

Effect Of The Strategy Exchanging Teaching In Achievement And The Divergent Thinking For The Students In Scientific Forth In Physics

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Abstract

The aim of the research is to identify the effect of Exchanging teaching in the achievement and Divergent thinking of students in scientific the fourth grade in physics .The following two zero hypotheses :

1-There was no statistically significant difference at the level of (0.05) between the average scores of the students. The experimental group studied the Exchanging teaching strategy and the control group that was studied in the usual way in the achievement test.

2- There was no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who studied the Exchanging teaching strategy and the control group studied in the usual way of Divergent thinking.

The current research was limited to scientific fourth grade students in the day schools of the Dhi Qar School for the academic year 2018-2017. The experiment was applied in the first semester. The sample consisted of (95) students divided into (3) divisions, To be the experimental group(A) and the number of its members (48) students and Division to be the control group(C) and the number of its members (47) students, the two groups were rewarded in the age of months with months and intelligence and physics for the third grade and the previous information.

The researcher prepared the requirements of the experiment by identifying the scientific material and formulating the behavioral purposes and preparing the teaching plans .

The experimental group studied interstitial teaching strategies and studied the control group in the usual way for one semester .

To obtain the results, the data was statistically treated using the T-test for two independent samples.

The results showed that the experimental group was superior to the control group in the achievement test and in the secondary thinking test. In light of this, the researcher made a number of recommendations and suggestions related to the results of the research .

First: Research problem:

Physics plays a major role in the development of the Bedouin economy, as it has become very important in technology and scientific research, and the development of countries is measured by the development of their educational outputs in all levels of education.

The researcher felt through his modest experience in the teaching of physics that there is a weakness in the level of student achievement in physics, as well as through the examination of the results of the monthly and quarterly tests and through meeting the parents of the students, as confirmed by a group of supervisors specialists and teachers through a meeting with their researcher . The researcher believes that the reasons for the low student achievement may be due to the use of non-teaching methods to achieve the goals set and the weak follow-up of some teachers to the educational difficulties faced by students, so the current problem of the study is concentrated in addressing the weakness of educational achievement through teaching according to modern teaching strategies, With the following questions:
-Is there an impact of the strategy of reciprocal teaching in the achievement of students in the fourth grade scientific in physics?

- Is there an impact of the strategy of reciprocal teaching in the thinking of students in the fourth row in the science of physics?

Second: The importance of research

Physics is one of the important factors in the progress of society and its development, and physics is an important element in scientific and technological innovations, and the physics curriculum is responsive to the development. Students need physics to help them organize their lives and ontribute to the preparation of students to meet the challenges of the future. Improving them is an effective means of sustaining scientific and technological renaissance. Teaching from a modern point of view is not a process of information transfer, but a planned activity aimed at achieving desired educational outcomes for students. This means that the role of the teacher according to the modern view of teaching will not be limited to the delivery of information.

In order to be heard, but to participate effectively in order to achieve this benefit. (Ali, 23: 2002) Zaitoun (2005) believes that the teaching of science occupies a high place in the student's curriculum, if it aims at imparting scientific knowledge and methods of science and processes, and developing backward thinking, trends and scientific tendencies as well as seeking to develop the appropriate scientific skills and develop them by conducting scientific activities and laboratory experiments. (Zaitoun, 2005:7) 7Several studies in the field of physics teaching indicated that students' reluctance to study physics and to create negative attitudes toward this material due to traditional methods of teaching, lack of use of educational activities, and the containment of physics on abstract concepts make the learning of this material more difficult (Khafaji, 2008 : 3) Because traditional teaching methods may not play a role in understanding knowledge and increasing criticism of physics teaching, the search for modern and sophisticated strategies for teaching physics is very necessary. Educators

have developed new strategies that stem from theories of cognitive learning and behavioral learning to help students learn. (Qatamy and Naifah, 1998: 70)

The importance of the modern teaching methods is to make the student the first element among the educational process, to prepare the students to participate effectively in the civil life and to be creative students to support the economy of the country, and the modern vision of teaching physics is to move towards teaching less topics and the completion of work and learning more. (Huwaidi, 2005: 49).

The importance of the current study stems from the fact that it is a new addition to the educational field in which the researcher attempts to investigate the effect of the teaching strategy as a experimental variable in the achievement of the fourth grade students in physics. This stage is important in building the personality of the student in its different aspects in general and in developing his mental abilities In particular, a higher level of student achievement and improved performance of the objectives of teaching physics at all levels of study.

Learning to think backwards also helps:

- 1 - free the student from his negative thinking.
 - 2 - A positive role of the student in the educational process.
 - 3 - Development of scientific trends and tendencies of students.
 4. Helps to acquire information, compile and classify knowledge.
 - 5 - Give the student a sense of achievement and develop the ability to respect himself and others.
- (Salama, 2002: 138)

Based on the foregoing, the importance of the current research comes from:

- 1 - Help students to achieve educational goals easily.
- 2 - taking into account individual differences between students.
3. Provide a suitable teaching environment for students.
4. Experimenting with modern teaching strategies.
- 5 - Provide the teachers of physics with modern strategies can be employed in the teaching of physics.

Third: Research Objective:

The current research aims at knowing

- 1 - the impact of the strategy of mutual teaching in the achievement of students the fourth grade scientific in physics.
- 2 - the impact of the strategy of teaching in the reciprocal thinking in the students' fourth grade in physics.

Fourth: The research hypotheses:

In order to achieve the objective of the research, the following two hypotheses were formulated: There was no statistically significant difference at the level of significance (0.05) between the average grade of the students of the experimental group who studied the reciprocal teaching strategy and the average scores of the control group students studied using the usual method in the achievement test. There was no statistically significant difference at the level of (0.05) between the average score of the students of the experimental group who studied the reciprocal teaching strategy and the mean scores

of the control group students studied using the usual method in the regression test.

Fifth: Research limits:

- 1 - Students of the fourth grade scientific in the preparatory schools belonging to the Directorate of Education Dhi Qar / Nasiriyah (center) for the academic year 2018/2017.
- 2 - The first to the five chapters of the book physics scheduled for the fourth grade scientific, I 6, for the year 2015.
- 3 - The first semester of the academic year 2018/2017.

Sixth: Definition of terms

Exchange teaching:

1-(Abu Ghazal, 2006):

"A dialogue in which mutual interdependence with knowledge scaffolds is met, where students engage with themselves and with teachers based on four axes: predicting, questioning, explaining, explaining and summarizing."

(Abu Ghazal, 2006: 242)

2- (Zeitoun, 2008) as:

"An educational activity that takes the form of a reciprocal dialogue between the teacher and students or between students about a readable text." (Zeitoun, 2008: 223)

3 -(Atiya, 2009) that:

"An educational activity based on dialogue. Students are distributed among groups where the mentor is assigned to each group that guides the members of the group and the strategy is based on summing up, self-questioning, clarification, prediction."

(Attiya, 2009: 233)

The procedural definition is:

An educational activity based on dialogue between teachers and students or students with each other in order to improve reading skills by summing up, asking questions, predicting, and clarifying. Achievement : defined by both

1-(Qxford, 1998) that:

"The acquired result of accomplishing something or learning it successfully, effort, perseverance and skill." (Qxford, 1998: 10)

1. (Allam, 2006) as:

2. "The degree of acquisition achieved by the student or the level of success achieved by or reach him in the subject matter or in a particular educational field"

3. (Allam, 2006: 305)

3- (Abogado, 2008) as:

"The outcome of what the student learns after passing through the educational experience to see the success of the strategy set by the teacher to achieve its goals and

the student's knowledge." (Abogado, 2008: 452)

The procedural definition is:

The amount of achievement of educational objectives measured by the grades obtained by the fourth grade students (the sample of the research) after answering the sections of the achievement test in the physics subject prepared by the researcher for this purpose.

Divergent thinking: defined by both

1-(Guilford, 1980) that:

"Production of new information and generation of new information is given and production is done profusely"

(Guilford, 1980: 146)

2- (Shehata and Zainab, 2003) that:

"Generating reasonable alternatives of information given where the focus is on diversity, abundance and scarcity of products and solutions". (Shehata and Zainab, 2003: 126)

3- (Khalil, 2007) that:

"To reach a number of solutions that adhere to available information and communicate to creative solutions." (Khalil, 23: 2007)

The procedural definition is:

A set of answers by fourth-graders to reach solutions and outputs and are measured by the total score that students receive in the test of backward thinking.

First: the strategy of reciprocal teaching.

The teacher is the role of the student and once the student plays the role of the teacher. This type of teaching is very important in managing the classroom and creating the classroom atmosphere that encourages interaction and testing their understanding and understanding of the educational experiences and knowledge they possess. (Ibadi, 2005: 181). Intercultural teaching is an educational activity that takes the form of a dialogue between the teacher and the students or between the students. They exchange roles with the presence of a leader for each group who directs the group in order to understand the readable material. (Zaitoun, 2003: 223) Interaction teaching is a learning strategy rather than a teaching strategy. The effort in this strategy lies with the student and the activity intended to implement the strategy correctly. This strategy does not have a starting point. It is applied in a circular way.

(Abdalbari, 2010: 162)

1. Characteristics of the Interaction Teaching Strategy:

- Contribute to better understanding of ordinary students and students with learning difficulties.
- Supports student confidence and feels empowered.
- Increase student motivation and willingness to read.
- Use efficiently with large numbers of students.
- Provide feedback and enhance student responses.
- Helps develop leadership skills and sense of community.
- Interested in the initial, structural and final evaluation.
- Increase students' attention and focus on the reading topic.
- Develop students' ability to control their thinking processes.

(Abdalbari, 2010: 160), (Attia, 2010: 188)

1.2. Inter-disciplinary teaching:

- Students should remember that strategies with useful media help them develop their understanding of what they read.
- The teacher must ensure that all students participate in the activities involved and provide support and feedback.
- The teacher must take primary responsibility for education and its models are sub-strategies, and responsibility should be gradually transferred to students.
- Acquiring sub-strategies involved in cross-teaching as a shared responsibility between teacher and students.

(Jeffrey, 2000: 92)

1-3: Justification of the strategy of mutual teaching.

- Helps in the thinking of the student in his work and tasks.
- Activates the student's prior knowledge, and evokes his / her knowledge, knowledge and values.
- Ease of application in the classroom and in most subjects.
- Develop capacity for dialogue and discussion.
- Helps overcome learning difficulties, especially reading difficulties.
- Increase student achievement in all subjects.
- Helps students to take responsibility for their education, and share their responsibilities with their colleagues.
- Focused around the student, contributing to his activity and his positive.
- Helps develop leadership skills and a sense of belonging and loyalty to the group to which he belongs.

(Abdalbari, 2010: 160), (Zaitoun, 2003: 227)

1.4: Interaction Teaching Strategy Procedures.

• Prediction:

The student's expectations of what will happen, and in the light of his past experience, he can predict, when the student predicts what will be presented from other ideas after the text they have studied and helps the process to understand the student of the things he read.

• Question:

Students formulate questions related to the subject in order to explore the context of the text more deeply, where the student focuses on the formation of a set of questions that relate to the main idea of the subject.

• Illustration:

Students are asked about difficult concepts and unusual terms in the subject. This is done by following a series of steps to overcome these difficulties.

• Summary:

A complex process of thinking requires the student to coordinate and organize different ideas to summarize the subject and try to separate what is fundamental from what is not essential and identify the main points of the subject and link them to each other to give an integrated summary on the subject.

(Jarwan 1999: 217), (Abdalbari, 2010: 174)

Second: Reflection:

This thinking is characterized by Guilford's emphasis on the diversity of products and their production, the production and generation of new information, and the limitations of this type of thinking and expand The process of research and production in abundance (Atom, 198: 2004)

The thinking is characterized by fluency. However, if the information available or presented is numerous in terms of quantity and quality, the pattern of thinking is characterized by a flexible response (Farah, 1997: 546)

2 - 1 elements of reflection:

1-1-2 : fluency

It is defined as the ability to produce the largest number of ideas in a given position and a specific time and divided into (5) types:

- Verbal fluency or fluency of words: It is easy to produce detailed words containing one or more combinations of spoken language and invoke in a manner commensurate with the educational - learning situation.

(saada, 2003: 277)

- Expressive Fluency: The speed with which words are interconnected within a certain time, and the issuing of interrelated ideas at a specific time.

- Reciprocal Fluency: An individual's awareness of the relationships and ease with which he can present ideas in an integrated sense of meaning. (Nofal and Muhammad, 2011: 96)

- Intellectual Fluency: is the easiest to generate as many ideas as possible about a particular subject.

- Fluency forms: are the ability to draw and produce a number of shapes and illustrations or re-formation on the basis of a dramatic or visual formality.

(Jarwan, 2002: 248)

2.1.2: Flexibility:

It is defined as the ability to think in different directions of answers to include the production of multiple types of ideas, and is divided into two types:

Automatic flexibility: It is easy to imagine many different functions or classifications.

- adaptive flexibility: is the process that refers to the individual's ability to change the face, which looks at the solution of a specific problem, which are two types:

1) adaptive flexibility of forms.

2) adaptive flexibility of meanings.

(Qatami, 1990: 655)

2.1.3- Originality:

Means to raise new ideas that have an indirect relationship to the position of the stimulant, and it means the ability of the individual to invent and produce new ideas within a limited period of time, and is unique to his ideas about others and the tendency to solve difficult problems (Noufal and Muhammad: 2011: 97)

4.1.2 - Expansion :

Means the ability to develop ideas and develop them by adding explanations to them which

help to clarify and highlight the basic idea.

5.1.2 - Sense of problem:

Means the ability to see many problems in one position, at the same time that others do not see any problem and sense of the problem is an important factor to reach interpretations or produce new that solve those problems.

(Solomon and Fouad, 1977: 9)

2-2: Hypotheses of thinking

Reflective thinking is different from other types of thinking as it uses a set of hypotheses:

1.2.2 : Launching:

This hypothesis confirms that the imagination is left behind to go beyond the familiar, often unconventional ideas are the way to find new ideas.

2.2.2: Inclusion of ideas:

This hypothesis confirms that the individual is alert to other ideas, and may be able to reach new ideas by associating diverse ideas from here and there.

(Jarwan, 2002: 248)

3-2-2 : postponement of judgment on things:

This hypothesis confirms the postponement of judgment and evaluation until the completion of the provision of a large number of possibilities and alternatives.

4-2-2 : fermentation of ideas:

This hypothesis is meant to leave the problem aside for some time, and new ideas may jump to mind through this period.

5-2-2 : Pursuing your ideas:

This means that whenever a large number of ideas are generated there is the possibility of a distinct idea. (Khalil, 2007: 22)

Third: Previous studies.

1 - Studies dealt with the strategy of Exchanging teaching

• Study (Al-Harthy, 2008)

This study was conducted in the Kingdom of Saudi Arabia and aimed to know the effectiveness of the use of cross-teaching in developing skills behind reading knowledge among secondary students.

The study sample consisted of (60) students randomly selected and divided into experimental and control groups. The researcher prepared a skill level for the reading material. After conducting the required statistics, the results showed that the experimental group was superior to the control group. .

(Al-Harthy, 2008: 2-1)

• Study (Al-Bahadli, 2011)

This study was conducted in Iraq and aims to know (the effect of the strategy of cross-teaching in the collection of geography in the third grade students Institute of preparing teachers).

The study sample consisted of (56) students randomly distributed to experimental and control groups and the researcher prepared the achievement test. After conducting the required statistics, the results showed that the experimental group was superior according to the mutual teaching strategies of the control group in the achievement test. (Bahadli, 2011: a-h)

2 - Studies dealt with the Divergent thinking**• Study (Khalil, 2007)**

This study was conducted in Jordan and aimed to find out (the effect of a training program for reflective thinking based on the Gilford model and the Bloom model on higher thinking skills). The study sample consisted of (242) students from the eighth and tenth grades randomly divided into experimental and control groups. The researcher tested the skills of higher thinking and after the results of the statistics showed the results of the experimental group which studied according to the training program for thinking backward on the control group in higher thinking skills.

(Khalil, 2007: 95-91)

• Study (Dakhel, 2011)

This study was conducted in Iraq and aimed to find out (the effect of the Karen model on the acquisition of grammatical concepts and reflective thinking in the fourth grade students).

The study sample consisted of (64) students randomly distributed to experimental and control groups. The researcher prepared the test of grammatical concepts and the measure of thinking.

(Dakhel, 2011: A-D)

Aspects of the use of previous studies

1- Comparison of the results of the current research with previous studies

2 - Identify the methodology of research and procedures followed by previous studies

3 - Identification of the statistical means used

4 - Identify how to apply the strategy of teaching in the school plans

5. Identify and interpret the results and make appropriate

First: experimental design

The design is a planning of the circumstances and factors surrounding the phenomenon to be studied in a particular way and then to observe what is happening. The experimental design has been adopted with partial control and remote testing. The experimental design can be explained according to the following plan:

Group	The variable Independent	The variable Dependant
Experimental	Strategy Teaching Reciprocal	Achievement and Reflection Thinking
Control	The normal way	

Second: the research community and its Sample

The Students of the fourth grade were randomly selected by the school administration and randomly selected (A) to be the pilot group and the number of its members (53) students, who have been excluded statistically (6) students from last year to have previous experience and thus the number of members of the group (48) students while the number Control of group members is (47) students.

Third: the equality of groups

1- The chronological age in months

The age of the students was calculated for the months until 2017/10/1 of the school records. The t-test did not show significant statistical differences at (0.05) Table (1) show that.

Table (1) The t- test of the variable age in months for the two research groups

Group	Number	Arithmetic mean	The standard deviation	T- Calculated	T- Table	The degree of freedom	Statistical significance
Experimental	48	204.5	15.7	0.433	2	93	Non-D
Control	47	205.7	10.8				

2 -Intelligence:

Using the Raven test to measure the intelligence of the students of the research sample because of the high degree of honesty and stability as well as being accredited in the Iraqi environment and can be applied to large numbers at the same time (Dabbagh,1983: 32-33) and applied the test on the two sets of research using t- test No significant differences were shown statistically at the significance level (0.05) and Table (2) shows that

Table (2) T-test of scores of two groups in the Intelligence test

Group	Number	Arithmetic mean	The standard deviation	T- calculated	T- Table	The degree of freedom	Statistical significance
Experimental	48	39.2	5.7	1.371	2	93	Non-D
Control	47	37.5	6.4				

3 - Achievement in physics for the third grade average

The scores of the students in the two research groups were obtained in physics for the third grade of the school records. Using the t-test, there were no statistically significant differences at (0.05) and Table (3) show that.

Table (3) T-test of the scores of the two groups of research in achievement in the physics of the third grade average

Group	Number	Arithmetic mean	The standard deviation	T-calculated	T-Table	The degree of freedom	Statistical significance
Experimental	48	71.6	14.52	1.388	2	93	Non-D
Control	47	75.4	12.85				

4. Previous information:

The researcher prepared a test of the previous information, which was based on what students studied in the intermediate stage, in order to determine the previous information that the students possess in physics.

The test consisted of (30) multi-choice types to ensure the integrity of the test before it was applied. It was presented to a group of experts in physics and teaching methods. Using t-test, there were no statistically significant differences at (0.05) and Table(4) Explains this.

Table (4) T-test of the scores of the two groups in the previous information test

Group	Number	Arithmetic mean	The standard deviation	T-calculated	T-Table	The degree of freedom	Statistical significance
Experimental	48	19.5	6.75	1.003	2	93	Non-D
Control	47	20.5	5.85				

Fourth: Research requirements:

1 - Determination of scientific material:

The scientific material was identified in the first five chapters:

- Chapter I: Parameters of its President in Physics.
- Chapter II: Mechanical properties of the material.
- Chapter 3: Fluids.
- Chapter 4: Thermal properties of matter.
- Chapter 5: Solar Systems.

From the physics book for the fourth grade scientific year 2018/2017

2. Identification of behavioral purposes:

Behavioral purposes were determined (108) as a behavioral purpose according to the Bloom classification, and were presented to a group of experts (*) in the field of physics, education and teaching methods.

3 - Preparation of teaching plans:

In accordance with the content of the thesis for research purposes, 24 study plans were prepared for two research groups according to each of the reciprocal teaching strategies and the usual method. They were presented to the group of experts in physics, education and teaching methods.

Fifth: My research:

- Building achievement test:

The researcher has built an achievement test according to the following paragraphs:

1- Preparation of the specifications table:

The table of specifications was prepared in which subjects of experimental material represented in the first five chapters of the course book were taught to the fourth grade students and the behavioral objectives of the five levels of the cognitive field of the Bloom classification (recall, absorption, application, analysis, composition)

- 1-Dr. Jalal Shinta Jabr / T. M / Faculty of Science for Pure Sciences / University of Dhi Qar.
- 2- Prof. Anam Kassim Al-Sarifi / Psychology / Faculty of Education for Human Sciences / Dhi Qar Univers
- 3- Prof. Zeinab AbdulSada Awwad / College of Education for Pure Sciences / University of Dhi Qar.
- 4 –Dr. Ali Abdul Dhahel / T./The education of the human Sciences/ University of Dhi Qar
- 5 - Dr. Hussein Khudair Jalil / Physics / Faculty of Computer Science / Sadiq University

2. Formulation of test paragraphs:

The paragraphs of the test were formulated in accordance with the specifications already discussed and in the paragraphs of the objectivity of the building, because they provide an acceptable degree of honesty and objectivity. The paragraphs of the test reached (40) a kind of multiple choice taking into account the technical and linguistic aspects of safety as well as their comprehensiveness to the subject of the experiment and its suitability to the students' levels.

3. Validation of the test:

The validity of the test was achieved by matching the estimates of the experts who were presented with the test in preliminary form with the concepts of the content of the five chapters of the course book and the behavioral purposes, to express their opinion on the extent to which they covered the content and levels of the target objectives and their measurement of cognitive levels.

4 - Application of the test on the survey sample:

After checking the veracity of the content for the test, in order to ascertain the cytometric properties of the test and to calculate the coefficient of difficulty and the strength of discrimination and the superiority of the alternatives and the coefficient of stability and estimation of the time taken in the answer. Also to ensure the clarity of the test paragraphs and instructions, the researcher applied the test on a sample randomly selected from students The fourth grade is composed of (50) students from Mohammed Al Baqer Preparatory School for Boys.

5. Statistical analysis of the test paragraphs:

5-1-The difficulty factor of the paragraph

The difficulty coefficient of the test paragraphs was calculated and found to be between (0.78 - 0.25) and these values are acceptable.

5-2- Discriminatory power of paragraphs:

The discriminant force of the test paragraphs was calculated as between (0.65-0.30) and those with a discriminating force (0.20) were better.

5-3- Effectiveness of wrong alternatives:

The effectiveness of each wrong alternative and each experimental paragraph was calculated. Alternatives were found to attract more members of the lower group compared to the upper group. Therefore, it was decided to keep the wrong alternatives as they were.

5-4-Stability test:

The coefficient of test stability was calculated at (0.85) and is considered acceptable for non-tested tests.

- Divergent thinking:

The researcher adopted the Gilford test for the measurement of reflexive thinking. This test consists of (5) events:

1- First Effect: It takes(4) minutes.

The student draws forms as much as he can and requires in each drawing to contain a circle.

2-Second Effect: It takes(5) minutes.

The student is given certain forms and asks him to collect some or all of them in order to show him one or several

3-Third Effect: takes (6) minutes.

The student is given 5 problems and asks him to draw things for each problem.

4 -Fourth Effect : takes (4) minutes.

The student is required to write the largest number of uses for a group of objects during that period.

5 - Effectiveness five: takes (8) minutes.

The student is asked to write several uses for two things. Thus the total time of the test is the residual thinking (27) minutes.

- Stability Divergent thinking:

Although the test has great credibility and stability, the researcher wanted to present it to a group of experts (previously mentioned) in order to evaluate the validity of the test paragraphs in terms of measuring the properties for which they were placed and the integrity of the paragraphs. After collecting and analyzing the questionnaires, The application should be ready on the exploratory sample.

- Application of reflective thinking on the survey sample:

The test was applied to a sample of students consisting of (50) students from the fourth grade students from Mohammed Al Baqer Preparatory School for Boys in order to identify the clarity of the instructions and the formulation of the test paragraphs and the response time.

- Stability of thinking Divergent:

The stability of the test was calculated using the alpha-cronbach coefficient, with the stability coefficient (0.87) being an acceptable value.

Sixth: Application of experience

1 - The experiment began at the beginning of the academic year (2018 - 2017) in the first semester.

The IQ test was performed on Tuesday, 2017 \ 10 \ 3

3. The previous information test was applied on Wednesday, 2017 \ 10 \ 4

4 - Effective teaching began on Thursday in 2017/10/5

5 - The test of achievement on Sunday, 14 2018/1 /

6 - applied the test of thinking back on Tuesday in 2018/1/16

Seventh: Statistical means

1- T-test:

I used the equivalence between the two groups and the comparison between the average scores of the two groups of research in the achievement test and the backward thinking. (Kubisbi, 2010: 118)

2-The Alpha-Cronbach equation:

Used to calculate the stability of the test of backward thinking.

(Ouda and Khalil, 1988: 350)

3- Keoder-Richardson equation (20):

Used to calculate the stability of the achievement test

(Imam and others, 1988: 25)

4 - equation of difficulty of paragraph:

Used to calculate the difficulty factor of the test scores.

(Allam, 2011: 251)

5. Equation of paragraph discrimination:

Used to find out the discriminatory power of the test scores.

(Al-Jalali, 2011: 44)

6 - equation of the effectiveness of alternatives:

Used to calculate the effectiveness of alternatives to the test scores.

(Azzawi 2008: 83)

7- Volume equation:

To find out how much effect an independent modulator has.

(Abu Hatab and Amal, 1996: 438)

First: Display the results

In order to verify the research hypotheses, t-test was applied to process the data and to know the differences in the average grade of students in the achievement test between the two research groups, as shown in Table (5)

Table (5)

The results of the T-test to show the significance of the differences in the achievement test

Group	Number	Arithmetic mean	The standard deviation	T-calculated	T-Table	The degree of freedom	Statistical significance
Experimental	48	35.6	6.8	5.716	2	93	D
Control	47	7.2	7.2				

Table (5) shows that the calculated values are (5.716), which is higher than the table value of (2). This means that there are statistically significant differences between the two research groups and for the experimental group.

To calculate the effect size ES. the effect size equation was used (0.25) and high.

The t-test was also applied to data processing and to the differences in the mean scores in the regression test between the two groups, as shown in Table (6)

Table (6) The results of the T-test to show the significance of the differences in the regression test

Group	Number	Arithmetic mean	The standard deviation	T-calculated	T-Table	The degree of freedom	Statistical significance
Experimental	48	55.75	11.82	4.560	2	93	D
Control	47	46.25	8.45				

It is clear from Table (6) that the calculated value of the exaggeration (4.560) is higher than the table value of (2). This means that there are statistically significant differences between the two research groups and for the experimental groupUp. To calculate the effect size ES. the effect size equation was used (0.18) and high.

Second: interpretation of the results

The search results showed the following:

1 - There are differences of statistical significance between the experimental and control groups in the achievement test and the benefit of the experimental group.

This can be attributed to a number of reasons, including:

- The Exchanging teaching strategy has had an impact on improving educational achievement.
- The Exchanging teaching strategy has led to positive cooperation among students by organizing them into small groups.
- The Exchanging teaching strategy had a role in organizing scientific knowledge.
- The Exchanging teaching strategy is more effective than the usual method.
- The Exchanging teaching strategy has contributed to the harmony of the students with each other and to enhance their self-confidence.

2 - There are statistically significant differences between the experimental and control groups in the Divergent thinking test and for the benefit of the experimental group.

This can be attributed to a variety of reasons:

- The strategy of cross-teaching has contributed to improving students' thinking.
- The use of the interactive teaching strategy has enabled students to understand more deeply the knowledge content
- The interactive teaching strategy has contributed to finding diverse solutions within the classroom.
- The interactive teaching strategy has contributed to the diversity of educational activities, allowing students to evaluate what has been accomplished
- The interactive teaching strategy has stimulated students' minds and continued learning.

First: Conclusions

The search results showed the following:

- 1 - The strategy of teaching exchange work to develop the teaching of physics.
- 2 - The strategy of teaching exchange led to increased student achievement.
- 3 - Teaching according to the strategy of teaching exchange have an impact on the increase of Divergent thinking inward students
- 4 - The strategy of teaching exchange contributed to increase interaction between students and increase their desire to learn.
- 5 - The strategy of teaching exchange in increasing the awareness of students and awareness of what they think.

Second: Recommendations

In the light of the research results, the researcher recommends the following:

- 1 - The need to use the strategy of teaching in the exchange of teaching physics.
- 2 - Training the teachers of physics in the secondary stage on how to use the strategy of teaching exchange.
- 3 - Include the book of the guide of physics in the secondary stage on the strategy of teaching exchange.
- 4 - The need to develop thinking in general and Divergent thinking and the extent of the possibility of raising the level of students in the Divergent thinking.
- 5 - The need to benefit from modern strategies in support of the teaching process and in the delivery of subjects to the minds of students.

Third: Proposals

To complete the current research, the researcher proposes the following studies:

1. Conduct a similar study for the current study of other subjects.
- 2 - Study the impact of the strategy of teaching exchange with another strategy.
- 3 - study the effectiveness of the strategy of teaching exchange in other types of thinking.
- 4- Studying the effect of teaching exchange strategy in other variables.
- 5 - Study the impact of the strategy of teaching exchange on students and students of different stages of study.

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