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The Effect of The Cube Strategy on Solving Physical Problems Among Students of The Department of Mathematics

By

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Abstract:

The goal of current research to investigate the effect of the Cube Strategy in solving physics problems among students of the Department of Mathematics and achieve the goal of research chose researcher sample of the first phase students in Mathematics Faculty of Education, University of Misan section of (113) students were divided between the first two divisions Division (a) by (55) students and the second Division (b) by (58) students and the appointment of indiscriminate represented Division (b) of the experimental group and the Division of (a) the control group and then subjected researcher two sets of search experimental and control procedures parity with some variables (chronological age, previous information material physics).and to complete the requirements of research identified the researcher scientific material and prepared lesson plans and set up the achievement test consisting of (20) paragraph covers the first three levels of Bloom's Taxonomy (remember, understand, application) to choose the type of multi-numbered (12) items and (8) paragraphs essay specific answer has been applied on a prospective sample of (80) students from non-research sample, and then finding the truth through his presentation to a group of arbitrators in the field of education and methods of teaching mathematics was testing the stability of (0.89), a high volatility as well to find a difficulty and discrimination paragraphs, after the end of the experiment was the test on the two sets of search application has been corrected and unloading data and processed statistically program bag Statistical social Sciences (spss).

showed search results beyond the experimental group on the control and in the light of this, the researcher suggested several conclusions that teaching the use of the Cube Strategy give students a positive role in the educational process, through observation, understanding and conclusion and thinking and the acquisition and the statement of opinion and the codification of ideas, it is no longer their role is limited to receiving and listening only, and this is in line with the objectives of the teaching of physics in terms of making the learner at the center of the educational process.

Keywords— *cube strategy, physical problems, mathematics students.*

Introduction

Physics plays a prominent role and a great contribution to the development taking place in the world today, which we see around us and feel its products in our dealings in various aspects of life and at all levels, as well as its intervention in the details of our daily lives in terms of the many technological applications that physics contributed to its development to relieve the burdens of life, as well as it sees it Those who specialize in teaching it are a fertile field for the development of thinking among learners through curricula and curricula, a goal whose achievement depends primarily on the teaching methods and methods used.

Teaching physics in our colleges no longer meets the needs of contemporary life, because the current era and the developments it has witnessed are based in many of their interpretations on the concepts of physics in the applications of technology that we deal with daily. And automatic memorization and this is confirmed by many studies and research, including the study of (Al-Tamimi and Al-Diny, 2008) and (Abdullah and Suleiman, 2011), in addition to the confirmation of this matter by most of the teachers of this subject to a pattern that follows a strategy according to arranged steps that ensures us an effective and wide participation by the learner and an acceptable level of goals achieved for teaching this subject.

Perhaps most of the contemporary trends in teaching in general, and physics in particular, call for the uniqueness of education and making the learner the focus of the educational process, and that the teacher is a guide, coordinator and facilitator of the learning process, and that the previous knowledge possessed by the learner is a prerequisite and a basis for the later learning process. The cube strategy is one of the structural strategies that provide the learner with enough space to practice thinking based on what the learner possesses and arrange ideas in a way that guarantees a solution to the educational situations he is going through while solving physical problems that are an indicator of learning the material and a sound understanding of the physical concepts under study and education, based on the foregoing The problem of the current research is manifested by answering the following question: What is the effect of the cube strategy in solving physical problems among students of the Department of Mathematics?

The Importance of Study

At the beginning of the third millennium, and in light of the great and rapid scientific and technological developments that the world is witnessing today, man is forced to search for many means and procedures that guarantee him the safety of adapting to what is happening in the world. He is sound and equipped with basic knowledge and skills to enable him to demonstrate smart behavior and thus adapt to the environment and to scientific and technical changes, by paying attention to the study materials, methods and methods of teaching them, and linking them to the life of the student, his needs and the needs of his community.

Therefore, university education witnessed a remarkable development in various developed and developing countries alike at the level of educational and research programs, keeping pace with the technological developments the world is witnessing in various fields of life. The reason for this is due to the insistence of universities to implement the process of continuous development and modification of their curricula according to the requirements of contemporary life And the application of modern methods in its educational practices in various sciences, including physics, as well as its quest to achieve the goals of teaching the educational material and the application of strategies that guarantee that.

Physics, which is one of the important branches of natural sciences, has increased in importance from its effective contribution to the technological development witnessed by the world and the manifestations of technology and its applications on a large scale in various fields of life, as in medicine, industry, communications, military sciences and others. Despite the importance of this material in explaining phenomena, revealing their causes and describing the movement and organization of things around us, the actual reality of its teaching is still characterized by rigidity and traditionalism based on recitation and indoctrination from the teacher, memorization, remembering, listening and repetition by the

learner, and focuses on quantitative learning and neglects qualitative learning, and that the criterion for success in this course is the student's ability to solve physical problems and neglect educational activities that develop multiple thinking patterns and different skills. This causes a negative understanding of the material and does not achieve the actual objectives of its teaching. (Al-Gharawi, 2010, pg. 4)

Since most of those interested in teaching physics and mathematics are unanimously agreed that enabling students to learn physics as a science lies in their ability to solve problems related to study concepts in various branches of physics, we must choose methods, methods and strategies in which the learner relies on his knowledge store and his own perceptions of knowledge and concepts of physics, in order to reach, thus, to Understanding and building a sound knowledge enables learners to solve the problems they encounter during the study and generalize their experiences in the future, and this is confirmed by the International Mathematical Society in the United States (MTCN) that educational programs must enable all students to meet the criteria for solving the problem and build new knowledge through solving the mathematical problem and reflection In which. (Zoghbi, 2008: 335)

The solution to the mathematical problem is one of the most important topics that have occupied the attention of many national councils and bodies concerned with teaching science and mathematics, such as the National Center in Science and Mathematics in Britain (NCSM, 1977) and the Council on Mathematics and Science in the United States (CPMS, 1982) and many researchers such as Trevor and Coney And his colleagues Davis and Henderson, given the effect of solving the mathematical problem on raising the level of thinking of the learner and increasing his ability to solve life problems to strive to get rid of the obstacle and achieve its goal, and usually the confusing situation is only eliminated through appropriate behavior or action. (Days,1977:135-147)

Some educators such as Gangne (1965) and Traverss (1977) use the term “ability to solve a mathematical problem” to indicate the individual’s acceptance of the confusing situation and his successful use of mathematical knowledge and intellectual skills to overcome the obstacle and achieve the goal he aspires to solving the problem is an extremely exciting activity and is the mainstay of all kinds of sports activities. Knowledge, skills, concepts, mathematical generalizations, and even all other study topics are not a goal in themselves. Rather, they are means and tools that help the individual to solve his real problems. Moreover, solving mathematical or physical problems was the natural way to practice thinking is that there is no learning without thinking and there is no thinking without problems. (Al-Mughirah, 1989) (Al-Mashiegh, 1989)

In this regard, Asiri (2003) stresses that it is necessary to train in-service teachers and students of physics and mathematics departments in colleges of education and teacher colleges to use different strategies in solving the mathematical problem, which will reflect positively on the achievement of their students in the future. (Asiri, 2008: 293)

It is no longer one of the goals of education in the information age that the student obtain knowledge only, but its goal is to acquire the individual skills necessary to access basic sources, and on this basis, most developed countries have been concerned with qualitative education for their students in the information age, which is concerned with improving the content of education, and is concerned with releasing capabilities Intellectual and creative among learners (Abdel-Dayem, 2001, p. 22) and this can only be done through the use of teaching strategies that emphasize the uniqueness of education in line with what the philosophy of teaching physics and modern mathematics advocates and focuses on students’

information and gives them a great opportunity to test their knowledge about the concepts of study applying what has been learned in new situations by following a strategy based on self-abilities in directing their learning path in a way that guarantees a solution to the issues presented to them during the study, and one of these strategies is the cube strategy.

The cube strategy is one of the constructivist strategies that rely on active learning as a basis for it. It is based on the principle of organizing knowledge (that is, the student constructs meaning by himself and reaches knowledge by himself). This strategy was developed by Spinr Kagan in 1980 and developed by (Cowan and Cowan) If this strategy works to motivate the student to think when reading by looking at the subject or concept from six aspects represented by the six faces of the cube, as this strategy allows for a deep analysis of the subject represented by the six aspects of the cube, namely (description, comparison, and analysis This analysis is equivalent to Bloom's classification of the six levels of knowledge, meaning that it helps the student to use different and higher levels of thinking. (ESA reglens,2006,p13)

The cube strategy expands the students' perceptions and makes their thinking flexible, as a result of the depth of vision of the topic from its various aspects, which represent the faces of the cube and include us and the formation of a hexagonal cube. The cube strategy requires distributing the students into groups of (4-6) groups, each group representing one side of the cube and they work either individually or collectively. (Shinbar, 2011, p. 38).

Working in groups greatly assists students in developing their higher levels of thinking such as interpretation, synthesis, analysis, generalization, and criticism, as well as developing a sense of confidence in them through expressing their own points of view, and establishing strong social relationships in an active environment. (Al-Nashef, 2009, p. 87), from this it is clear that the cube strategy helps students to sequence, organize and follow their thoughts, and makes them more scientific by giving them the opportunity to ask the questions that revolve in their minds to search for logical and rational answers that convince them, and that these questions represent the process of moving the mental queen, and make her alert, alert and aware.

This strategy emphasizes the importance of mental upbringing and development of thinking through the availability of an educational environment that stimulates thinking, and the need to provide the student with tools and means that make him more able to deal effectively with information from its various sources in order to achieve better learning by increasing the student's ability to think about the tasks facing them. (Al-Hashemi and Taha, 2008, p. 51)

The cube strategy includes six aspects:

1. Description: It searches for questions related to the characteristics of the subject, whether it is a phenomenon or a concept, taking into account that the students ask questions that seek to generate ideas in order to answer the situation in which the phenomenon exists, so that the students use the five senses (sight, hearing, touch, smell). .
2. Analysis: The student searches for the components of the topic so that the topic or concept is divided into many parts.
3. Comparison: looking for similarities and differences between the subject and other things. The teacher asks a question in which he explains the phenomenon that is similar to the phenomenon studied, and the students must know the similarities and differences.
4. Correlation: It examines the things that are related to the topic and make the student

think about it when the topic is raised. The teacher seeks to ask questions that excite the student and make him think or remember the information related to the topic.

5. Application or transfer: It searches for uses, that is, the benefit of the subject, whether it is a phenomenon or a concept.
6. The proof: It seeks to emphasize the importance of the subject in life, whether the outlook is positive or peaceful. (Saliha, et al., 2016, p. 1716).
7. Based on the foregoing and through the researcher's review of many previous studies and research in the field of difficulty in solving the physical problem at all levels of study, including the study of Al-Alwani (1995), the study of Khaji (2004), the study of Abdullah and Suleiman (2011) and the study of Al-Gharawi (2016) as well as his experience In the field of teaching in the Department of Mathematics, he noticed that most of the college students in the Department of Mathematics suffer from a significant weakness in the field of solving the mathematical problem in both physics and mathematics. Standing at this phenomenon and proposing appropriate solutions to it by adopting the cube strategy as a strategy for solving physical problems among students of the Department of Mathematics. Accordingly, the importance of the current research lies in the following points:

1. The scarcity of local and Arab research (to the knowledge of the researcher) that dealt with the topic of using the cube strategy as a strategy for solving physics problems at the university level.
2. The current research targets an important stage of study, which is the first stage in the Department of Mathematics. Diagnosing weaknesses in the cognitive field and skills of students in the early stages of their academic preparation will help them refine their scientific personalities, alert them to weaknesses and address them, and correct their understanding to reach the level of mastery of scientific specialization and prepare them for a profession Teaching.
3. Draw the attention of those in charge of the educational process and programs to prepare mathematics and physics teachers to the need to train students on self-learning strategies and active learning strategies that depend on students' thinking in the stages of preparing them for the teaching profession.
4. The current research opens a broader horizon for more research in the field of physics and mathematics teaching and the consolidation of educational practices in various scientific disciplines with regard to preparing and qualifying teachers during service.
5. The current research is a qualitative addition to the educational library in the field of solving physical and mathematical problems and the individualization of education.

Objective of the study:

Detecting the effect of using the cube strategy in solving physical problems among students of the Department of Mathematics.

Hypothesis of study:

For the purpose of verifying the research objective, the following null hypothesis was formulated:

((There is no statistically significant difference at the level of significance (0.05) between the average degrees of achievement of the experimental group students who study the subject (general physics) with the cube strategy, and the average degrees of achievement of the control group students who study the same subject in the traditional way)).

Limitations of the search:

The current paper is determined by the following:

1. Students of the first stage - Department of Mathematics - College of Education - University of Maysan, of both sexes (males and females).
2. The academic year 2017-2018 AD.
3. The general physics course prescribed for students without specialization, according to the methodological vocabulary, approved by the Sectoral Commission for Colleges of Education in Iraq.

The cube strategy:

Ambo Saidi and Suleiman (2011) defined it as: "A visual method or style that helps students organize scientific information for a single scientific phenomenon by looking at the scientific phenomenon from six aspects, which are the faces of the cube."
(Ambo Saidi and Suleiman, 2011, pg. 496)

Procedural definition: The researcher defines it according to the purpose of the current research as: a set of sequential and regular steps that the teacher and students follow, which include (description, analysis, comparison, correlation, application, and proof) subjectively while they deal with scientific phenomena and mathematical issues related to the physical concepts under study, which Included in the vocabulary assigned to them in the general physics for the first stage in the Department of Mathematics.

Second: solving physical problems

There is no agreed definition among educators on physical issues. Therefore, the definitions have varied and varied according to the variety of relevant studies. Everyone agrees that physical issues are a situation that needs a solution, proof, explanation, or answer.

Frederick H. Bell (1987) as: An attitude that the solver sees as a problem.

Jarwan (2002): It is a thinking process in which the individual uses his previous acquired knowledge and skills in order to respond to the requirements of an unfamiliar situation. (Jarwan, 2002: 95)

Zeitoun (2003) as: A mental concept that includes a series of organized steps that the individual follows in order to reach a solution to the problem. (Zaytoun, 2003: 327)

Accordingly, the researcher adopts the definition of Jarwan (2002), and the researcher defines procedurally solving physical problems according to the purpose of the current research as: the ability of the first-stage student in the department of Mathematics to find a solution to a physical problem presented to him related to the general physics concepts assigned to them according to specific steps that include (description of the problem, and its analysis, and comparing it with what he possesses of previous information, and showing the correlational relationships, and trying to solve them and applying what was reached, and demonstrating the proof of that by making sure of the solution) in order to reach the solution and learn about it.

Previous Studies

The researcher did not find previous studies that dealt with the effect of the cube strategy in solving physical problems together, to the best of the researcher's knowledge, so he presented studies that are similar to his current research in terms of the independent variable (the cube strategy) and differ in the dependent variables as follows:

1. Saleh et al. (2016): The study aimed to know the effect of teaching the geometry unit using the cube strategy on achievement and the trend towards learning mathematics for the seventh grade in Qalqilya Governorate. The researchers used the experimental method with a quasi-experimental design, by applying the study to a sample (50). A student from the seventh grade students, and the study population amounted to (2198) male and female students. The researchers found a statistically significant difference between the average achievement and trends between the students of the experimental group and the control group and in favor of the experimental group that studied using the cube strategy, with a statistically significant relationship between the achievement Academic and trends towards learning mathematics for seventh grade students, and based on the results of the study, the researchers recommended a number of recommendations, including training educational supervisors and teachers to use modern methods of teaching, including the cube strategy, linking mathematics to scientific life and daily experiences, and encouraging teachers to apply the cube strategy to other scientific locations. (Saliha, et al., 2016, p. 1707)
2. Hilal and Al-Shammari study (2015): The study aimed to verify the effectiveness of the cube strategy in developing the structural thinking of fifth-grade literary female students in geography. A student distributed equally between two groups and the two groups were rewarded with some variables (chronological age calculated in months, previous information, intelligence, synthetic thinking, academic achievement of the father and mother). The synthetic thinking was prepared by (Habib, 1995) consisting of (36) items. The test was applied before and after the research sample. The experiment continued for a whole semester in which the two experimental research groups were studied according to the cube and control strategy in the traditional way, and then the synthetic thinking test was applied at the end of the experiment, and the results were statistically processed. The results showed that the experimental group outperformed the control group with a statistically significant difference. In light of the results, the researchers recommended several recommendations, including: Emphasis on I use the cube strategy in teaching geography because of its importance in raising achievement and structural thinking, and the necessity of informing geography teachers of the cube strategy and training on its use through training courses prepared for this purpose.
3. Shenbar study (2011): The study aimed to identify the effect of using cube strategy in acquiring and assimilation of scientific concepts for fifth grade students in science subject the study was conducted in Baghdad - Iraq and the study sample consisted of (60) students, chosen by the researcher by random drawing method As Division (A) represented the experimental group and its number was (30) students, which studied according to the cube strategy, and Division (B) numbered (30) students represented the control group and studied in the traditional way. The researcher used the t-test as a statistical method in processing and analyzing the study data. The results showed that the experimental group, which was taught by the cube strategy, was superior to the control group, which was taught by the traditional method in science and retained scientific concepts.(Shinbar, 2011, A-C)
4. A study (Mohammed & Almahjh, 2013): aimed at knowing the effectiveness of the integration between the two strategies (the cube and the circular bit) on the achievement of the fourth scientific students in the biology subject and the development of their metacognitive thinking. Therefore, the researchers used the quasi-experimental design for four groups, three experimental and fourth control groups. The researchers built two tools for research, namely, the achievement test consisting of (20) paragraphs of the type of multiple choice to achieve the objectives of the research, a random sample was taken from the fourth grade students of science at a girls' school with 129 students and they were divided into four groups represented: the first experimental group, which studied with a strategy the integration between (the cube and the circular house), the second experimental group, which was studied

with the cube strategy only, and the third experimental group, which was studied with the circular house strategy only, and the fourth group was the control group, which was studied in the usual way, and the results of the study showed that there is a significant difference in favor of the group that studied By integrating the two strategies (the cube and the round house) followed by the group that studied with the cube strategy only, and then the strategy of the house then see the group that studied in the usual way. (Mohammed & Almahjh, 2013, pp.767-798)

Procedures of study:

1. This paragraph includes a presentation of the procedures carried out by the researcher, which were as follows: or not. Experimental design:

The researcher used one of the experimental design patterns with partial control (experimental group and control group) with a post test. (John: 1988: 97).

dependent variable	independent variable	the group
physics problem solving test	cube strategy	Experimental
physics problem solving test	normal method	control

Scheme (1) of the experimental design adopted in the research

2, the research community and its sample:

The current research community consists of the students of the Department of Mathematics in the Faculty of Education, University of Maysan, whose number is (344) male and female students from the morning study. A, B, and by random assignment, Division (B) identified the experimental group with (55) male and female students, and Division (A) to be the control group, with (58) students, as shown in Table (1).

Table (1) of the research community and its sample

total	female	male	sex Educational level
113	88	25	first
124	95	29	the second
51	43	8	the third
56	42	14	the fourth
344	268	76	the total

3. Equality of groups: The researcher equalized the two groups of the research sample with the following variables:

1. Previous information in Physics:

To get acquainted with the previous information possessed by the students of the two research groups about the physics subject that was included in the knowledgeable subject in the experiment, the researcher relied to measure the previous information the scores of the general exam in the preparatory stage in the subject of physics, which he obtained from the students' data from the registration department, where the average students' grades and the

standard deviation were calculated For the research sample (the experimental group and the control group) and to find out the significance of the statistical differences between them, the researcher used the t-test for two samples of unequal numbers, where the calculated T-value (0.564) was less than the tabular value of (1.98) at the degree of freedom (111) and the level of significance (0.05). This means that there is no significant statistical difference between the experimental and control groups. Therefore, the two research groups are equivalent according to the previous information variable, Appendix (3), as shown in Table (2).

Table (2) The arithmetic mean, standard deviation, and the calculated and tabulated T-value for the experimental and control groups in the previous information

Statistical significance (0.05)	T value		degree of freedom	standard deviation	SMA	No.	group
	tabular	calculated					
Not statistically significant	**1.98**	**0.564**	**111**	**9.861**	**65.200**	**55**	Experimental
				9.386	**66.377**	**58**	control

2. Age:

To match the research sample with the age variable, the researcher relied on the students' data and used the birth date calculated in months until 15/11/2017. The arithmetic mean and standard deviation of the experimental and control groups were calculated, respectively. The average age of the experimental group students was (228.600) with a standard deviation of (17,846) while the mean the age of the control group students is (243,666) and a standard deviation of (15.518). 0.05) It was found that there are no statistically significant differences, so the two groups of the research sample are equivalent in terms of the age variable, appendix (3), as shown in Table (3).

Table (3) The arithmetic mean, standard deviation and the calculated and tabulated T-value of the experimental and control groups in the age variable

Statistical significance (0.05)	T value		degree of freedom	standard deviation	SMA	No.	the group
	tabular	calculated					
Not statistically significant	**1.98**	**1.400**	**111**	**17.846**	**228.600**	**55**	Experimental
				15.518	**243.666**	**58**	control

4. Research requirements: These include the following:

1- Determining the educational material:

The researcher identified the scientific material represented in the vocabulary prescribed

for students of the first stage in general physics, which includes the following topics (linear motion and Newton's laws, circular motion, rotation, static electricity, light, sound) and its content has been developed that covers all the main and secondary concepts included in the vocabulary the aforementioned, the number of pages of the study content for these seven vocabulary (109) pages distributed among six chapters.

2 search tool:

To measure the level of achievement of the research sample members in physics, the researcher prepared an achievement test whose paragraphs varied between the objective paragraphs of the multiple-choice type, amounting to (12) paragraphs, and the article paragraphs (8) specific-answer paragraphs, thus the test paragraphs amounted to (20) paragraphs covering the first three levels of Bloom's classification (Remembering, Understanding, Applying) Appendix (2) and as shown in Table (4).

Table (4) Achievement test specification table

Weighing behavioral goals				Content Weight	Number of shares	Content
Total %100	**Application60 %**	**Understanding20 %**	**Knowledge20 %**			
6	4	1	1	%31	9	the movement
5	3	1	1	%21	6	static electricity
5	3	1	1	%27	8	the light
4	1	2	1	%21	6	the sound
20	11	5	4	%100	29	the total

*One hour is two hours

5- The validity of the test (apparent validity and content validity)

The validity of the test items was determined by ensuring their apparent validity and content validity, as the honest test is the one that actually measures what was designed to be measured. (Esawy, 1974, p. 45)

The researcher was keen to present the paragraphs of the achievement test in physics, the content of the scientific material and behavioral purposes to a group of experts and specialists in education and methods of teaching science, measurement, evaluation and physics, and asked them to express their opinions on the validity of the test paragraphs Annex (1) and in light of their opinions, some of the paragraphs were modified until all the paragraphs were obtained agreement on the percentage of agreement (80%), thus achieving apparent honesty. (Farr,1970,p135)

6- The clarity of the instructions and test items:

The test was applied to an exploratory sample consisting of (82) male and female students from the first stage, who are not from the research sample who are studying the same subject. After calculating the arithmetic mean time of the sample, it was found that the appropriate time for the test sample is (60) minutes.

7- Statistical analysis of the test items:

For the purpose of statistical analysis, the test was applied to an exploratory sample consisting of (82) male and female students who are not members of the research sample. The correct sentences were obtained from each of the test items separately for both the upper and lower groups. Then the researcher performed the following procedures on them:

a - Paragraph discrimination power: It means the ability of the paragraph to distinguish between students with higher and lower levels of the measured trait (Melhem, 2001, p. 236). When calculating the discriminatory power for each of the test items, it was found that it was between (0.23-0.69), and Brown indicates that the good item if its discriminating ability is (0.20) and above is an appendix (4).
b- Difficulty level of paragraphs: It is the percentage of students who answered wrongly for a paragraph (Melhem, 2001, p. 235) and that the tests are considered good if their paragraphs vary in their difficulty level to be between (0.20-0.80) (Bloom et al., 1983: 107), so The law of the coefficient of difficulty was applied to each of the test items, and it was found that its value ranges between (0.46-0.67), and thus the number of test items is acceptable in terms of difficulty (Appendix 4).
c- Effectiveness of alternatives: The wrong alternative is effective when it attracts to it a number of members of the lower group greater than the number of the upper group. (Al-Baghdadi, 1980, p. 125), and the purpose of the wrong alternatives is to distract the unknowing students so that they do not reach the correct answer by chance. The use of the effectiveness of the alternatives on the scores of the upper and lower groups for the coefficient of excellence showed that the wrong alternatives attracted a number of students in the group more from the students of the group and accordingly it was decided to keep the wrong alternatives.
8- Test stability: It means that the test should have a high degree of accuracy, mastery and consistency, (Awda, 1988:354).

The test stability was calculated using the alpha-Cronbach equation. This equation measures the degree of internal consistency between the test items, where the reliability coefficient reached (0.89). Collins Alli that the tests are considered acceptable if their stability coefficient is (0.70) and above, and thus the test is ready for application. (Collins,1969,106)

Fifth: Procedures for applying the experiment:

After selecting the research sample from the students of the first stage in and appointing the experimental and control groups and making parity between them in some variables, the researcher applied his experiment on 19/11/2017 by the professor of physics after being trained on the cube strategy and the presence of the researcher with him to ensure the progress of the experiment as follows:

A. Experimental group:

This group studied the cube strategy according to the following steps:

The following steps must be followed to teach the cube strategy:

1- It defines the educational task (physical, verbal or mathematical problem), and paves the way for it by giving a general idea about it.
2- Students are asked to describe the educational task or the physical issue presented to them by reading it carefully, showing the characteristics of the concept or phenomenon

around which the idea of the issue revolves, generating questions about it.

3- The students analyze everything they know about the issue after reading it in their own way and identify the unknowns, the data and the conditions for the solution (the appropriate law), then ask them to express them with a diagram or draw an illustration.

4- The teacher encourages the students to make a comparison between what is presented to them and what has been learned from auxiliary problems or to recall examples similar to the question presented in case the solution to the current problem is difficult and to find the relationship between the data and the unknown and to devise a special strategy to solve the problem or there is no direct relationship between the data and the unknown and the request they devise a way to solve and the teacher may participate in raising questions.

5- The teacher asks the students to link what has been reached to the topic of the lesson and write it down. Here the teacher encourages the students to write down everything they have learned about the topic.

6- Students begin to solve the physical problem in light of the information that has been reached and what has been adopted as a method for solving.

7- In the last step of the cube strategy, which emphasizes verifying the procedures taken in solving physical problems, and thus verifying the solution and its result, and clarifying the pros and cons in that.

B. The control group:

This group was studied according to the usual method, according to the following steps:

1. The question is read by the subject teacher after writing it on the board
2. Identification of data and unknowns
3. The teacher explains the problem with an illustration
4. The teacher proceeds to implement the solution on the board in a sequential manner
5. Assigning students to transfer and record the solution in their notebooks
6. Give the students an opportunity to inquire about some aspects of the solution steps.

Sixth: Post-application of the achievement test:

After completing the experiment on (4/22/2018), the researcher applied the achievement test to the individuals of the research sample on (29/4/2018) on one day and for the two research groups at the same hour, and gave the two groups the appropriate time to answer (two hours) and the answer sheets were corrected for the two research groups According to an approved correction key for the objective paragraphs, where one score is given for the correct answer and zero for the wrong or left out answer.

Seventh: Statistical and computational means:

The researcher used the Statistical Package for Social Sciences (SPSS) and a number of statistical methods to process the data and information obtained from the research sample.

Presentation and interpretation of results:

To achieve the research objective of revealing the effect of the cube strategy in solving physical problems among students of the mathematics department by verifying the validity of the null hypothesis which states that: ((There is no statistically significant difference at the level of significance (0.05) between the average degrees of achievement of the students of the experimental group who study the subject (General Physics) using the cube strategy, and the average achievement scores of the students of the control group who study the same subject in the traditional way)).

In order to identify the significance of the difference between the average achievement scores for the experimental and control groups, the researcher used the t-test for two independent samples unequal in number. The calculated t (3.719) is greater than the tabular (t) value (1.98), which indicates the existence of a statistically significant difference, and thus rejects the null hypothesis and accepts the alternative hypothesis, and this means that there is a statistically significant difference in favor of the experimental group, and thus the effectiveness of the cube strategy was confirmed. In solving the physical problems of the research sample members in the experimental group, as shown in Table (5)

Table (5) The results of the t-test to indicate the differences between the mean scores of the students of the experimental and control groups in the achievement test

Statistical significance (0.05)	**T value**		**degree of freedom**	**standard deviation**	**SMA**	**No.**	group
	tabular	**calculated**					
statistically significant	**1.98**	**3.719**	**111**	**8.914**	**73.850**	**55**	Experimental
				11.231	**65.600**	**58**	control

The researcher attributes the superiority of the experimental group that studied physics according to the cube strategy over the control group who studied the same subject in the traditional way to the following reasons:

1. The exposure of the students of the experimental group while using an educational situation they were not familiar with previously in their academic life in the previous school stages included in the cube strategy is based on attention, follow-up and analysis of what is presented to them and focus on it and trying to connect the parts and find relationships and put them logical explanations that generated them with motivation towards learning physics led this the strategy resulted in students' interaction with physics, which led to an increase in their academic achievement and their love for the prescribed scientific subject.
2. The cube strategy helped students to develop the process of organizing their information while dealing with physical problems because it depends on the logical sequence of information and tests their previous information and organizes their understanding of the operations in a logical, sequential manner that depends on their self-desire to answer their self-questions that they want to answer.
3. The use of the cube strategy enabled the students of the experimental group to practice thinking in a practical way because it puts the student in front of problems that require a solution and can only be solved through scientific thinking and away from routine memorization
4. The use of the cube strategy gives students a big role in the learning process, and makes them feel productive through thinking and follow-up, and the method of asking scientific questions and follow-up continuously.

Conclusions:

In light of the results of the current research, the researcher reached several conclusions, including:

1- The effectiveness of the cube strategy in the achievement of first-stage students in the Department of Mathematics at the College of Education - University of Misan in solving physical problems compared to the usual method.
2- The cube strategy gives a great opportunity for first-stage students to practice thinking about their learning paths and modify them according to their own desire, readiness and abilities, which gives them an incentive to learn this subject.
3- The use of the cube strategy increases the scientific level of the students of the Mathematics Department in the College of Education who are preparing for the teaching profession in our middle and high schools.
4- Teaching using the cube strategy gave students a positive role in the educational process, through observation, understanding, conclusion, thinking, acquisition, statement of opinion and writing down ideas, as their role is no longer limited to receiving and listening only. educational.
5- The possibility of applying the cube strategy with ease and ease in the Mathematics Department in the College of Education in Misan, in a way that suits the abilities of the students and the available possibilities.

Recommendations:

In light of the findings of the current research, the researcher recommends the following:

1- The necessity of emphasizing the use of the cube strategy in teaching physics in the physics and mathematics departments in the faculties of education in Iraqi universities, because of its positive and effective impact in raising the level of educational attainment among students.
2- The necessity of including the cube strategy in addition to other modern models emanating from the constructivist theory in the vocabulary of the teaching methods of physics and mathematics and training students of faculties of education during the period of their studies on lessons prepared according to the cube strategy and using it as a strategy to solve physics and mathematics issues.
3- The necessity of designing and organizing the physics curriculum for first-year students in the Department of Mathematics in the light of effective learning theories, including the constructivist theory and its based teaching strategies and models.
Include the textbook in the teaching of Mathematics and Physics Teaching Methods and lessons prepared according to strategies and other teaching models based on constructivist theory.
4- Training the teaching staff in the faculties of education on the use of the cube strategy in teaching other academic courses.

Suggestions:

1- A similar empirical study in the achievement of students of the Department of Mathematics and Physics - Colleges of Education in different subjects and different stages of study and in other variables such as critical, creative and scientific thinking, attitude towards the subject and retention of learning.
2- An experimental study to show the effect of the cube strategy compared to other strategies such as the self-table, the circular house, the strategy (think, pair, share) and cooperative learning on the achievement of students of the Department of Mathematics - College of Education in physics.
3- A similar empirical study in the achievement of science department students in

physics - College of Basic Education in other academic stages.

4- Conducting a similar study to find out the effect of the cube strategy in acquiring scientific concepts and some other variables according to gender.

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