

The Impact of the Reverse Learning Strategy on the Achievement of Sixth Graders and the Development of Their Creative Thinking

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Abstract

The aim of this study is to know (The Effect of Flipped Learning strategy in the Achievement of sixth grade students and the development of Their Creative Thinking). In order to achieve the objective of the study the two researchers depended on the experimental design, The sample of the study included (50) students of the AL- Smaha primary school students as (25) students for the first experimental group which studied according to the Flipped Learning strategy, and (25) students for the control group which studied depending to the traditional method, and it was qualified in the following variables (previous information, previous achievement, age). The test were prepared and it considered of (20) items as multi-choice type, and verifying its veracity by presenting it to group of experts and specialists, and verifying the veracity of the content by preparing test map. The reliability estimate was (0.82). The creative thinking test prepared too, which considered of (6) activates they were veracity and the reliability was (0.77). The results of the study showed: The students of the experimental group who studied according to the Flipped Learning strategy exceeded the students of the control group who studied according to the traditional method in both of the achievement test and the creative thinking test The researchers recommended several recommendations, including the need to adopting new teaching strategies. The study also suggested new scientific studies and other stages or other variables such as scientific thinking, developing critical thinking, the attitude towards the sciences.

Keywords: Flipped learning; Creative thinking.



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1. Introduction

The employment of technology in the education provided in our time has provided great opportunities for increasing the participation and effectiveness of students, especially in the teaching of science curricula, and new developments have emerged in the teaching pathways. The focus has been on the learner's effectiveness, which included his participation in the educational process. which emphasized the changing role of teachers, bringing to required them not only the introduction and use of technology is attractive by offering more topics interesting but require understanding of the best ways to ensure that students learn by understanding the mechanism of learning (how students learn) and to ensure that One innovative approach has been introduced through a new strategy of inverse strategy.

Where he pointed out (Hamdan *et al.*, 2013) That this method of teaching puts a lot of direct education in the hands of students instead of the traditional method of indoctrination and listening to the teacher, Where learners rely on learning that takes place outside the classroom through the sites and Alfdeaut education under the supervision of Yeh and guidance of the teacher and this strategy allows time for students to learn more through learning experiences inside and outside the classroom Hassan and Hana (2014).

Especially after the science curriculum has seen several changes in primary school, as these changes are reflected in the vocabulary of the school curriculum and out, especially science curriculum for the sixth grade of primary, Contrast influenced this change data on the methods and methods of teaching science, having access to the book grade science a primary for the sixth and found that it contains the activities of (exploratory, problem - solving), also it includes scientific concepts and a lot of scientific experiments that require hiring a lot of educational media Can ensure the development of thinking outside the Fund in the sense of developing creative thinking

Thus, the teaching of this article requires the following methods and methods varied and different depending on content, themes and experiences diversity, however, is still the reality of the teaching of science level of education developed what employ weak educational technology is still in our schools and we still adopt the traditional methods of teaching, and this resulted in a lack of interaction of learners and their participation in the educational process and therefore lower achievement in science, which is one of the most important negative indicators that directly affect the educational process, and from this point of the study attempts to provide a new teaching strategy for teaching science, a strategy circus M inverted or inverted. Characterized by flexibility and redistribution of class time so as to ensure interaction between the teacher and the student.

The research problem is determined by answering the following question:

What is the impact of the reverse learning strategy on the achievement of the sixth grade pupils and the development of their creative thinking?

2. The Importance of Studying

1. The importance of the study stems from the fact that it was presented in response to the recommendations of educators on the need to modernize and adopt teaching strategies that ensure diversity in the sources of learning and provide an opportunity for more effective learning.
2. The importance of being the first study (according to a science researcher n), which is trying to integrate the inverted learning strategy in teaching science and to promote the use of technology within the Limitation the Education.
3. Importance of the importance of the stage of study covered by the study (the sixth primary stage) at the stage of being fundamental to the discovery and acquisition of facts and is therefore important in the formation of concepts for the crisis to deal with modern science curricula.
4. The importance of the study of the importance of encouraging the development of creative thinking skills as one of the objectives that modern teaching seeks to achieve.

3. Search Goal

The current research aims to identify:

The impact of the reverse learning strategy on the achievement of sixth graders and the development of their creative thinking.

4. Search Hypothesis

To achieve the goal of research has been zero - premise data the following status: -

1. There is no statistically significant difference at the level of (0,05) between the average grades of students The experimental group studied using the inverted learning strategy and average scores of control group students who studied (normally) in the post-achievement test .
2. Do not There is a statistically significant difference at the level of (0.05) between the average grade of students the experimental group studied using the learning strategy and the mean scores of control group students who studied (in the usual way) in the creative thinking test.

5. Search Limits

Your current search is limited to:

1. Sample of the class Elementary School (Al- Samaha Elementary Boys) belonging to the Directorate General of the province of Baghdad/ Rasafa first.
2. The first semester of the academic year 2018-2019
3. Chapters (I - II - III) of the science book developed for the sixth grade primary, I 1, 2017.

6. Terminology

6.1. Strategy

Abd El (2012), defined it as "an organized plan that includes the methods and methods that the teacher takes to achieve the desired goals" Hassan and Hana (2014) .

Invert learning strategy or (inverted): Al-Zuban (2015) was defined as: " strategy educational concentrated about students instead of from teachers, it does learners to watch videos educational short in a their homes before time period, While Exploits Teacher time Period by providing environment Learn Interactive Active Complete In which Direct learners, And application What They learned it " Al-Zuban (2015)

6.2. Collection

He defined it as "the set of facts, concepts, principles, laws, theories, and skills acquired by learners as a result of a study of a particular unit of study or subject." Al-Zubaidi and Muhannad (2012)

6.3. Creative Thinking

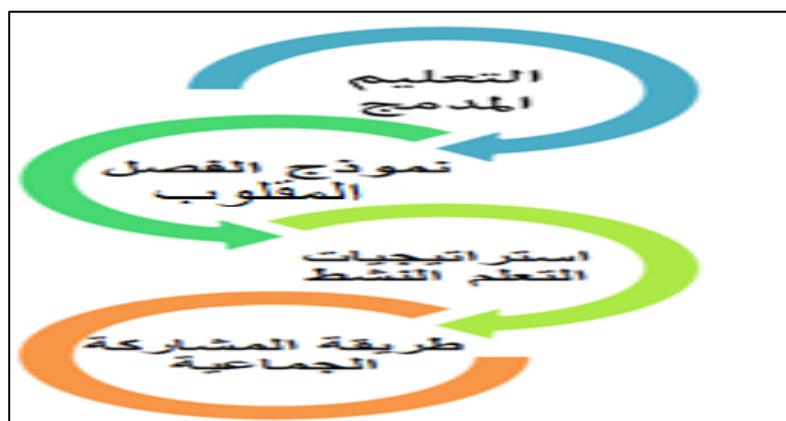
Arafa Al-Zubaidi and Muhannad (2012) as "a mental process accompanied by impulsively and emotion regulates the student's mind experiences and information in a creative way to enable access to what is new is useful." Hassan and Hana (2014)

7. Chapter Two

7.1. (Theoretical Framework)

Reverse learning strategy Flipped Learning strategy: Active education is described as a process of activating the role of the student in a positive and active manner in activities that require providing solutions and ideas that can be applied in new situations. In this sense, the idea of reverse learning emerged as a model between active education and learner-centered education (Hassan and Hana, 2014).

As it relies on the use of modern technology in the delivery of direct education, this model is characterized by the characteristics of active learning, where learners participate in building knowledge by working together in interactive lessons. Has been introduced This Concept in a several conferences between (1998) and (1996) and the title (in a way of learning Inverted or learning (inverse) The Flip Learning. [Al-Zubaidi and Muhannad \(2012\)](#)_Also presented at a close time each from [Lage et al. \(2000\)](#) and in Australia in a Public (2000) style similar For Baker in a Teaching And its application, They were fired On that The concept is in a close and nominal name) the classroom Inverse inverted Classroom) And included their vision that the student Watching lecture Before At that time, And from Then Spend Time Selected To illustrate the lecture Concepts Hard, And work in a Groups Cooperative ([Al-Zubaidi and Muhannad, 2012](#)). The idea of learning has emerged Inverse As a style of Patterns Learning Built-in Which Starch result For the evolution Received In j environment Education Madm where learning is based on the inverse interaction and partnership between the teacher , who in turn focuses on learning experiences and opens the doors for the learner to apply these experiences with a new vision , especially when the fact that learning is designed nicely designed ([Mr, 2002](#)).



The classroom - based learning Reversed In its design of one of the best modern technology solutions to address the problems of traditional education and develop the level of creative thinking of the learner They are Chimmel use Technology To benefit from learning within the educational process Can For the teacher Spend More From Time in a Interaction And dialogue And discussion With External Alp in the classroom rather than just lecturing the students can watch shows and educational vdiostat through educational sites certified under the guidance of the teacher ([Sherman, 2013](#))

Learning the characteristics of hearts or Inverted

1. The inverted learning model attempted to create more time for the student to apply the new knowledge.
2. The learning is inverted Based on active learning.
3. This kind of learning on the principle of learning through the heart of a group of homework consists.
4. The ability of students to "repeat the lesson" more than once based on their individual differences ([Abd El, 2012](#))

8. The Advantages of Classrooms Designed According to Learning Inverted

1. Ensures good use of the study time.
2. Allows students to repeat the lesson more than once based on their individual differences.
3. The teacher takes more advantage of the guidance, motivation and assistance.
4. Building stronger relationships between learner and teacher.
5. Encourages the best use of modern technology in the field of education.
6. Learner becomes a researcher for sources of information.
7. Promotes critical thinking and self - learning and building expertise and skills of communication and cooperation among learners ([Attia, 2008](#))

9. Reasons for Using Inverted Learning

1. Study materials and their rapid development.
2. Tight time and not submit activities and discussion adequate for all students.
3. Differences Individual between Students in a speed in a Understanding Absorption, And they are feeling Bored in a during Explanation lesson.
4. Necessity Diversity in a Techniques Learning and its means.
5. Progress Technology Accelerated in a the world, And direction Learners to me Use Technical, Q Most of them They spend Their time On the network Spider ([Afaneh and Yusuf, 2009](#))

10. Grade Tools Inverted

1. Computer.
2. Internet.
3. Video production applications.

4. Intermediary for video transmission product.
5. Presentations (Allam, 2000)

11. Steps to Implement a Strategy Reverse Learning

There is no specific design for implementing reverse education, but there are agreed steps:

1. Inform students of the course material through a video tutorial (5-7 minutes). Read and write a text about the subject of the lesson.
2. The student takes notes and questions to be discussed with the teacher during the class directly.
3. At the beginning of the quota is given enough time to the questions about what learners have seen it (the time of questions and answers).
4. It allocates time then for a certain activity and one relations wither topic of the lesson, such as a research mission or laboratory experiment.
5. The teacher teaches the pupils.
6. The raid Tzu my new house of my duty with video (Ali, 2011)

Baker (Baker) as it came in a Johnson (2013) And classified them to levels:

1. Illustration h
2. Expansion
3. The application of
4. Practice

Where the first and second level is carried out in the house while carried out Level 3 and 4 in the classroom (Al-Khaheeli, 2015). And section Bishop and Pilgrim Bishop & Veliger, 2013) Reverse learning into two:

Section I: Learning my self - BASED on a long Ast x technology Kha classroom shaking is long learning tools as aluminum trench diverse.

Section SECOND J: human interaction goal of classroom activities designed by which the teacher and devoted her Time

Appropriate in The beginning of the share of questions which the students through which the Do not make sure that they have read the article. The students requested and carried out the activities before the class and took their observations or ask them about them (Tafesh, 2004)

12. Creative Thinking

Creative thinking is a "mental process characterized by inclusiveness and complexity and involves interrelated cognitive, emotional and moral factors that constitute an active and unique state of mind, a purposeful behavior that does not occur in a vacuum or in isolation from valuable cognitive content because its purpose is to find authentic solutions to problems in a knowledge or life field Human beings, the method used by the individual to produce as many ideas as possible about the problem he is exposed to (intellectual fluency), and these ideas are characterized by diversity and difference (flexibility) and non-repetition or common (authenticity).

13. Creative Thinking Skills

That creative thinking involves three key skills: the fluency, flexibility and originality of the Torrance scale of creative thinking.

- 1- Fluency: The ability to generate a large number of good and correct ideas for an issue or problem is free or open. Fluency includes the quantum side of creativity. It means the multiplicity of ideas that can come from the individual or the ease or speed with which certain repercussions are called. The mind (creator) as if always fired shots of new ideas appropriate, and characterized the appropriate ideas and answers to suit the requirements of the real environment and therefore must exclude random ideas and answers, such as (write as many as possible heat-conducting metals).
- 2- Flexibility means the ability of the individual to change the state of mind by changing the situation. Flexibility is the ability to generate a range of diverse responses, which show unusual uses of something familiar. Flexibility includes the qualitative aspect of creativity. Flexibility is the opposite of mental inertia. On transparency towards the topics at hand.
- 3- Originality: the ability to express unique, and the production of ideas far and skilled than the common ideas and clear during a specific time period, that is, excellence and uniqueness in the idea and the ability to access the direct and familiar beyond the ideas, and the less the degree of prevalence of the idea increased the degree of authenticity, More characteristics associated with creative thinking [13].

14. Reverse Learning Strategy and Relationship B. Creative Thinking

The opposite learning strategy is One of the strategies that develop creative thinking; because the mind thinks differently or unfamiliar and just thinking about a way to engage an unfamiliar thought in creativity and creation can be seen here and the relationship between creativity and thinking Palmekos Which is an active mental process that requires high mental abilities and efficiency, especially in the creation of unusual ideas, and this type of thinking patterns on the situation of the learner in front of the situation makes him in a state of imbalance, which makes his mind active in the process of thinking to seek a solution and rebalance because the case This imbalance is necessary and necessary to stimulate thinking and access to non-traditional intellectual products [13]

In fact, there are several names for the concept of this strategy, some of them called thinking of inverted or thinking of the inverse Or strategy, note - think - explain or strategy of contradictions or reverse strategy , and put this strategy under the influence of educational attitudes that contradict with what he or his previous experiences, which raises his attention and makes him eager to know this contradiction, and search and investigate a convincing explanation for resolving this contradiction and interpretation [14]

15. Chapter Three

15.1. Search Procedures

This chapter describes the procedures used in the research in terms of adopting appropriate experimental design and the research community and the method of selection of the sample and the methods of equivalence of my group Research and presentation of the requirements of the search and its tools and how to apply them and the statistical means used to analyze the results.

15.2. First: Research Methodology

The experimental approach was adopted in this research the appropriate approach to the nature of research.

15.3. Second: Experimental Design

| T | Groups | Parity | Independent variable | The dependent variable | Search Tool |
|---|------------------------|--|----------------------|---------------------------------------|---|
| 1 | The experimental group | 1- The chronological age 2- Previous collection 3- Test the previous information | Inverted learning | 1. Collection 2. Creative thinking | 1- The collection test 2 - the test of creative thinking dimension |
| 2 | Control group | 4- Test Tribal Creative Thinking | The usual method | | |

The choice of experimental design is the first step for the researcher when conducting a scientific experiment. Therefore, the researchers adopted the experimental design of the experimental groups (experimental group and control group) with partial control as it fits the research requirements.

Figure (1) shows the distribution of the two research groups according to the approved experimental design.

16. Third: The Research Community and Its Design

School was selected (primary tolerance for boys) are deliberate to be an area of research for many reasons, including: 1. contain several divisions of the sixth grade of primary, 2 and its proximity to the housing area (one of the researchers), making it easier to move to, 3. Knowledge management school and teachers of what Ensures full cooperation and assistance in carrying out research and assistance in overcoming expected difficulties. The research community has been composed of two divisions in aFor the sixth grade, where the number of students in each of the people (A, B), respectively (2, 7, 2, 6). Where selected Baltaan random Division (a) to represent the experimental group, and the number of pupils (26) students, where he ruled out (pupil) of the repeaters last year, and the Division (b) the control group, and the number of individuals with (2 7) pupils, excluded them (the pupil) of the head among, So the number of final sample members (50) became his pupil, Table (1).

Table-1. Final distribution of individual research sample

| Groups | Division | Number of students | Number of excluded demand in August | Number of final research students | Teaching Method |
|--------------|----------|--------------------|-------------------------------------|-----------------------------------|---------------------------|
| Experimental | a | 26 | 1 | 25 | Reverse learning strategy |
| Control | B | 27 | 2 | 25 | The usual method |
| Total | | 53 | 3 | 50 | |

Fourth: Statistical equivalence between the experimental and control groups:

Done To verify the equivalence of the sample members in some variables that may have an effect on the variable dependent of the independent variable. These variables are:

1. The chronological age
2. Previous collection
3. Test the previous information
4. Creative thinking

The two groups were equivalent to each of the following:

16.1. The Chronological Age (Months)

Obtained the chronological age of the experimental and control groups of school records and it became clear that the average age of members of the experimental group (141.28) months and contrast (6.96) and the average age of the members of the control group (140.8) months and contrast (9.25) and to find out indication of the difference between these poles using "test Tae (t - test) For two independent samples, it was found that the difference was not statistically significant at the level of significance (0.05 , 0). The calculated T value (0.596) was smaller than the tabular T value of (2.0106) and by degree freedom (48) Table (2).

Table-2. The results of the T-test of the two groups of research in the age variable calculated in months"

| The group | Sample size | "Arithmetic mean " | variance | The degree of freedom | " T value " | | " Level of significance" (0.05 , 0) |
|----------------|-------------|--------------------|----------|-----------------------|-------------|--------|-------------------------------------|
| | | | | | Calculated | Table | |
| "Experimental" | 25 | 141.28 | 6.96 | 48 | 0.596 | 2.0106 | Not a function |
| Control | 25 | 140.8 | 9.25 | | | | |

16.2. Previous Collection

The mean of the members of the research sample in science for the fifth grade of primary, the average grade of the group (78.28) with variation (169.8), while the control group average (76.96) was different (203.6) (T-test) For two samples Independent to know the significance of statistical difference between the scores of pupils two groups, it became clear that the difference is not relegated to the statistical significance at the level (0.05), as was T calculated value (0.341) O'Gorman T value Tabulated adult (2.0106), and the degree of freedom (48), and this shows that The experimental and control groups are statistically equivalent in the previous collection variable Table (3).

Table-3. Test results of the two research groups in the previous collection

| The group | Number of sample members | "Arithmetic mean " | contrast | The degree of freedom | " T value " | | Level of significance |
|--------------|--------------------------|--------------------|----------|-----------------------|-------------|--------|-------------------------------|
| | | | | | Calculated | Table | |
| Experimental | 25 | 78.28 | 169.8 | 48 | 0.341 | 2.0106 | Not statistically significant |
| Control | 25 | 76.96 | 203.6 | | | | |

16.3. Test the Previous Information

In order to verify the extent to which the sample members have access to the previous information on science, a test of previous information has been prepared. Consists of (20) substantive paragraphs of multiple choice, and was verified testing safety has been presented to a group of experts and arbitrators agreed on most of the paragraphs of the test with a simple adjustment to the formulation of some of them were testing the application on Wednesday , 26/10/2018 , and reached Average scores of the experimental group (5.32) contrast (9.22) , and the average group scores control (5.08) and contrast (8.076) , and when using Altaia test (t-test (T = 0.288) was smaller than the T-table value of (2.0106) and the degree of freedom (48) , which indicates that the difference between the two groups is not statistically significant . However, the experimental and control groups are statistically equivalent in the previous information variable Table (4).

Table-4. Test results for members of the two research groups in previous information

| the group | Number of sample members | SMA | contrast | The degree of freedom | T value | | Level of significance |
|--------------|--------------------------|------|----------|-----------------------|------------|--------|-------------------------------|
| | | | | | Calculated | Table | |
| Experimental | 25 | 5.32 | 9.22 | 48 | 0.288 | 2.0106 | Not statistically significant |
| Control | 25 | 5.08 | 8.076 | | | | |

16.4. Tribal Creative Thinking Test

For the purpose of knowledge equivalent to two groups of research (experimental and control) in creative thinking hay variable t study verbal TORRANCE test to think about creative being suitable for the Iraqi environment is characterized by honesty and stability as a result of its application in local environments and ensure that only Khet bar (8) activities describe the capabilities of creative thinking (fluency, flexibility , originality) was also verified virtual sincerity by submitting it to a number of experts, the test was applied on Thursday a brief summary (27/10/2018) to reward, and when Comparison Mediterranean Degrees The two groups, is found that Average Degrees Students The experimental group may Reached (48.96) and contrast (111.95) , and the average degree of control (48.32) and contrast (122.97).

When the tester is used t-test) For two independent samples to know the significance of statistical difference between the scores of students in the two groups, it became clear that the difference is not relegated to the statistical significance at the level (0.05), as was T calculated value (0.2087) is smaller than the T value Tabulated adult

(2.0106), and the degree of freedom (4 8), Indicating that the experimental and control groups are statistically equivalent in this variable Table (5).

Table-5. Test results of the two research groups in the previous collection

| The group | Number of sample members | SMA | contrast | The degree of freedom | T value | | Level of significance |
|--------------|--------------------------|-------|----------|-----------------------|------------|--------|-------------------------------|
| | | | | | Calculated | Table | |
| Experimental | 2 5 | 48.96 | 111.95 | 4 8 | 0.2087 | 2.0106 | Not statistically significant |
| Control | 2 5 | 48.32 | 122.97 | | | | |

17. Fifth: Research Requirements

17.1. Determining the Content of the Educational Material

Before the direct application of the experiment was to determine the subject matter of the book Science of Developer grade sixth primary (year 201 8 / 201 9) and formed article of (two units for the first and second) and formed: the unit first: the characteristics of living organisms: consisted of:

Chapter I: Natural reproduction in the plant

- Lesson 1: Reproduction of seeds
- Lesson 2: Vegetative reproduction
- Chapter II: Artificial reproduction in plants
- Lesson 1: Reproduction by division and vaccination
- Lesson 2: Reproduction with the seeds

The second unit: The human body and its health: It consisted of:

Chapter I: Devices in the human body

- Lesson 1: The nervous system and its health
- Lesson 2: The structural system and its health
- Lesson 3: The muscular system and its health

Chapter II: Sense in man

- Lesson One: Members of Sense
- Lesson 2: Skin composition and functions

17.2. Identification of Scientific Concepts

After having identified t educational material and chapters of the constituent material content analysis identified as a set of concepts that will be examined during the duration of the experiment it included all major and secondary concepts contained in the article covered by the research experience and the number of concepts (25) concept .

17.3. Behavioral Purposes

A set of behavioral purposes was derived to cover the subjects of the prescribed material and to benefit from the general objectives set for the subject of science for the primary stage. The number of (30) behavioral purposes was presented to a number of arbitrators and some of them were amended.

17.4. Preparation of Teaching Plans

The researchers prepared the teaching plans for the two research groups and presented them to the competent experts to judge their validity and suitability. The number of plans (9) was a study plan in the light of the five-year plan.

18. Sixth: Ada- T Search

18.1. The First Tool: - Building the Experimental Test

The Declaration Dad achievement test, according to the content of the subject matter of the book of science Developer grade sixth primary composed of (20), paragraph multiple - choice , as a promising achievement test according to the following steps:

- 1- Determining the educational material.
- 2- The number of behavioral goals.
- 3- Numbers of the test map (table of specifications): from the current research requirements The numbers of the test map to ensure the comprehensiveness and veracity of the distribution of its paragraphs and representation of the educational material scheduled, so the researchers determine the time taken each semester of the article prescribed from the science book scheduled for the sixth grade of primary and the first three levels From the cognitive field of the Bloom classification (recall - assimilation - application). The weights of the class content have been determined based on the views of the group of teachers and teachers who are interested in teaching this subject. The weights of the goals were adopted in Thdidhaaly the proportion of behavioral objectives in each level of the Q three levels depending on the contents of each chapter. The test subjects were divided by (20) test paragraphs (6).

Table-6. Table of specifications (test map)

| Seasons | Number | Weight | Behavioral objectives | Total |
|---------|--------|--------|-----------------------|-------|
|---------|--------|--------|-----------------------|-------|

| | of pages | Content | Knowledge | Absorption | Application | |
|-----------------|----------|---------|-----------|------------|-------------|------|
| The first unit | 30 | 42 % | 40 % | 33 % | 27 % | 100% |
| | | | 3 | 3 | 2 | 8 |
| The second unit | 41 | 58 % | 5 | 4 | 3 | 12 |
| Total | 71 | 100% | 8 | 7 | 5 | 20 |

19. Validity of Test Paragraphs

The test shall be the achievement of (20) paragraph presented to the arbitrators (experts) specialists in the methods of teaching science, measurement and evaluation and some paragraphs were modified in the light of their views

Answer instructions:

-A set of instructions was prepared and included instructions for answering a description of the method of answering each question. The answer to the paper should be indicated by the correct alternative and the need to answer all the questions and not leave any paragraph without an answer.

-Instructions for correcting the test of achievement: A model was prepared to correct the answers, giving one degree for the correct answer and zero for the wrong answer. The left or more than one signal was treated incorrectly.

5- The exploratory test: (the achievement test and the test of creative thinking) were applied to a sample of 48 students from Najeeb Pasha primary school,

6- Statistical analysis: The appropriate statistical means were used according to the program spss.

7 - Validation of the test: - The validity of the test has been verified as follows:

-Virtual honesty: To verify the veracity of the test, the test paragraphs were presented to the group of arbitrators and specialists in education and teaching methods to verify the validity of the test and the proportion of agreement was adopted 80% to determine the validity of the paragraph.

-Content Validation: A sample map was used to determine the extent to which the paragraphs represent the content of the course material and the behavioral objectives. The tests are considered authentic if they represent the content of the subject and the objective that you measure.

8 - Stability test:

To calculate the stability equation was used: Kudrichardson - 20 (KR-20).

It is a good way to calculate the percentages of correct and false answers in test paragraphs, and variance

The second tool: preparation of the test of creative thinking dimension:

1- Defining the Objective of the Creative Thinking Test:

The objective of the test is to measure the creative thinking skills of students in the sixth grade

2 - Defining creative thinking skills:

Was selected Skills to think creativity according to What Eat it Most Studies Previous (Fluency and Flexibility and Originality).

3- Formulation of creative test paragraphs

The preparation of the paragraphs of the test consisted of (6) the activities of each activity to a position in which one measures the creative thinking skills (fluency, Flexibility, Originality). The ease and clarity of the terms and their relevance to the level of primary students were taken into consideration.

D - Instructions to correct the test of post-creative thinking:

A model was developed to correct the students' answers by giving each student four grades as follows:

- the degree of demand of Ge: measured by the ability of the learner to mention the largest possible number of appropriate responses at a specific time minus the repeated answers that have nothing to do with the subject of the test

Thus, one degree is given for each answer, and the highest score is (40) and the lowest score is (zero) .

- The degree of flexibility: measured by the ability of the individual to diversify the appropriate answers and the greater the number of different answers increased degree of flexibility and given one degree for each type of answers no matter

The number of ideas which my belong me to that kind and given a single score for each idea, so the highest

The score is (40) and the lowest score is (zero).

- Degree of authenticity: measured by the ability of the student to give answers are uncommon (strange) compared to his colleagues and so the degree of originality is high if the recurrence is small. Originality as such Put it down Torrance, and it shall be the highest score (20) and the lowest grade (zero).

E - Statistical analysis: The use of appropriate statistical methods.

And - Stability of the test of creative thinking:

Verified From stability the test Using Equation alpha Kronbach to calculate Factor Stability, as the stability coefficient of the bar (0.77) was a good stability coefficient.

20. Seventh: Application

1. Experience: Experience has been applied from the date of 26 / 10 /201 8 until 26 /1 2 /201 8 the teaching rate of the two sets of research by three shares for each division 3 weeks.

2. The test was applied summative on 29 /12/201 8 on the two sets of research at one time after the flags were members of the sample in advance the date of the exam was the patch according to the model that placed his researcher said .
3. The test application thinking creative posttest on 2 7 /12/2018 on the two sets of research at one time after the flags were in advance the date of the exam was the patch according to the model .

21. Eighth: Statistical Means

The researchers used their research procedures and analyzed the results of the following statistical methods:

1. Using the T-test t-test) For two independent samples to compare the two groups in both the cognitive tests and the creative thinking .
2. Equation of the difficulty factor: - Used to calculate the coefficient of difficulty of the paragraphs of the test paragraphs (achievement and creative thinking)
3. The equation of discrimination : - used to calculate the strength of the distinction of the test scores and the test of creative thinking
4. Equation of the effectiveness of wrong alternatives.
5. Quidder Richardson equation Kauder Recharadson - 20 : Used to find stability
6. The overall test of achievement
7. Cooper's equation: To calculate the proportion of the agreement of the arbitrators on the terms of the test of achievement test creative thinking
8. Alpha Kronbach's equation: A test of creative thinking was used to calculate persistence.

22. The Fourth Chapter

22.1. View and Interpret Results

In order to achieve the goal of research in the knowledge of the impact of the reverse learning strategy in the achievement of students in the sixth grade of primary and development of their creative thinking will be presented and interpreted results.

23. First: View results

23.1. The First Hypothesis

1. The absence of a difference is statistically significant at the level of significance (0.05) between the average grades students who have studied the experimental group according (learning strategy Inverse) and the average score of the control group students who have studied according (the usual way) in the test grades posttest

To test this hypothesis , the "T-test" was used (t -test) The results showed that there was a difference between the average of the experimental group (12.48) with the difference (33.01) and the average score of the control group (8.04) with a difference (19.123), [Table \(7 \)](#).

Table-7. The arithmetic mean and the standard deviation of the research groups (experimental and control) in the post-achievement test

| The group | Sample size | Arithmetic mean | variance | The degree of freedom | T value | | Level of significance (05 , 0) |
|--------------|-------------|-----------------|----------|-----------------------|------------|--------|--------------------------------|
| | | | | | Calculated | Table | |
| Experimental | 25 | 12.48 | 33.01 | 48 | 3.074 | 2.0106 | Function |
| Control | 25 | 8.04 | 19.123 | | | | |

It is clear from the table that the average of the experimental groups studied according to the reverse learning strategy of achievement is higher than the average control group studied in the normal manner. The value of (t) calculated (3.074) which is statistically significant at the level of (0.05) because it is greater than the value of (v) Tabulated the (2.0106) Accordingly , the difference between the two groups is in favor of the experimental group that used the strategy of learning Inverse and thus rejects the hypothesis of zero and accepts Alternative . Which proves the existence of differences of statistical significance for the benefit of the members of the experimental group, because of the impact of this strategy in activating the positive role of the learner within the educational process through the classroom and home activities and direct learning provided by the strategy through the adoption of the learner self-learning methods to allow the student to learn according to his ability and speed Learning.

24. The Second Hypothesis

There was no statistically significant difference at the level of (0,05) between the mean of the students of the experimental group who studied according to the (reverse learning strategy) and the average score of the students of the control group who studied according to the usual way in the creative thinking test.

To test this hypothesis, the "T-test" was used (t -test) The results showed that there was a difference between the average score of the experimental group (36.4) with difference (68.41) and the average control group score (27.6) with variation (63.83), [Table \(8 \)](#).

Table-8. The arithmetic mean and the standard deviation of the two sets of research (experimental and control) in the creative thinking test

| The group | Sample size | Arithmetic mean | variance | The degree of freedom | T value | | Level of significance (05 , 0) |
|--------------|-------------|-----------------|----------|-----------------------|------------|--------|--------------------------------|
| | | | | | Calculated | Table | |
| Experimental | 25 | 36.4 | 68.41 | 48 | 3.826 | 2.0106 | Function |
| Control | 25 | 27.6 | 63.83 | | | | |

Is evident from the table that the average total of experimental studied according learning strategy Reversed in a changing creative thinking higher than the average control group studied according to the usual way. The value of (t) calculated (3.826) is statistically significant at (0.05) because it is greater than the tabular value of (2.0106). Therefore, the difference between the two groups is for the benefit of the experimental group that used the reverse learning strategy thus rejecting the null hypothesis Alternative. This means that the reverse learning strategy has had an impact on the development of creative thinking in its aspects (fluency, flexibility, originality) among pupils Sixth grade for its learning strategy Inverse of building a new intellectual environment that led to the expansion of the capabilities they worked on the development of thinking of creative student compared to traditional methods.

25. Impact Size: (Effect Size)

A number or proof of how much the importance of research as a result of such as the strength of the relationship between two variables or the amount of output change from the interference of the independent variable in the dependent variable using a standards statistical effect size according to the research sample (linked or non - linked samples and to measure the impact of independent groups box size calculates ETA (η^2))

1. Collection

$$0.16 = \frac{(30.74)^2}{48 + (30.74)^2} = \frac{(t^2)}{(t^2) + \text{درجات الحرية}} = \text{مربع إيتا } (\eta^2)$$

2. Creative thinking

$$0.23 = \frac{(30.826)^2}{48 + (30.826)^2} = \frac{(t^2)}{(t^2) + \text{درجات الحرية}} = \text{مربع إيتا } (\eta^2)$$

The following table (9) illustrates the level of impact

Table-9. Reference table for determining the size of the effect

| The tool used | Effect size | | |
|-----------------|-------------|---------|-------|
| | Small | Average | Large |
| ETA box μ^2 | 0.01 | 0.06 | 0.15 |

When calculating the magnitude of the effect and comparing it according to Table (9), we note that the effect of the reverse learning strategy in the achievement variable (0.16), the effect size was significant. We note that the influence of the variable creative thinking was equal to (0.23) which is the size of a very large effect.

25.1. Second: Conclusions

In light of the findings of the present study, we conclude the following:

1. The use of the reverse learning strategy is important in providing interaction between the teacher and the learner, which helps to improve the achievement of students, especially in science.
2. The ability to adopt an inverted learning strategy as a teaching strategy that develops the creative thinking skills of learners.

25.2. Third: Recommendations

1. The need to modernize teaching methods and the use of modern teaching strategies
2. The need to employ the technical skills j of learning and employment in teaching.
3. The need to accustom the student to assume the responsibility of learning through activating his role during the educational process and not just the usual methods of conservation and indoctrination.

25.3. Fourth: Proposals

1. Conduct a study on the inverted learning strategy in stages and other study materials.
2. Conduct a study dealing with the learning strategy (inverted) and other teaching strategies.
3. A study of other variables such as tendencies, scientific thinking, retention, and the trend towards m birth of science.

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