies on skills of reading scientific images in other regions, and on other classes, and training teachers to use more effective strategies and models in Meeting the needs of students so that they have an impact in developing the skills of reading scientific images, and conducting more research and studies on the skills of reading scientific images in other regions and on other classes.*

Keywords--- *An Advanced Educational Unit based on Visual Learning, Scientific Image Reading Skills, the Ninth Grade.*

I. INTRODUCTION

Since the senses are the primary source for acquiring knowledge, and the experience that the learner obtains through the senses is more effective than learning experiences based on automatic memorization, because the participation of all the senses, especially the sense of sight, leads to the consolidation and deepening of learning, and thus helps to consolidate what the learner has learned It follows that the learning effect remains, which helps to increase the convergence and congruence between the meanings of words in the learner's mind and encourages them to participate and positive interaction with the information provided, as it provides an opportunity to make decisions

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and discover new ideas and information that were not previously noticed, and overcome individual differences between learners and retain information And retrieved it after a period (Al-Fraijat, 2011).

The use of visual materials in education is based on a number of reasons, including that it motivates the learner and pushes him towards learning, and helps to facilitate complex content, as it provides an opportunity for exploration, research, and investigation, and enriches learning, facilitates it, gives it vitality and clarity, and helps to save time and effort spent in speaking, And to convert abstract concepts into concrete concepts, and address the sense of sight that comes through most of what a person learns, as it is characterized by its attractiveness; It quickly acquires the sense of sight even for a short period of time, helps bring the content closer to the human mind, and makes its lifespan longer (Seven & Engin, 2007; Bozdogan, 2011).

Visual learning has gained increasing importance in the field of education, and its influence in building knowledge and understanding relationships and processes is receiving great care today, and researchers are focused on trying to understand the impact of visual materials in textbooks on learning (Cook, 2011).

Visual graphics are useful for communicating the corresponding meanings by making abstract information tangible and more realistic. The visual image can be represented by knowledge based on perception or on understanding the meaning, as the spatial mental image works to keep the private information and different topics in an appropriate place in the memory of the visual image, It can represent a meaningful representation and the image is translated into its meaning automatically, which is why we remember the visual image better than verbal information. Drawings, maps, and illustrations can contribute as visual aids for learning because they can usually impose certain information that will be stored as visual or verbal information (Dwyer, 2015).

The use of images and illustrations raises mental activity, because it raises the interest of the learner, his curiosity, the curiosity of the learner and his questions. The image itself became easier to understand than the word and raises the curiosity and questions of the learner (Al-Farra, 1999; Abdullah, 2002).

The brain deals with images more easily than the written material, whether in the processes of mental processing, storage or recall. The image is economical in nature by summarizing a lot of details in the depicted or illustrated scene and this is why it is more permanent, so it is stored for longer periods in long-term memory as it is more resistant To change and switch (Ambosaidi and Al Balushi, 2011).

The perceptual visual machine is inherently complex, making man different from other beings, because it can transfer information from the environment to which it belongs, and process it through the visual perceptual channel. The importance of the image is due to the fact that it performs educational and learning purposes, saves time and effort, and shares the sense of sight with the sense of hearing among students because it is one of the non-verbal languages whose content is easy to understand if the reader knows the rules for reading it, so the learner should be trained to read pictures as you know Words given that the content of images carries concepts and ideas that are sometimes difficult to carry (Qandil, 2006; Al-Shanti, 2011).

Therefore, the learner must be given the opportunity to see and discuss the various images and shapes that are used to increase the understanding of visual forms, and to acquire a new language, which is the visual language that

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helps to increase the ability of communication and understanding the course of things around it, especially at the current time when the picture and shapes have become sophisticated, Because of the use of advanced cameras that helped spread optics as a universal language (Cochran, 2007).

I have conducted many studies interested in the current topic of the study, such as the study of Arafat (2000) that aimed to reveal the effectiveness of illustrations and illustrations in the achievement of the subject of science and the acquisition of science operations for those with excessive activity from first grade middle school students in Egypt, where the study sample consisted of (85) students, They were divided into two groups: an experimental that included (45) students who studied using a set of drawings and illustrations appropriate for the environment unit and its resources, and a control group of (40) students who studied the same unit in the usual way, and the results of the study indicated that the use of illustrations in teaching science has helped On the ease of learning and the increase in academic achievement, and the acquisition of some science processes such as (observation, classification, conclusion, interpretation).

Al-Maliki (2002) conducted a study aimed at identifying the relationship between the skill of visual spatial visualization in mathematics, and the technical skill of students in the second intermediate class in the city of Makkah Al-Mukarramah, as well as identifying if there is a difference in the skill of visual spatial visualization in mathematics between students and students in the second grade The average. To achieve the goals of the study, the researcher built a test to measure the visual visualization skill and technical skill in mathematics and after applying the study tool to the study sample of (215) students and (198) students, the results showed a strong and positive correlation between the visual spatial visualization skill in mathematics and technical skill among students The male and female students outperform the female students in the visual spatial visualization skill.

Barakat's study (2006) aimed to identify the effectiveness of the visual spatial approach in developing some dimensions of spatial ability and achievement for second-grade middle school students in Sharkia Governorate in Egypt in the science subject, and to identify the type of relationship between spatial ability and achievement in science, and the study sample consisted of (80) Students, divided into two experimental groups and equally controlled, the researcher used a spatial perception test and visual perception test, and the results showed that there were statistically significant differences in the two tests in favor of the experimental group.

The study of Abdul-Jawad and Ali (2012) aimed to identify the level of a child's reading of images in the levels of (counting, describing, and interpreting) in the scale of health culture among kindergarten children. Kingdom of Saudi Arabia. The sample was divided into (40) males and (40) females, and a scale consisting of six dimensions was prepared to measure the health culture to know the level the child reached in reading the pictures, and the study reached the height of the image reading at the level of (counting and describing) among children in A measure of a healthy culture, and a low reading of the image at the level of interpretation, as the researchers recommended the development of study units to raise the child's reading of pictures at levels (counting, description, and interpretation).

The study of Abdel Nabi (2012) aimed to demonstrate the effectiveness of the proposed strategy based on reading the image to develop some creative writing skills for the fifth grade students from basic education, and the

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research community was among the fifth grade students from the first cycle of basic education in Giza Governorate, and the researcher has followed the descriptive approach and approach Almost experimental, the sample size reached 28 male and female students, and the study reached the effectiveness of the image-based strategy in developing creative writing skills.

Al-Jourani (2014) conducted a study aimed at knowing the impact of the visual teaching strategy on the achievement of biology and the development of science operations on middle-grade students in Diyala. The study sample consisted of all middle-grade students in the Amal Secondary School in Baquba, and the researcher used the achievement test and science operations test as tools To study. The results showed that there is a statistically significant difference between the experimental and control groups and in favor of the experimental group in the collection of biology and in the development of science processes.

The study of Muhammad and Jabouri (2019) aimed to reveal the skills of reading pictures and bio-illustrations for fifth-grade students, and to achieve this goal, the researchers built the research tool which is testing the skills of reading pictures and illustrative bio-graphics, which consist of (40) items of a multiple choice type, The characteristics of honesty and consistency were taken into account in its construction, the research sample also included (200) students from the Qadisiyah Governorate Center, who were randomly selected from the schools of the province. The highest skill is followed by the skill (linking relationships) then the skill (conclusion), while the skills that were the lowest among the skills are skill (interpretation) and skill (image analysis).

Through a review of previous studies that dealt with visual learning, some studies show that education through the image helps to retain information for a longer period, compared to verbal education that does not remain on the information except for a short period. , 2014) that proved the effectiveness of the visual teaching strategy in academic achievement, and in a study (Muhammad and Jabouri, 2019) that dealt with the skills of reading pictures and biological illustrations, and the agreement of many studies that emphasized the importance of developing image reading skills in education} And among these studies: Study (Arafat, 2000), (Al-Maliki, 2002), (Abdel-Jawad and Ali, 2012), and (Abdel-Nabi, 2012), And a study (Al-Jurani, 2014) {, and some studies focused on studying the impact of the use of visual learning on other dependent variables except for the achievement variable, as in the study (Abdel Nabi, 2012) which dealt with the development of some creative writing skills and (Al-Jurani, 2014) which dealt with the development of science processes.

It became clear to the researchers within the limits of their awareness of the scarcity of studies that dealt with the impact of visual learning on the skills of image reading, as the researchers did not find a research or study that dealt with the impact of visual learning on the skills of reading pictures, or combined these variables in one study despite the importance of this topic. Therefore, this study is one of the first studies to address the effect of an educational unit developed based on visual learning in developing the skill of reading the scientific image.

It is worth noting that the researchers - according to the limits of their knowledge - did not find studies that dealt with the effect of developing an educational unit based on visual learning in developing the skills of reading scientific images, but there are many studies that have proven the effectiveness of visual learning in other dependent

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variables other than the skills of reading scientific images such as achievement, as a study (Arafat, 2000; Barakat, 2006), as in the study (Al-Jourani, 2014) that dealt with the development of science operations.

Therefore, the researchers decided to design an educational unit, enhance the content with pictures and drawings in the light of the visual learning curve, and measure their impact in developing their skills in reading pictures and biological illustrations for students of the ninth grade of biology, and specifying the theoretical framework for photo reading skills, identifying some study concepts, and choosing a curriculum The study is a semi-experimental approach, and building the study tool used, which is: testing image reading skills, and defining the appropriate procedures for the study.

The Study Problem and its Questions

The researchers noted the weak skills of reading pictures and illustrations among students in the biology topic for the ninth grade, in addition to their lack of adequate illustrations adequately, as well as a survey of the opinions of many teachers and teachers in some schools of the northeastern Badia about the extent of use of pictures and biological illustrations, it was noted that the concentration The teachers focus on completing the course, and many teachers did not have knowledge of visual learning and how to use visual aids to help students acquire concepts of biology and deeply absorb them.

The study problem is determined by answering the following main question:

The study problem is determined by answering the following main question:

"Is there a statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean for the performance of the study members on testing the skills of reading scientific images combined due to the variable of the unit used in teaching (an educational unit developed based on visual, regular learning?)".

From this question emerged the following zero assumptions:

1. The first zero hypothesis stated: “There is no statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean for the performance of the study members on testing the skills of reading the scientific images individually and collectively due to the variable of the unit used in teaching (existing educational unit developed) On visual, regular learning).
2. The second null hypothesis stated: "There is no statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the two arithmetic mean for the performance of the study members on testing the skills of reading individual and combined scientific images attributable to the student gender variable (male, female)."
3. The third null hypothesis stated: "There are no statistically significant differences at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean of the performance of the study members on testing the skills of reading individual and combined scientific images attributable to the interaction between the two unit variables used in teaching and gender."

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The Study Objectives

The study aims at:

- Identifying the impact of visual learning on image reading skills for the ninth grade students.

The Study Importance

This study derives its importance from the fact that it studies biology, where most of its concepts are studied in a manner based on memorization and indoctrination.

The importance of the study stems from the fact that:

First: It provides a comprehensive theoretical framework on one of the patterns of learning patterns to raise the level of visual learning and develop the skill of reading pictures, while emphasizing the steps and procedures of the model because of their importance that may help researchers in benefiting from them in the future.

Second: This study acquires its importance in that it is one of the first studies - within the limits of the researchers' knowledge - that dealt with the impact of visual learning on image reading skills, as this subject has not been previously studied in Jordan at least, which may contribute to supporting scientific research in this field.

Study Limits and Limitations

The generalization of the results of this study is determined as follows:

- A sample of ninth grade students in schools affiliated with the Ministry of Education in the northeastern Badia in the academic year 2019/2020.
- The study was limited to teaching the unit (the cell and the tissues of the human body) from the second unit of the biology book for the ninth grade, the first part
- The degree of generalization of the study results depends on the validity and reliability of the tools, and the accuracy of the students' response to the image-reading test.

Terminology of Study

A developed educational unit: A study unit designed based on visual learning, which should be strengthened in educational materials and presented to students with a view to achieving educational, cognitive, skill and emotional goals.

- Visual learning: A process based on visual perception in the learning process, through which experiences and knowledge are acquired through image viewing, sensory plans and scenes, and information collection visually. This learning depends on observation (Mohsen, 2009).
- Procedurally defined: It is the learning that the researcher undertakes in designing an educational unit based on a set of images and scientific drawings and applying them to the experimental group.
- Image reading skills: these are skills that enable the learner to observe and describe the content of the image or the illustrated drawing, to explain its content, and to draw out what it holds of concepts, ideas, values, relationships, and technical or aesthetic standards, and to summon these components and their associated and transform them into spoken or written speech (Al-Farra, 2007).

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And procedurally: These are the following image reading skills (observing the image or drawing and its description, analyzing the image or drawing, linking and installing, recognizing ambiguity and interpreting it, and extracting the meaning), and students' performance was measured by calculating the average performance of students on testing scientific photo reading skills prepared for this purpose.

II. METHODOLOGY AND PROCEDURES OF THE STUDY

The study used the quasi-experimental design with two groups (an experimental group and a control group), where the study sample was chosen in the available method, and they were distributed in four groups (two groups for males one control and the other randomly experimental) and (two groups for females one control and the other randomly experimental), and applied randomly The study tool (the scientific image reading test) was pre-requisite on the experimental and control study groups, and the two experimental groups were taught the developed unit based on visual learning, while the two groups studied the controls using the usual method, after which the study tools were applied dimension to all groups.

Sample of the Study

The members of the study consisted of (90) male and female students from the ninth grade students who were chosen in the available method, including (41) male and (49) male students, distributed to four people in the first semester of the academic year 2019/205 AD. Where two groups were chosen randomly as an experimental group, the number of its members reached (48) male and female students, studied using an advanced educational unit based on visual learning, and the other two divisions were considered a control group, the number of its members reached (42) male and female students, studied using the regular unit, as shown in Table (1).

Table 1: Distribution of Study Sample According the Gender Variable

Group	*Gender*	*Number*	*Percentage*
Controlling	Male	19	21.1%
	Female	23	25.6%
	Total	42	46.7%
Pilot	Male	22	24.4%
	Female	26	28.9%
	Total	48	53.3%
Overall	Male	41	45.6%
	Female	49	54.4%
	Total	90	100.0%

A. The first group (the two controlling groups), and the educational unit was applied to it according to the usual method, and the number of its members reached (19) male students and (23) female students.

B. The second group (the two experimental groups), and the educational unit that was developed according to the visual learning model was applied to it, and the number of its members reached (22) male students and (26) female students.

Study Method

The researchers prepared the study tool as follows:

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Scientific Picture Reading Test

A. Building a Scientific Picture Reading Test

1. The goal of the test: The goal of the test is to measure the skills of reading scientific images of ninth grade students.
2. Determine the type of test items: the researchers identified the test items from the multiple choice type because of its many advantages such as clarity of questions, ease of answering them, objectivity of correction, and the ability to analyze results accurately and the high factors of honesty and consistency.
3. Formulating the test items: The researchers formulated an appropriate test items appropriate to the level of the ninth grade students, where their linguistic integrity, scientific validity, clarity and distance from ambiguity, and the extent of their representation of content and objectives, and their correct answers were distributed randomly, each of which included an introduction followed by Four different alternatives (A, B, C, and D) have one correct answer.
4. Drafting test instructions: The researchers drafted test instructions at the beginning of the test, which defines the purpose of the test, the number of items, and how to answer them.
5. Test testing: The researchers experimented with testing on a survey sample from the study community to determine difficulty and discrimination factors and to determine the sincerity and consistency of the test and the time needed for it as it is calculated by recording the time it took the first student to answer and the time taken by the last student.

B. Validity and Consistency of the Scientific Image Reading Test

To ensure the sincerity of the scientific picture reading test, the researchers presented the test to a group of specialized arbitrators, in order to ensure its validity as a measuring tool in this study in terms of: linguistic integrity, scientific health, clarity, representation of skills to be measured and their suitability for students of the ninth grade.

To check the stability of the current study tools (test the skills of reading scientific images); It was applied in its final forms to a survey sample of 53 students from the ninth grade students, where the coefficients of the return stability were calculated using the (Pearson) equation; Also, the internal consistency coefficients were calculated using the (Cronbach Alpha) equation, and Table (2) shows that.

Table 2: Internal Consistency and Frequency Coefficients for Testing Scientific Image Reading Skills

Measure	***Items Number***	***Internal Consistency Coefficient***	***Consistency Frequency Coefficient***
Testing Scientific Image Reading Skills	25	0.91	0.86

It can be noted from Table (2) that the consistency coefficient of the internal consistency of the science image reading skills test has a value of (0.91), while the consistency coefficient of the test of reading the scientific image skills has a value of (0.86), all of which are acceptable for the purposes of the current study.

C. Correction of the Scientific Image Reading Test

Based on the arbitrators 'notes and directions, appropriate adjustments were made to some of the test passages, by linguistic and scientific reformulation, where the test came in its final form with the following features: The

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number of test items reached (25) items, all of them from a multiple choice type, and the test duration reached (45) minutes, The correct answer was given one score, while the incorrect answer was given a **zero**.

D. An Exploratory Application for a Scientific Picture Reading Test

The application of the scientific image reading test to an exploratory sample from outside the study sample aims to give the researcher the opportunity to obtain accurate results that enable him to apply the test to the study sample, determine the number of test items, define difficulty and discrimination coefficients for test items, and calculate the stability coefficient of the test, and to identify Clarity of the test instructions, and the time required to fully answer his items.

- The researchers applied the test of reading the scientific image to an exploratory sample other than study groups consisting of (53) male and female students from the ninth grade class at the Sobha Comprehensive School for Girls of the Directorate of Education for the Northeastern Badia for the academic year 2019/2020 AD.
- It was found to the researchers that the test instructions were clear and accurate, and the time required for the test is (45) minutes, as the researcher determined the time in which he received the test paper from the first student who was able to answer the test paragraphs and reached 25 minutes, then the time when the last student asked to answer About the test has reached 45 minutes, and 10 minutes were taken into consideration to organize students, distribute test papers and read instructions, then calculate the entire test time by calculating the average of the previous two times as follows:

$$Test\ time = first\ student's\ answer\ time + last\ student's\ response\ time\ /2 = 25 + 45/2 = 35\ minutes$$

10 minutes for the examination time are added to organize the students and distribute the test papers and instructions, so it is:

Actual test time = 35 + 10 = 45 minutes

E. Calculating Difficulty and Discrimination Coefficients for the Test Items Reading the Scientific Image

Difficulty coefficients were calculated for the test items, and it was considered that the paragraph whose difficulty factor is less than (0.2) is very difficult, whereas the difficulty factor has greater than (0.8) is very easy, thus accepting the paragraphs whose difficulty factor ranges from (0.2-0.8) (Odeh, 2014).

The discrimination factor is related to a large degree to the difficulty factor, and the task of the discrimination factor is to determine the effectiveness of a paragraph in distinguishing between a student with high capabilities and a student with low capabilities, and discrimination factors were calculated for the test items, thus accepting the paragraphs that were distinguished between (0.2- 0.8), according to the standard referred to by Odeh (2014). Table (2) shows the results of the difficulty and discrimination factors for the paragraphs of the scientific image reading test.

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Table 3: Difficulty and Discrimination Coefficients for the Scientific Picture Reading Skills Test Statements (A sample of 53 male and female students):

Item No.	*Difficulty Coefficient*	*Discrimination Coefficient*	*Item No.*	*Difficulty Coefficient*	*Discrimination Coefficient*
1	0.50	*0.29*	**14**	0.54	*0.36*
2	0.54	*0.21*	**15**	0.46	*0.36*
3	0.43	0.43	**16**	0.61	0.50
4	0.29	0.43	**17**	0.36	0.43
5	0.50	*0.29*	**18**	0.39	*0.21*
6	0.36	0.43	**19**	0.25	*0.36*
7	0.57	0.43	**20**	0.54	*0.36*
8	0.36	*0.29*	**21**	0.46	*0.36*
9	0.32	*0.36*	**22**	0.32	0.50
10	0.39	*0.36*	**23**	0.43	0.43
11	0.50	0.43	**24**	0.21	*0.29*
12	0.54	*0.36*	**25**	0.43	0.57
13	0.36	0.43			

Table (2) shows that the difficulty coefficients for the paragraphs ranged between (0.21-0.61), and the discrimination coefficients ranged between (0.21-0.57). And based on what was indicated by the return (2010) of the acceptable extent of the difficulty of the paragraph, which ranges between (0.20-0.08), and also with regard to distinguishing the paragraph, as the paragraph is considered good if its discrimination factor is higher than (0.39), and it is acceptable and it is recommended to improve it if the discrimination factor ranges Between (0.20-0.39), weak and it is advisable to delete it if its differentiation coefficient ranges between (zero -0.19), and accordingly every paragraph of the coefficient of discrimination within the range (greater than or equal to 0.20 and less than 0.40) has been improved / modified.

The Application of the Study

The procedures for carrying out the study were as follows:

A. The first and second controlling groups: These two groups studied the cell unit and the tissues of the human body according to the usual method, and the teaching period for these two groups lasted (4) weeks with two sessions per week.

B. The first and second experimental groups: The two groups were studied according to the developed unit, where the teacher and the teacher of biologists - who taught the two experimental groups - taught the lessons of the developed unit under the supervision of researchers, Where the teacher and the teacher were visited twice before starting the teaching process, and they were explained on how to teach according to visual learning, and some lessons were applied between the teacher and the teacher and researchers before their application in front of the students, and with the presentation of a guide for these two groups with the same teaching period for the two controlling groups, also (4) Successive classes on communication programs at the beginning of the experimentation process, and the teacher and teacher discussion in some notes related to implementing the teaching procedures according to the visual learning model, and the necessary educational materials and tools were provided to implement the included visual learning, in addition to following up the teaching process until the application was completed.

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The Study Variables

1. Independent variable:
   - Gender: Male and Female
   - The developed unit has two levels
   - The educational unit developed based on visual learning
   - Regular educational unit.
2. Dependent Variable: Photo reading skills and has 5 levels (note the image or drawing and its description, analysis of the image or drawing, linking and installation, awareness and interpretation of ambiguity, and meaning extraction).

III. THE RESULTS OF THE STUDY AND ITS DISCUSSION

The results of the study were presented and discussed according to their question and the accompanying hypotheses as follows:

- Is there a statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean of the study members' performance on the skills of reading combined scientific images attributable to the unit variable used in teaching (regular, developed educational unit based on visual learning)?

To answer this question and verify its associated hypotheses; The arithmetic averages and the standard deviations of the performance of the modified pre-, post- and post-study study members on the skills of scientific image reading combined, according to the variable of the unit used in teaching (ordinary, and a developed educational unit based on visual learning), as shown in Table (4).

Table 4: Arithmetic averages, and standard deviations of the performance of the modified pre-, post- and post-study study members on the skills of scientific image reading combined, according to the unit variable used in teaching

Unit Used in Teaching	***Gender***	***Former Performance***		***Prior Performance***			
Regular	*Male*	*Arithmetic Mean*	*Std. Dev.*	*Arithmetic Mean*	*Std. Dev.*	*Adjusted Arithmetic Mean*	*Incorrect Std. Dev.*
	Female	8.68	5.45	15.26	2.73	15.34	0.68
	Total	9.96	2.57	16.22	3.79	16.16	0.62
Advanced Visual-Based Learning and Reading Unit	Male	**9.38**	**4.12**	**15.79**	**3.35**	**15.75**	**0.46**
	Female	9.14	2.53	17.77	2.41	17.80	0.63
	Total	9.73	3.57	19.92	2.76	19.89	0.58
Overall	Male	**9.46**	**3.12**	**18.94**	**2.79**	**18.85**	**0.43**
	Female	8.93	4.10	16.61	2.83	16.57	0.47
	Total	9.84	3.11	18.18	3.75	18.03	0.43

Table (4) shows that there is a apparent difference between the arithmetic and pre-arithmetic intermediate between the performance of the members of the experimental group who were taught with a developed educational unit based on visual learning, and the presence of a virtual distinction between the two arithmetic intermediate interfaces for the performance of the members of the study groups: the control and the experimental group. To know the statistical significance of the apparent dimensional differences according to the variable of the unit used in

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teaching, after neutralizing the tribal differences in the performance of the members of the two study groups on the skills of reading scientific images combined; Use the Two-Way ANCOVA accompanying analysis, as shown in Table (5).

Table 5: Results of the Binary Variance Analysis Associated with the Arithmetic Mean for the Performance of the Post-Study Members on the Skills of Reading the Combined Scientific Images According to the Unit Variable Used in Teaching

Variance Source	***Squares Total***	***Freedom Degree***	***Squares Mean***	***F-Value***	***Statistical Mean***	***Effect Size***
Prior (Combined) Test	11.260	1	11.260	1.276	0.262	
Unit Used in Teaching	212.968	1	212.968	24.135	****0.000***	***0.221***
Gender	46.517	1	46.517	5.272	****0.024***	***0.058***
Unit Used in Teaching X Gender	8.851	1	8.851	1.003	0.319	0.012
Error	750.047	85	8.824			
Adjusted Total	**1048.400**	**89**				

*** Statistically significant at the level of statistical significance (α = 0.05)**

Given the results of the analysis of variance shown in Table 5, the following is noted:

The value of the statistical significance of the unit variable used in teaching was (0.000) which is less than the level of the statistical significance (α = 0.05). Thus, the first zero hypothesis was rejected, which states: "There is no statistically significant difference at the level of statistical significance (α = 0.05) between the arithmetic mean of the study members' performance on the skills of reading individual and combined scientific images attributable to the unit variable used in teaching (regular, unit Educational development based on visual learning), and accepted the alternative which states:

"There is a statistically significant difference at the level of statistical significance (α = 0.05) between the arithmetic mean for the performance of the study members in developing the skills of collectively reading scientific images attributable to the unit variable used in teaching (the usual, developed educational unit based on visual learning)." - From the table of mathematical averages, it turns out that the statistically significant difference was in favor of the performance of the members of the experimental group who were taught using a developed educational unit based on visual learning with an average arithmetic average higher than the average arithmetic average of the performance of the members of the control group who were taught in the regular unit. The Effect Size was calculated using the Eta Square, which was (0.221); This means that (22.1%) of the variance (improvement) in the performance of the members of the post-study on testing the combined skills of scientific image reading is due to the use of an advanced educational unit based on visual learning.

The result that demonstrated the effectiveness of developing an educational unit in biology based on visual learning can be explained in developing the skills of reading scientific images, that the skills of reading scientific images depend on the skill of visual discrimination, the skill of perceiving spatial relationships, the skill of information interpretation, the skill of information analysis, and the skill of inferring Meaning, which are essential skills all students need in their daily lives, and visual learning focuses on these skills (Deweny, 2007).

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The development of an educational unit based on visual learning clearly contributed to attracting the attention of students and giving them the opportunity to focus on skills in reading scientific images such as pictures, models, video clips and analogues, which led to their superiority over their peers among students of the control group in the test of reading scientific images as in the study (Muhammad and Jabouri , 2019) which addressed the skills of reading pictures and biological illustrations.

The development of an educational unit in biology based on visual learning contributes to the retrieval of information from long-term memory, as it connects the student to the concept with the image, which facilitates retrieval and the speed of its response to learning, because the interesting elements of tools and visual means that have provided them with their thinking, motivation and attract their attention are provided To gain knowledge in biology and other disciplines (Al-Mousa, 2014).

Likewise, through the practical experience of the researchers in teaching and the observations of teachers, the use of various visual activities, including images, models, videos, drawings and LCD displays, contributed to the effect of learning and organizing information within the student's knowledge structure, where the learner builds his knowledge by watching many visual activities that entrench his knowledge, And develops many skills, as the use of visual activities led to a comprehensive view of the subject and possessing different and varied skills.

The skills of reading the images themselves, their clarity and their interconnectedness, led to the completion of the knowledge image of the students, due to the interesting elements they provide to the classroom environment, which gives pleasure and activity, and this appears during the presentation of videos in which the image, movement and sound merge together, which facilitates storage and recall operations for information.

Teaching the developed educational unit based on visual learning provided students with an increase in awareness, understanding and awareness of what they have learned, through the use of various visual activities that arouse their attention, increase their self-confidence and reduce the confusion that students may feel during the educational situation, which leads to increased learning. It also contributed to providing assistance to students and providing them with skills that enable them to deal with the educational situation and interact with it positively in order to achieve the desired educational goals.

In order to achieve the desired educational goals.

The teaching of the educational unit developed on the basis of visual learning reduced the gap that arises between teachers and students, because it is based on the principle of providing assistance from the teacher or from any source of knowledge available in order to achieve educational goals, as well as led to more continuous and effective communication between Students and the teacher on the one hand, and between the students and their colleagues on the other hand, which reflected positively on learning, and the teacher was able through this interaction to identify the needs of students of all kinds, and transfer his knowledge and skills expertise to them.

In addition to teaching the developed educational unit based on visual learning, it provided information to students in a rich and varied learning environment that encouraged them to take responsibility for their own

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learning, and gave them a sense of acceptance from others, transcending individual differences, and overcoming the boredom that may accompany the learning process.

The researchers 'findings are consistent with the findings of Barakat's study (2006) in developing some dimensions of spatial ability and achievement through the visual spatial entrance, and that the learner builds his knowledge through doing many activities and visual imaginations that develop students' ability to possess various skills, and that Using visual displays that make it easy to recall information when you need it.

The value of the statistical significance of the gender variable was (0.024), which is lower than the level of the statistical significance ($\alpha = 0.05$). Thus, the second null hypothesis, which states: "There is no statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean of the study members' performance on the skills of reading individual and combined scientific images attributable to the gender variable (male, female)" was rejected and accepted The alternative states: "There is a statistically significant difference at the level of statistical significance ($\alpha = 0.05$) between the two arithmetic mean for the performance of the study members in developing the skills of scientific image reading combined due to the gender variable (male, female)". From the table of mathematical averages, it becomes clear that the statistically significant difference was in favor of females with a mean mean average higher than the male average. The effect size was calculated using the Eta Square, whose value was (0.058); this means that (5.8%) of Variation (improvement) in the performance of the post-study members on the combined skills of scientific image reading skills due to the gender variable.

- The results of the current study showed that the skills of reading scientific images are influenced by the sex of the student, so we find that females prefer the visual cognitive style more than the male, more precisely; Current results have proven that females are more affected by image reading skills, as they prefer to create a mental image of new or complex information, and images and illustrations also play an important role for them in assimilating the information (Yaqoub, Safar, and Shame, 2016).

In sensory development, the sense of vision grows and improves in childhood, but myopia appears and is more evident in females than males, as it appears at this stage the ability to distinguish between colors, and this ability in females is more than in males, as color blindness is very rare in females (Abdullah , 2011).

Given the difference in the composition of the sensory systems between the sexes, researchers confirm that the female and male senses sometimes work in different forms, as Sax (2005) conducted a study indicating a close link between the formation of the sensory systems and between the development of cognitive abilities, behavior, and analytical thought. This is because the woman may see in the same scene or painting, colors that the man does not see, and thus create information that differs from the information received by his brain, and it is remarkable that he conducted a study on male and female mice, according to which the retina of the male eyes is provided with dense cells to monitor the speed of movement, while It has been proven that the retina of female eyes is more effective for collecting information related to shapes and colors, and if we take into account the scientific fact that emphasizes the very similarity between the behavior of mice and humans, we realize the reason why females are attracted to reading color scientific images more than males.

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- The value of the statistical significance of the bilateral interaction between the two unit variables used in teaching and sex was (0.319), which is greater than the level of the statistical significance ($\alpha = 0.05$). Thus, the third zero hypothesis was accepted, which states: "There are no statistically significant differences at the level of statistical significance ($\alpha = 0.05$) between the arithmetic mean of the study members' performance on the skills of reading individual and combined scientific images attributable to the interaction between the two unit variables used in teaching, and gender".

IV. In Light of these Results, the Researchers Recommend the Following

The use of visual learning in science education in general and biology teaching in particular as one of the effective learning methods that work to achieve many goals of science education, as the use of visual activities through a strategy that includes organized steps improves learners' abilities to learn science, and the use of teaching strategies that contribute to raising Skills of reading pictures and illustrative biosafety in teaching biology for the ninth grade, and training teachers to use strategies and models more effective in meeting the needs of students so that they have an impact in developing the skills of reading scientific pictures, and conducting more research and studies on skills of reading scientific pictures in other regions and on other classes.

References

[1] Abdallah Mohamed. (2011). Educational understandings and knowledge: Teaching methods for children. Amman: Dar Al-Manhal.

[2] Abdullah, Atef. (2002): The effectiveness of a proposed unit for developing the skills of reading pictures and drawings related to social studies for middle school students, Cairo, Ain Shams University, the fourteenth scientific conference, curricula of education in light of the concept of performance, volume 1, the Egyptian Curricula Association.

[3] Al-Farra, Abdullah. (1999). Education and Communication Technology (2nd floor). Sanaa: University Publishing House.

[4] Al-Fraijat, Ghaleb. (2011). Introduction to educational technology (1st floor). Amman: Dar Al-Konouz, Scientific Knowledge for Publishing and Distribution.

[5] Al-Gorani, Youssef. (2014). The effect of the visual teaching strategy on the achievement of biology and the development of science processes for middle school students. *Al-Fateh Magazine*, 58 (5), 118-148.

[6] Al-Mousa, Anwar Abdul Hamid. (2014). Technology in the service of learning and education (1st floor). Lebanon: Arab Renaissance House, Hilat, Bahgat. (2001). The effect of using the survey on the acquisition of science processes among students with different educational patterns. Unpublished Master Thesis, The Hashemite University, Zarqa, Jordan.

[7] Al-Shanti, Afaf. (2011). The compatibility between the image and word cultures as a criterion of quality in the content of the Palestinian science textbook, Parthia, for the fourth basic grade. Master Thesis, Al-Azhar University, Gaza.

[8] Ambo Saeedi, Abdullah; Al-Balushi, Sulaiman. (2011). Science teaching methods, concepts and applications (2nd floor). Amman: *Al Masirah House for Publishing, Distribution and Printing.*

[9] Arafat, success. (2000). The effectiveness of the use of illustrations and illustrations in teaching science among middle school pupils with excessive activity on achievement and acquisition of some science processes. *Journal of Scientific Education,* 3 (2), 123-149.

[10] Barakat, Ahmed. (2006). The effectiveness of the spatial visual approach in developing some dimensions of spatial ability and achievement for prep stage students in science. Unpublished Master Thesis, Ain Shams University, Egypt.

[11] Bozdogan, Aykut Emre (2011). THE Effects of Instruction with Visual Materials on the Development of Preservice Elementary Teachers' Knowledge and Attitude Towards Global Warming, TOJET: *The Turkish Online Journal of Educational Technology,* 2(10), 218-233.

[12] Cochran ,L. (2007). Visual Education, *International Encyclopedia of Curriculum,* 3(12), 858-910.

DOI: 10.37200/IJPR/V24I5/PR2020774
Received: 22 Apr 2020 | Revised: 29 Apr 2020 | Accepted: 22 May 2020

[13] Cook, Michelle (2011). Teachers' Use of Visual Representations in the Science Classroom, *Science Education International*, 3(22), 175-184.
[14] Downey, mathewt. (2007) .pictures as teaching aids: using the pictures in history Textbooks, *social Education,* Vol. 85.
[15] Dwyer, Francis and David, Mike. (2015). Visual Culture and Visual Learning, translated by Nabil Gad Azmy, 2nd floor, *Cairo: Beirut Library.*
[16] Maliki, Awad. (2002). The relationship between visual spatial perception in mathematics and technical skill among students in the second intermediate class of the city of Mecca, *Journal of Mathematics Education*, 12 (3), 167-202.
[17] Muhammad, Ali; Jabouri, Hamzieh. (2016). Skills of reading pictures and biological illustrations for fifth-grade students. *Al-Qadisiyah Journal*, 17 (1), 321-346.
[18] Obaidat, Zoukan and Sohaila, Abu Al-Semid. (2012). Modern teaching strategies in the twenty-first century (1st floor). Amman: Dar Al-Fikr Al-Arabi.
[19] Qandil, Ahmed. (2006). Teaching with modern technology (1st floor). Cairo: The World of Books.
[20] Sax, L. (2005). Why gender matters: What parents and teachers need to know about the emerging science of sex differences. New York: Doubleday.
[21] Seven, Mehmet Ali; Engin, Ali Osman (2007). The Importance and Effect of Us ing Aid Materials in Foreign Language Teaching, ERIC Number: ED497456. Re trieved from: http://files.eric.ed.gov/ fulltext/ED497456.pdf

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