

Qualitative Research in Education  
Volume 13, Issue 2, 27<sup>th</sup> April, 2024, Pages 1 – 20  
© The Author(s) 2024

# The effect of virtual mathematics laboratory on the achievement and Visual culture skills of middle school students

Ali Majid Mustafa Al-Jammali 1, Prof. Dr. Ilham Jabbar Faris 2

1) University of Baghdad\ College of Education for Pure Sciences / Ibn Al-Haytham.

2) University of Baghdad\ College of Education for Pure Sciences / Ibn Al-Haytham.

## Abstract

The current research aims to identify the impact of the virtual mathematics laboratory on attainment and Visual culture skills among middle school students. The sample consisted of (76) students from the first intermediate grade students in (Baghdad Intermediate School for Boys) affiliated to the First Directorate of Education of Baghdad Al-Karkh, with a total of (37). A student in the experimental group and (39) students in the control group, a test was prepared to collection by (30) paragraph. And a visual culture skills test was prepared with (27) items, and the apparent validity of the test was verified. And calculate the stability coefficient of the test Achievement and visual culture. By using Cronbach's alpha equation, and by using appropriate statistical methods, the results showed that the students of the experimental group who studied in the virtual mathematics laboratory excelled over the students of the control group who studied in the usual way in visual culture skills. and collection. In the light of these results, a number of conclusions, recommendations and suggestions were reached.

## Keywords

virtual math lab, achievement, Visual culture skills.

---

**Corresponding author(s):** Ali Majid Mustafa Al-Jammali

**Contact address:** ali.majid2103m@ihcoedu.uobaghdad.edu.iq

## Introduction

One of the alphabets of teaching and learning is that it occurs at a higher rate if the student uses the sense of sight and works with hands. so Studies such as the study of (Al-Jubouri, 2010), the study of (Omar, 2013), and the study of (Suleiman, 2015) emphasized the necessity of relying on them. In teaching science and mathematics, because mathematics is an abstract science that needs to teach knowledge by using specific tools and means to approximate the image of this knowledge. Both studies (Hasan, I. F & Faris, EJ 2019) (and study) The greatest And Jasem, 2019) (and study) Hasan, I.F & Faris, EJ (2020)) and study (Al-Aqabi & AL-Kadhimi (2023)) to the fact that the use of interactive methods in teaching can affect effective variables that improve mathematical abilities and achievement and some important skills that are the goals that mathematics seeks to achieve. It was the emergence of the concept of the knowledge economy and the concept of integrating educational environments (STEEM) a role in the emergence of the need to move towards the use of technology in teaching mathematics as an urgent need to develop thinking skills and types of intelligence based on the theory of brain-based education, which clearly refers to the concept of visual thinking and from it to visual culture, and this is indicated by a study (2021) (elt&Jawad, L.F.) and study (Hassan, DAK 2018.) and study (Hassan, AK 2017.) and study (Majeed, BH, 2022)). And where longer Lab Mathematics is one of the modern trends advocated by the first scientific conference of the Arab Society for-Education technology to benefit from local and international experiences in the field of technological development (Nofal, 2010, p. 17), Because of the development in the field of educational technology, it has become possible to use modern methods that increase the effectiveness of students and give them multiple skills and help make learning more efficient and effective because of the use of various methods and the development of basic skills for students, because it works to give them reinforcement to discover concepts and generalizations and apply them to solve life problems and exercises Mathematics, because the mathematics lab is a microcosm of real life, so it connects real life with abstract concepts and ideas. For this reason, pain is used a job The default with the natural sciences, and so on We thought Experimenting with the use of the mathematics lab to transform the idea of abstract concepts and generalizations with

their symbols and their relationship into images and shapes that move so that the role of the student becomes to discover these concepts and their applications with generalizations to achieve the most important objectives of teaching mathematics, which is problem solving, which has an effective role in raising the level of students. Cognitive: If the student is able to understand his problems, then he will be able to pass any problem and he will have the ability to develop his visual culture through understanding, realizing and interpreting the problems. The culture: Visual for students. Therefore, the research problem will be determined by answering the following question:

**What is the effect of the virtual math lab on attainment and Visual culture skills of middle school students?**

**Second: the importance of research:**

**theoretical importance**

- A. The virtual mathematics laboratory is one of the methods that contribute to the treatment of ineffective teaching methods used in mathematics lessons and that are unable to develop visual culture skills. and collection.
- B. As far as is known. This research is the first of its kind locally and in the Arab world to measure the impact of the virtual mathematics laboratory on visual culture in mathematics. Intermediate first grade students, which helps in expanding students' effectiveness in learning through its active role to make the student the focus the operation Educational - Learning through individual and group educational participation.

**2. Applied importance:** The practical importance lies in the following:

- A. The research is characterized by being an attempt to prepare procedural-practical steps and to provide abstract data on the impact of the virtual mathematics laboratory on attainment and The culture: visual. For middle school students.
- B. It provides an integrated bag that includes presentation of engineering lessons for the first intermediate grade using the virtual mathematics laboratory.

C. The research provides tests for the skills of cultureVisual and achievementSo that it has propertiesPsychometrics suitable for the first intermediate grade, and to be reliable for its adoption in other research.

**Third: . Research goal:** The current research aims to:

A study of the impact of the virtual mathematics laboratory on the visual culture skills of middle school students.

**fourth:.. research assumes :**

1. There is no statistically significant difference at the level of significance (0.05) between the average scores of the students of the experimental group that studied using the virtual mathematics laboratory and the average scores of the students of the control group that studied using the traditional method in a testachievement.
2. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group that studied using the virtual mathematics laboratory and the mean scores of the students of the control group that studied using the traditional method in testing visual culture skills.

**Fifth: search limits**

**The following search was limited to:-**

1. Students of the first intermediate grade in the first Karkh Education Directorate inBaghdad city.
2. The second semester of the academic year (2022-2023 AD).
4. Visual culture skills, including (skills for translating visual messages (reading pictures), writing skills for visual messages).

**Sixthly :. to set Terminology**

**a. Virtual lab(Virtual Laboratory) was known by:**

1. (Zeitoun, 2005): It is a "virtual teaching and learning environment aimed at developing students' laboratory work skills. This environment is located on a website, and this website usually includes a home page with a number of links or icons.(Tools)related to laboratory activities, their achievements and their evaluation..

(olive,2005, p. 165)

**theoretical definition:**known to the researcher theoretically that he:education environment And to learn virtual And interactive with high technical specifications in the computer jThe aim is to display the content of mathematics through the virtual laboratory, which the researcher has chosen from specialized websites in this regard, and to use it within the classroom in order to improve the academic achievement of students. and their visual culture skills.

**operational definition**The researcher defines it procedurally as::An interactive educational-learning environment that needs computer technologies, which in turn aims to present the content of mathematics through the virtual laboratory, which the researcher chose from specialized websites in this regard and use it within the classroom in order to improve the academic achievement of students in the first intermediate grade (the research sample) and their visual culture skills.

**T.achievement (achievement)**He was known by:

(Abu Jado, 2009) that it is "the outcome of what the student learns after a certain period of time and it can be measured by the grades he gets with an achievement test to know the success of the strategy that the teacher sets and plans for in order to achieve his goals and what the student reaches in terms of knowledge that translates into grades."(Abu Jado, 2009, p. 235)

**theoretical definition:**The researcher adopts the definition of (Abu Jado, 2009.) as a theoretical definition of it.

**operational definition**The researcher defines it procedurally as: (the grades obtained by the first intermediate grade students on the test that measures the achievement prepared by the researcher for this purpose, a test in mathematics).

**w.visual culture skillsvisual culture skills):**

(Ibrahim, 2003): It is "the skills that a student learns to read and write visual language" (Ibrahim, 2003, p. 297).

**theoretical definition**These are skills that are related to the sense of sight that can be developed through sight, and that enable the student to translate visual messages (reading pictures) through recognition, verbal recall, comparison, classification, arrangement, interpretation, solving visual problems, and the skill of writing visual messages through visual discrimination and awareness of

spatial relationships.

**operational definition** The researcher defines procedurally as: “a set of skills that enable the student to read and write the image, and it is measured by the degree he obtains in the visual culture skills test prepared by the researcher for this purpose.

## **Chapter II/Review of references**

### **The first axis: the theoretical background**

#### **virtual math lab(virtual math lab)**

The continuous tremendous development in human knowledge and experiences has resulted in many innovations in all fields, the most important of which are: technological innovations that have been employed in developing the educational process with all its elements and raising its level, and the use of the concept of virtualization in relation to the field of laboratories has spread widely, and it is called in the literature Arabic has other names, including: (the virtual laboratory, the virtual laboratory, the electronic laboratory, the network-based laboratory, and the digital laboratory), as it is called in foreign literature by other names, including (Online Lab, Web Open Lab Virtual Labs, Web Lab, Electronic Labs, ), and the virtual lab teacher is called the Virtual Teacher, and his students are called Virtual Students.(Al-Hazmi, 2010, p. 133).

#### **Virtual lab strategies**



Figure (1) The strategy of the virtual laboratory (prepared by the researcher)

#### Fourthly: visual culture ((Visual Culture

Who used the term ( Visual Literacy)For the first time, the year (1969 AD) is the world John Debes) , and translated into Arabic(Visual literacy)This meaning was part of the visual culture ((Visual Culture) Debes was working at the Kodak Foundation, which devoted his time to developing programs that help develop visual skills for young learners, holding conferences on visual culture with the participation and support of multiple parties, and the International Visual Literacy Associations, 2012 was formed. (IVLA) as one of the branches of the Educational and Technological Communications Association, which issued its publications such as the Journal of Visual Culture, which aimed to show the full correlation of visual verbal expression, and the National Education Association considers visual culture to be the ability to understand oneself, and to express it in terms of Visual materials and the link between meanings and visual images, which hide behind these images, and this is similar to the definition presented by (Braden & Walker, 1980) at the annual conference;The twelfth of visual culture is as follows: "In order to be a visually educated person, you must be able to extract the meaning of what you see, and to be able to communicate the meaning to others through the images that you create." (Dwyer W Moore, 2015, s89)

There are many culture skills mentioned in the previous literature, and the researcher has adopted a set of visual culture skills, commensurate with the characteristics of the target group. (The research sample

is intermediate first grade students). as follows:

**Visual culture skills:**

**First: the skills of translating visual messages (reading pictures): it is the decoding of the visual code, that is, the ability of the student to read the visuals and convert the visual language into a verbal language.**

1. Recognition: The student's ability to name, recognize, or prepare the components of a previously studied illustration.
2. Verbal Recall: The ability to verbally recall information about the components and elements of an illustration.
3. Comparison: The student's ability to identify similarities and differences between things or their components.
4. Classification: The student's ability to collect things or events that are represented by illustrations.
5. Arrangement: The student's ability to arrange the components or elements of the illustration.
6. Interpretation: It means the individual's ability to employ the information he has in reaching himself the reasons behind a phenomenon, event, process, or something that is expressed in an illustration through his awareness of the relationships between the components of this drawing.
7. Visual Problem Solving: The student's ability to identify appropriate relationships and procedures to deal with an unfamiliar situation expressed by an illustration.

**Second: Visual message writing skills: The student's ability to convert verbal content into visual by using sequential images and arranging visuals**

1. Visual Distinction: An ability to notice the similarities and differences between several visual stimuli such as shape, size, color, etc
2. Perceiving spatial relationships: is the ability to distinguish surrounding objects and to perceive the positions of objects

**The second axis: previous studies:**

**A study on the virtual math lab:**study (good,2019): conducted inEgypt to know on design Lab mathematics default using patterns from nutrition review in development skills measurement stereotypes And sense aesthetic for mathematics I have pupils stage Elementary, the curriculum was



used experimental, and the sample consisted of 86 Pupil And his disciple, she showed Results Existence spreads Favor the group Experimental that I studied according to lab mathematics default in a test Measuring skills stereotypes and scale sense The aesthetic of mathematics .

**A study on visual culture:**Study (Abdel-Fattah,2021): conducted in Egypt aim toIdentify on design books booster existing on merge between allusions visual and catalysts the games educational in the video Interactive to develop skills the culture visual and indulge in learning I have the pupils weak hearing.The curriculum has been taken experimental and descriptive analytical, the sample consisted of (28)Pupil And his disciple, she revealed Results in application remote between groups The three for every from a test skills culture about Existence spreads function statistical visual, and scale indulging in learning, and test my attainment(Favor the group Experimental third, and condolence The result previous to that style merge got up on to benefit from features And advantages all from allusions visual stimuli the games digital that include it the video Interactive By the book augmented.

### **The third chapter: research methodology and procedures**

**Research Methodology (Research Methodology ):**To achieve the research goalsbeen followedThe experimental method is as described in the steps below:

**Firstly. Experimental design(Experimental Design):**It was adoptedExperimental design for two equal groups (experimental and control) with a post-test, and a table (1)This design demonstrates:-

**Schedule (1) Research experimental design**

measure the dependent variable	dependent variable	The independent variable	Equivalence of the two groups	the group
- a testachievement -a testvisual culture	achieveme ntVisual culture	Virtual math lab	Knowledge test previous sports Chronological age Previous collectionin materialmathemat ics	Experime ntal
		the usual way		control

			- IQ test	
--	--	--	-----------	--

**secondly. Research community (research population):** The research community is represented by the first intermediate grade students in the day intermediate and secondary schools affiliated to the General Directorate of Education of Baghdad / Karkh, the first for the academic year 2022-2023 AD, as the total number of intermediate day schools reached (75 (schools), while the total number of members of the research community reached (42511).<sup>1</sup>A student.

**Third. The research sample: (Research Sample)** The selection of (Baghdad Intermediate School for Boys) was random, School included two divisions From the middle class, to Division (B) the experimental group, as the number of its students reached (37 (students and class (C) to represent the control group and the number of students in it) 39) students.

#### **Fourthly. procedures settings (Control Procedures)**

**1. internal safety for the experimental design (Internal Validity Experimental Design):** The researcher conducted an equivalence between the two groups, in order for the current research to be honest and accurate according to the criterion in which the resulting difference between the two research groups can be attributed to the independent variable and not to any other factor in the variables (prior knowledge, intelligence, previous achievement).

**2. External safety of the design (Experimental):** The following procedures were taken:

**a. Circumstances of the experiment and the incidents associated with it:** The members of the two groups were not exposed to accidents that would impede the course of the experiment that may affect the dependent variables in addition to the effect of the independent variable.

**B. Experimental extinction (leaving the experiment):** did not The sample members are exposed to Students drop out or leave.

---

(<sup>1</sup>) The data was obtained from the First Directorate of Education of Karkh / Division of Statistics and Planning according to the book Facilitating the Mission No. D40/4811 on 9/20/2022 AD, Appendix (1).

c. Maturity: I started The experiment took place on 2/21/2023 AD, and ended on 4/17/2023 AD. These operations had no effect on the research experience.

#### **D. The effect of the experimental procedures:**

**1. Confidential research experience:** been preserved Confidentiality of the research experience BAgreement with the school administration and the subject teacher.

**2. Subject :-**The students of the research sample were taught the two groups With the same number of content of the study material represented in the chapters (fifth and sixth) of the mathematics book. For the first intermediate grade / fifth edition for the academic year 2021 AD.

**3. Teaching aids** Use the researcher. The following teaching aids:

- ❖ smart board, computer, projection screen (data show).
- ❖ locations ((Mathigon, MATH is fun)).
- ❖ programs (Shapes 3D -Geometry Drawing), (shapes 3D-Geometry) Learning), (Gegebrar shaper 3D CAD modeling), (shapes 3D-Creat (Geometry AR), (ward wall ,(Games), Three-dimensional shapes (wooden, plastic, cardboard papers)

#### **Fifth: the search tool:**

##### **1. achievement test**

- 1. determining the goal From the test:** measurement Students' achievement level in the academic content of mathematics to be taught to them.
- 2. to set Scientific article:-** The item has been identified science that will be taught to the two groups.
- 3. Formulate behavioral goals:** The behavioral objectives are formulated according to Merrill's classification within the domain Cognitive in its three levels, and the final number reached (186) behavioral goals.
- 4. to set The number of test items:** A number is specified Achievement test items With (30) paragraphs Checksums.
- 5. Preparation of specification table (test map):**to The test map has been prepared As shown in the following table:

#### **Schedule(2) Specifications table**

<b>The</b>	<b>knowledge domain levels</b>	<b>The</b>	<b>The</b>	<b>chapter title</b>	<b>t</b>
------------	--------------------------------	------------	------------	----------------------	----------

number of paragraphs	Discovery32%	application 34%	to remember 34%	relative weight of the class	number of shares specified		
15	4.704 = 5	4.998=5	4.998 = 5	49%	17	Engineering	
15	4.846=5	5.202=5	5.202=5	51%	18	measurement-alspaces	
30	10	10	10	100%	35	the total	

6. **Drafting test items My achievement:**The researcher prepared (30) test items to build a test that combines objective questions and essay questions.

7. **Preparation of test instructions**The test instructions directed to the students were prepared and placed at the front of the test paper, as they are the guide that guides the student when answering the test items.,AndThe researcher prepared the test correction keyRWhich shows the correct answer for each paragraph of the objective and essay test, and the essay paragraphs included (10) paragraphs, and the total score for the essay questions was (46) degrees, and thus the score. The total achievement test as a whole is (66) marks.

#### 8. Validity of the test:

A. **Virtual validity :-**The achievement test was presented to a group of arbitrators with specialization in mathematics and its teaching methods.And it was doneThe percentage of agreement reached more than (80%) of the opinions of the arbitrators, and all the test paragraphs were kept in their final form, consisting of (30) paragraphs.

B. **Validity of the content:** It has been verifiedPreparing a table of specifications, and thus the achievement test is considered honest with regard to its representation of the content of the scientific material, as well as the behavioral goals that it measures.

9. **Exploratory application (test validity):** The test was applied to an exploratory sample of (35) first-grade students.And doneCalculating the average of this time to be (53) minutes, the time required for students to answer the achievement test items,AndAfter the achievement test was applied on the survey

sample the second, on a group of students different from the students of the research sample, consisting of (100) students from the first intermediate grade students in (Al-Mansour School for Boys).

**10. Statistical analysis of the items of the achievement test:** After applying the test on the statistical analysis sample It was completed corrected papers Test the students' answers and find the final score for each student They are arranged in descending order, with a percentage of 27% for the upper group and 27% for the lower group.

- A. **Difficulty coefficient for the achievement test items:** It turns out test paragraphs range Its difficulty between (0.31-0.66) Thus, all paragraphs become valid and appropriate.
- B. **Discrimination coefficient for the achievement test items:** It has been shown to distinguish the test vertebraranged between (0.29-0.67), All paragraphs are acceptable.
- C. **effectiveness Wrong alternatives:** The effectiveness of the alternatives was calculated The wrong turns out to be all negative and effective.

**11. Achievement test stability:** -I've been using Cronbach's alpha equation, so the stability coefficient value was (0.82) and he The stability coefficient of the test is good, For the purpose of ensuring the stability of the correction of the article paragraphs The researcher's correction was used with himself and with another researcher (teacher). So it was the ratio from (0.95 -0.90) , And Male (Allam, 2000) The stability of the correction of the test paragraphs is good if transaction (%80 (and more) Ghanem et al, 2022, s633).

**The final achievement test and its application:** The achievement test was applied in its final form.

## **B. Constructing a visual culture test**

1. Determine the goal **From the test:** Knowing the level of visual culture among the first intermediate students of the two groups in order to compare them to study the effect of the variable independent in it.
2. **examining On previous studies:** The previous literature and studies, which dealt with the fields of visual culture, were reviewed, and the benefit from these studies was evident in defining the fields and formulating the test items.
3. **to set Fields of visual culture:** It consisted of two areas And its sub-indicators are: ( skills translation Messages visual (reading the pictures) ( Identify call

verbal, Comparison, Category, arrangement, interpretation, Solution the problems visually), And skills Writing visual (distinguish Visual, realize relations spatial)

4. **Drafting the test items in light of the specific areas:-** It was completed editing vertebrae a test The culture visual in a light domains composed the test from (27) paragraph Of which (22) vertebrae from Type the choice from Multi And (5) paragraph from Type frying pan.
5. **Show fields with paragraphs to the arbitrators:** The two fields identified with the paragraphs were presented to a group of arbitrators in the methods of teaching mathematics, and it was a ratio Agree more than (% (80 of the opinions of the arbitrators
6. **Preparing test instructions:** Instructions for the test directed to students were set at the beginning of the test. **And Prepared Researcher that test correction key, Thematic paragraphs (0-1) As for the essay paragraphs, their grades ranged between (1-9) degrees, and the total score for the test was (44) degrees.**
7. **Exploratory application of visual culture:-**

**A. Information sample (the first survey sample):** Dish Researcher that The test was conducted on a sample (first reconnaissance) whose number reached (35) students from the first intermediate grade, It was the average time (59) minutes, After applying a test Visual culture on (sample information), Test applied once again On a second survey sample consisting of (100) students from the first intermediate grade students in (Al-Mansour Intermediate School for Boys) affiliated to the General Directorate of Education of Baghdad / Al-Karkh Al-Oula.

#### **statistical analysis For test items:-**

- **Difficulty index for the test items:-** It was found to range between (0.31- 0.66) This indicates that all treatments are acceptable.
- **discrimination coefficient. for test items :** It was found to range between (29.0-66.(0) The paragraph is good and acceptable
- **effectiveness of the alternatives** All paragraphs show that they are all negative, that is, they are effective, that is, the lower category is dispersed more than the upper category.

#### **8. Psychometric properties**

##### **A. Validity of the test:**

1. **Virtual validity** :The apparent honesty was achieved by presenting the test items to a number of arbitratorsFMathematics and its teaching methods,Paragraphs that had an agreement rate of more than (80%) were taken.who are they .
2. **Building validity**:The validity of the construction was confirmed for the test paragraphs The visual culture is as follows:
  1. **Scores for each paragraph with the degree of the related field (skill)**:My values ranged The correlation coefficients are between \*\* (0.258 -0.984), which is a good indicator of the validity of the construction for the visual culture test..
  2. **Scores for each domain and total test scores**:As values ranged Correlation coefficients are between \*\* (0.642–0.873), which is a good indicator of the constructive validity of the visual culture test.
  3. **The score of each paragraph with the total test scores**:As the values of the correlation coefficients ranged between\*\* (0.258 - 0.850), which is a good indicator of the constructive validity of the visual culture test.
- B. stability Visual culture test**:Test stability has been extracted. Visual culture in a wayCronbach's alpha was the stability coefficient (0.87),thatStability coefficientIt has good stability (Jassim and Al-Adhami, 2022, p. 420).

**9. Visual culture test Final and application**:The visual culture test was applied in its final form.

#### **Presentation of the results of the achievement test**

In order to achieve the first objective of the research, which is to know the effect of the independent variable on the achievement variable, the null hypothesis was put forward, which states::(There is no difference Statistically significant at the significance level (0.05) between the mean scores of the students of the experimental group who studied according to the virtual laboratory and the scores of the students of the control group who studied in the traditional way in the achievement test).

## (achievement)

Statistical significance at the level (0.05)	S Test'Leveneto equal the variances		t-testto equal the mean		standard error for the arithmetic mean	deviatio n normative	averag e Arithm etic	num ber the students	div	the group
	Significa nce on both sides	F	Signifi cance on both sides	T						
statistical function	0.082	3,103	0.001	3,517	1.50093	9,129	45.62	37	B	Experi mental
					1.72731	10,787	37.53	39		c

To find out the significance of this difference statistically, (t-test) for two independent samples to find out the significance of the difference between the mean scores of the students of the two groups. If the results indicated in the table above, to excel students. The experimental group who studied by relying on the virtual laboratory on the students of the control group who studied according to the traditional method in the achievement test. Thus, the first null hypothesis was rejected and the alternative hypothesis was accepted.

**effect size:** volume was effect of the variable. The independent (virtual laboratory) in the dependent variable (achievement). It was big, and it was valuable ( $d=0.82$ ).

### View achievement test results

The use of virtual lab strategies (presentation strategy, research learning strategy (individual learning), problem-solving strategy, electronic games strategy, And the strategy of practical presentations-Tronier, and the strategy of practical experiments using the dry laboratory) through displaying it on the interactive smart board in order to teach mathematics, as these strategies contributed to providing an interactive learning environment. Characterized by movement, graphics, colors and three-dimensional shapes (3D). Thansled by an element. The thrill and fun of learning.

**View the results of the visual culture test:-**



To achieve the goal of the research, which is to study the impact of the independent variable on the variable of visual culture, the null hypothesis was developed, which states that: (There is no statistically significant difference at the significance level (0.05) between the mean scores of the students of the experimental group who studied according to the virtual laboratory and the scores of the students of the control group who They studied in the usual way in the visual culture test).

Statistical significance at the level (0.05)	s Test'Leveneto equal the two contrasts		t-test for the two means to be equal		standard error	standard deviation	SMA	number of students	div	the group
	indication	f	Significance on both sides	T						
statistical function	.1740	1,886	0.000	4,148	0.949	5,776	33.43	37	B	Experimental
					1,227	7,663	26.94	39	c	control

After applying the visual culture test and correcting Students' answers, for the purpose of obtaining a statistical description of the raw data of the experimental and control groups In the visual culture test, the statistical program was used (SPSS) and the results were obtained, and a table (4) shows that.

**Schedule (4) Statistical table for the two groups (experimental and control) in the variable (visual culture)**

and by application (t-test) for two independent samples to find out the significance of the difference between the mean scores of students of the two groups, the t-value (t) was (4.148) at the level of significance (0.000), which is smaller than the approved level of significance (0.05) and with a degree of freedom (74), and this indicates the superiority of the students of the experimental group Those who studied according to the virtual laboratory on the students of the control group who studied according to the traditional method in the test of visual culture, and it was a size The effect of the independent variable (virtual laboratory) on the dependent variable (visual culture).), And That effect size (virtual laboratory) in the variable (visual culture) He was large, because the value of (d) of (0.96) is greater than (0.8).

### **Interpreting the results of the visual culture test:-**

1. The diversity in teaching strategies and the diversity of activities with the presentation of life problems by inferring examples from real life and taking into account individual differences led to finding differences between the experimental and control groups. in visual culture skills, and this is due, therefore, to the effect of the independent variable (virtual math lab)
2. The skills of visual culture and what it includes (translation skills, visual messages (reading pictures), visual writing skills, etc. are compatible with the steps of the virtual laboratory, which led to raising the level of visual culture in the experimental group more than it is in the control group.

**Conclusions:** Teaching in the virtual mathematics laboratory had an impact on raising the level of visual culture skills, and the size of the effect was high for first-grade students

**Recommendations :** Hopefully from specialists with technology education in Ministry education Higher and search Scientific and ministry Education interest by design programs computational and create sites e and labs default that singing Knowledge Mathematics And provide sources to learn miscellaneous for students and means educational more developed to meet their needs and considerate differences individuality between them .

### **proposals :**

1. building program my training for my teacher mathematics According for skills the culture visual using lab default
2. design educational integrate lab default and strategies within Curriculum mathematics in stages education different

### **Sources:**

1. Ibrahim, Inshirah Abdel Aziz (2003). Employing educational games in developing visual culture skills for the hearing impaired, Journal of Education Technology, Seventh Annual Conference on Education Technology for People with Special Needs.
2. Al-Adhami, Mays Aladdin Ghanem, Jassim, Basem Muhammad (2019): The effect of a proposed strategy according to the (Addy & Shire) model on pivotal thinking among first-grade intermediate students in mathematics, Al-Ustadh Journal for Humanities and Social Sciences, Volume (58), Issue (4), Appendix (1), December 2019 AD - 1441.
3. Abu Jado, Salih Muhammad (2009). Educational Psychology, 7th Edition, Amman; Dar march publishing, distribution and printing.

4. Al-Jubouri, Naseer (2010): The effect of the laboratory model on correcting common errors of mathematical concepts among the first intermediate grade student, unpublished master's thesis, University of Baghdad, College of Education for Pure Sciences, Ibn Al-Haytham.
5. Jassim, Bassem Muhammad, Mais Aladdin Ghanem (2022). The effect of a proposed strategy according to the model of strengthening the layers of cognitive awareness in the achievement of female students in the second intermediate grade in mathematics, Tikrit University Journal for Human Sciences, Vol. 29, No. 10, Part Two of 2022.
6. Al-Hazmi, Doaa bint Ahmed Hassan (2010). **Virtual laboratories in learning science**, i1, Riyadh; Al-Rushd Library.
7. Hassan, Shaima Mohamed (2019), Design of a virtual mathematics laboratory using patterns of feedback in developing stereoscopic skills and the aesthetic sense of mathematics among primary school students, Mathematics Education Journal, Vol. 22, No. 12.
8. Dwyer, Francis and Moore, David Mike. (2015). Visual culture and visual learning. (Translated by Nabil Gad Azmy), 2nd edition. Oman. Beirut Library. Cairo
9. Zaytoun, Hassan Hussein (2005), a new vision in e-learning education (concept, issues, application, evaluation), 1st edition, Riyadh; Al-Sultah House for Publishing and Distribution.
10. Suleiman, Amani Adnan (2015). The effect of teaching the engineering unit using the mathematics laboratory on the achievement and motivation towards learning mathematics among sixth grade students in the schools of Tulkarm Governorate, PhD thesis, published, College of Education, An-Najah National University.intention
11. Abdel-Fattah, Wafaa (2021), Designing Enhanced Books Based on Combining Visual Cues and Educational Game Stimuli in Interactive Video to Develop Visual Culture Skills and Immersion in Learning for Hearing Impaired Students, Journal of Scientific Research, Volume 22, Issue 2
12. Omar, Doaa Bint Khaled (2013), The Effect of Using the Virtual Mathematics Lab in Developing the Mathematical Connection Skills of Fourth Grade Students in Makkah Al-Mukarramah, a published master's thesis, College of Education, Umm Al-Qura University, Saudi Arabia.
13. Nofal, Khaled Mahmoud (2010), virtual reality technology and its educational uses, 1st edition, Amman; Curriculum House for Publishing and Distribution.
14. Al-Aqabi, Ali Khazal Jabr; Al Kadhimi, Hiyam Mahdí Jawad (2023), The Effect of Proposed Strategy According to The Realistic Mathematics Theory on The Achievement and Mathematical Interrelation of Third Intermediate Students, Journal of Educational and Psychological Researches, 20 (77), pp.391-415.
15. Hasan, IF, Faris, EJ (2019). The of Effect Instructional Design based on Kagan Structure In Generating Information Skills for First Intermediate Student's In Mathematics. Journal Of Educational and Psychological Researches, 16(62), pp.301-322.

16. Hasan, IF, & Faris, EJ (2020). The impact of instructional design-learning according to the Kagan structures in the achievement of the first grade students in mathematics. *Al-Adab Journal*, 2 (132), pp. 181–204.
17. Hassan, DAK (2018). Effect of the Fink model of active learning in lateral thinking and the achievement of mathematics students in mathematics. *ALUSTATH JOURNAL FOR HUMAN AND SOCIAL SCIENCES*, 224(3), pp.63–88.
18. Hassan, AK (2017). The effective of the suggested instructional design that based on the teaching strategy for understanding in achievement for students of mathematics in the fifth grads. *Journal of Educational and Psychological Researches*, 14, pp. 1-22.
19. Hassan, AK (2018). Evaluating the quality of the teaching skills of math teachers in junior high/ scientific branch from their point of view. *Journal of Educational and Psychological Researches*, 14 (52), pp. 438- 470.
20. Jawad, LF, Majeed, BH, & ALRikabi, HT (2021). The Impact of Teaching by Using STEM Approach in The Development of Creative Thinking and Mathematical Achievement Among the Students of The Fourth Scientific Class. *International Journal of Interactive Mobile Technologies*, 15(13), pp. 172–188.
21. Majeed, BH (2022). Impact of a Proposed Strategy According to Luria's Model in Realistic Thinking and Achievement in Mathematics. *International Journal of Emerging Technologies in Learning*, 17(24), pp. 208-218.