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The effectiveness of brainstorming in the achievement of fourth-grade students in science

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Abstract

The research is to identify the effectiveness of brainstorming in the achievement of fourth-grade students in science. To verify the validity of the following hypothesis:

(There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students, which are taught according to brainstorming, and the average scores of the control group students, which are taught according to the usual method).The experimental design with partial control was used, which includes an independent variable, which is brainstorming, and a dependent variable, which is achievement. The research community consisted of fourth-grade students from Al-Samaha Primary School for Boys, which is belong to the education of Baghdad Governorate, Firs Al-Rusafa t. For the academic year 2014/2015.

The research sample consists of (50) students divided into two sections, A / B, section (A) represents the experimental group, which consists of (25) students, who studied according to brainstorming, and section (B) represents the control group, which consists of (25) A student who studied according to the usual method.

The two groups were equalized in: 1- Previous achievement variable in science. 2- Previous information in science. The behavioral objectives were formulated and there were (110) behavioral objectives (12) teaching plans were prepared, including (6) teaching plans for the experimental group and (6) teaching plans for the control group, and they were presented to a group of experts. An achievement test was prepared and it consisted of (20)items of a multiple-choice type. The validity of the test was verified, and the percentage of agreement was (80%).

The stability was calculated and the stability rate was (0.82) and the appropriate statistical means were used to reach the results.

In light of the results of the research, it was found that the experimental group, which was taught according to brainstorming, was superior to the control group, which was studied according to the usual method in the achievement test. The research came out with some recommendations and suggestions.

Keywords: Activity, brainstorming, Achievement.

INTRODUCTION

Research problem

The problem of research in low achievement in science is one of the problems facing teachers and researchers in the field of education, and

primary education is the first building block for the later educational stages, which has negative effects

The opinions of researchers differed about the reasons for the low level of student achievement, some of whom saw teachers' adoption of traditional methods of teaching, and some of them saw weakness in teachers' experience in modern teaching methods. (Al-Tamimi, 2006: 26)

Others see a clear decline in the achievement levels of primary school students, especially in science, due to the learner's inability to link what he hears and sees during teaching. (Al-Maliki, 2008: 59)

And in a study that indicated the low achievement of students due to the lack of using teaching methods that work to form positive attitudes towards the subject, as modern teaching methods allow the learners to participate effectively in the classroom by indicating their interest and preparations and motivating their talents and abilities to develop and innovate in solving problems and generating the largest numberSome ideas about an issue or problem are more acceptable than other methods that rely on memorization.(Saleh, 2004: 22)

Despite the spread of teaching methods that emphasize the role of the main learner in the educational process globally, science education in our schools is still limited to listening and receiving.He often adopts the traditional method of making the pupil passive. (Al-Kathari and Muhammad, 2000: 69)

Brainstorming refers to the students' clairvoyance of new ideas that remain bright in his mind, and it is a method of searching for appropriate ideas and putting them in organized situations.(Reading, 1998: 44) order to determine the effectiveness of brainstorming in the achievement of fourth-grade students of primary school, the problem was identified by the following question: (What is the effectiveness of brainstorming in the achievement of fourth-grade students in science

Research importance /

Science has a great role in our contemporary world as it affected life and contributed to every kind of activity in it and it became a feature of the times and a tool for development and progress. Science has witnessed a rapid development and a comprehensive scientific renaissance in the fields of scientific education, whether with regard to the philosophy and goals of scientific education or the content of school books, teaching strategies, teacher preparation and characteristics, or evaluating the results of learning and the learner, as the teacher's understanding of the nature of science helps to build appropriate teaching strategies, and the teacher's understanding of the nature of science Science affects the quality of questions that students face. The more he understands the nature of science, the more he uses questions of understanding and application. (Ambosaidi and Suleiman, 2009: 17)

Therefore, we find modern trends in education that have paid attention to teaching methods and considered them as the cornerstone of the educational process, because of their great importance in achieving their goals and translating the goals of the curriculum into concepts, trends and tendencies that the school aspires to achieve. . (Razuqi and Fatima, 2005: 7)

Al-Samarrai, 2000) stresses that the teacher must possess modern teaching methods and methods that enable him to deliver the scientific material to the minds of the learners efficiently, in order to achieve the educational goals. (Al-Samarrai, 2000:6)

The primary stage is one of the important stages, as it is the basis for the later stages. The stronger the foundation, the more robust the educational system will be to meet the requirements of the times. Therefore, attention must be paid to that stage and make learners know a lot about their lives and develop their scientific trends. (Al-Azzawi, 2003: 4)

And that the fourth grade of primary school students have reached the beginning of the stage of abstract thinking in that their thinking pattern differs from the thinking pattern of

students of previous grades, because they seek to identify the physical and social environment around them and interact with it and test their ideas with the ideas of others. (Al-Khalili et al., 1996: 169)

Academic achievement is one of the most complex psychological and educational concepts;This is due to the participation of many different factors and processes, including scholastic, personal, social and economic ones. It is also one of the most areas that provide the opportunity to reveal the abilities of learners and develop their talents and ambitions. (Hamdan, 1996: 65)

Thought is based on progress, and a society cannot advance unless thought progresses and it is in his power to provide the methodological foundations for that.(Al-Kathiri and Al-Nathir, 2000:30)

Brainstorming is one of the methods of developing thinking and creativity in solving various scientific and life problems with the aim of increasing mental capabilities and processes. Brainstorming requires a challenge between the problem presented and the mind of the learner.This method allows the learners to more actively participate in the achievement of the lesson objectives by stimulating the learners, stimulating their talents and enhancing their mental abilities.(Mohsen, 2008: 219)

Through questions that challenge and provoke thinking, and give students insight into how the learning process takes place and the acquisition of scientific foundations for different knowledge.Interest in developing thinking skills has increased due to the rapid development that led to the emergence of the so-called cognitive explosion.(Abdul Salam, 2001: 77)

The importance of the research lies in the use of brainstorming in science to generate new ideas to solve problems by putting the mind in a state of excitement and thinking in more than one direction, stimulating talents, enhancing mental abilities, reducing intellectual lethargy, and encouraging students to find new solutions.

1- The necessity of using brainstorming in science teaching to address problems that may arise in regular teaching methods

2- The results of the current research may benefit science teachers and those in charge of the process of building and developing curricula, especially the primary stage

Research goal and hypothesis/

The research aims to identify the effectiveness of brainstorming in the achievement of fourth-grade students in science in order to verify the following hypothesis:

1- There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who are taught according to brainstorming and the average scores of the control group students who are taught according to the usual method.

search limits

The current search is limited to/

1- Pupils of the fourth grade of primary school at Al-Samaha Primary School 2014/2015

2- Fifth Unit: Human and Electricity (Chapter One / Benefits of Electricity - Chapter Two / Sources of Electricity).

define terms

1- Efficiency: defined by Code (1979), Good: as the ability to achieve the desired results with savings in time and effort.(Good, 1979, p:207)

Tawfiq (1997): It is defined as determining the desired or expected effect of education and training of learners to achieve the goals set, and it is measured by identifying the increase and decrease in their average grades.. .(Tawfiq, 1997: 17)

Magdy (2009) defined it as the ability to influence and achieve goals and achieve desired results in the best possible way.(Majdi, 2009: 745)

2- Brainstorming /

Abu Allam, 1989: It is a technique by which a group of individuals tries to find solutions to a limited problem, by identifying or producing all intuitive ideas cooperatively (Abu Allam, 1989: 85).

He defined it (Shehata and Zainab, 2003): It is one of the group discussion processes in which group members are encouraged, under the supervision of a leader, to generate as many innovative ideas and suggestions as possible within a relatively short period of time.(Shehata and Zainab, 2003:325)

Salama, 2009: It is a teaching method based on preparing study units by dividing them into short problems that challenge students' thinking.It requires access to multiple ideas within a short period, and the largest number of class students participate in it, while giving each student an opportunity to express his opinion and share with others' ideas.. (Salama, 2009: 264)

3- Attainment /

Defined by ox Ford, 1998: It is the acquired result of accomplishing or learning something with success, effort, and skill.(OX Ford, 1998 p:10)

Define it (Webster, 1998): the student's achievement in the class of a certain work in terms of quantity and quality in a specified period.(: p,9 Webster, 1998)

He defined it (Abu Jadu, 2008): as the outcome of what the student learns after a specific period of time has passed, and it can be measured by the degree he obtains from an achievement choice, in order to know the extent of the success of the strategy that the teacher sets and plans to achieve his goals, and the student’s knowledge of its translator into degrees.
(Abu Jadu, 2008:425)

Theoretical framework

First: Brainstorming: The origin of the name brainstorming goes back to the so-called brain storm and represented (Emotional Griais), which indicates that the new idea is the one that occurs in an exciting moment of clairvoyance, and is rooted in the person who receives it with united emotion and lives it with warmth and enthusiasm, that is, itA method of searching for suitable ideas and characterized by quick linking, reviewing, and critiquing the place for personal improvisations in situations organized for this purpose.(Al-Shammari, 1995: 3)

Brain storming has continued its roots and foundations from the Hindu religion. The Indians used it 400 years ago and they called it (Brai Barshana) and the word (Brai) means the side that falls outside your mind, while the word (Barshana) means question. (Stein, 1975: P,27)

The American scientist (Osborn) was the first to use brainstorming to develop thinking in (1938), when he was working in publishing, advertising and media affairs.In (1954) he founded the Foundation for Creative Education and used brainstorming to train individuals and groups to solve problems creatively with the aim of finding new solutions to the problem.In (1955) he was able to set the rules and principles organizing how to conduct brainstorming in writing Applied Imagination, in which he indicated that this method is suitable for application in many areas of practical, scientific, administrative and industrial life.(Fedman & Arnold, 1983: P,492)

Also (Parnes & Mealow, 1962) developed the brainstorming method, which is widely used in many areas such as employee management development and solving economic, social, political and legal problems.

The use of brainstorming is related to revealing what is stored in the minds of individuals who do not have the opportunity to show it.Cognitives say (the overcrowding of information and experiences in our minds leads to the suppression of some ideas and prevents them from appearing), in addition to that, as aware, active and organized individuals of our experiences, our ideas are often subject to criticism and this prevents their appearance. These organizational obstacles prevent the

emergence of creative ideas for us as well as for our children.(Qatami, 1990: 691)

Brainstorming is one of the famous methods of generating creative ideas, as this method appeared and developed in the labor market, then moved to the field of education and became one of the methods that received great attention by researchers, scholars and those interested in developing creative thinking and solving problems in most subjects.. . (Hosseini, 2003: 197)

There have been many names for brainstorming in the various studies and literature, but they express the same meaning in them (brainstorming, brainstorming, brain rain, brainstorming, thinking, flow of ideas, generating ideas, collective intellectual generation, deferment of evaluation, and adjourned trial). (Al-Titi, 2001: 165)

He states (H.S.A., 2003) that educators and those interested in brainstorming put forward many definitions of this concept, the most important of which is that (it is about finding an ideal state for the brain, through which it can generate new ideas).Others see it as part of the problem-solving method, which includes (the creation of new ideas by postponing judgment or decision).A third group believes that brainstorming is a "method that increases the ability to generate ideas."While a fourth group emphasizes that (it is the time that is devoted to generating the largest number of ideas, regardless of the value of the initial initiatives for them.

Brainstorming has another definition, as some see it as a method in which a group of people puts aside social and legal barriers, in order to generate new ideas and solutions.While another definition goes that it represents (the process that has been organized in order to obtain the largest number of ideas related to specific areas of interest, while others assert that it is a free linking process between different ideas in order to form a set of new concepts and ideas.) . (Saada, 2003: 165)

Through this, it was found that brainstorming aims to generate the largest possible number of ideas on a particular topic. In general, brainstorming in teaching is based on posing a topic or a problem to students and informing them of all its aspects and the factors affecting it, then asking them to find solutions to them, provided that these areThe solutions are immediate and oral, and then the teacher writes down the solutions presented by the students on the board and classifies them into groups without evaluating and commenting on them, then the discussion takes place on those solutions and the selection of the best of them after the end of what can be called a brainstorming session or a rain seeding session.(Muhammad, 2003: 147)

The basic principles used in the brainstorming session/

Parnes Osvorn suggests some basic principles of brainstorming, including

1- Delayed evaluation: It is not permissible to evaluate any of the ideas generated in the first phase of the session, because criticizing or evaluating any idea for the participating individual will make him lose follow-up, and distract him from trying to reach a better thought because the fear of criticism and the feeling of tension hinder thinking. (Al-Mimar, 2006: 205)

This is because the individual feels that his ideas will be the subject of criticism since its appearance, and the postponement of judgment helps to clarify the characteristics of the proposed idea through free, non-critical dialogue, which is built on the idea, or on part of it, or who neglects it if it does not have a prominent value, which leads to manyAnd the diversity of the ideas presented, thus, new ideas or solutions may result, or they may seem worthless, but in fact they may be good when used by other students for another idea. .

(Al Hammadi, 1999: 46)

2- Release freedom of thought: It means liberation from what may hinder thinking, in order to reach a state of relaxation and lack of reservation, which increases the release of creative abilities to imagination and generate ideas from an atmosphere that is not tainted by criticism and evaluation. This principle is based

on the fact that strange unrealistic ideas and the way in whichIt sparks better ideas in other people. . . (Wahib Wendy, 2001: 31)

3- Quantity before quality: that is, focus on generating the largest number of ideas, regardless of their quality. Extremist, illogical or strange ideas are acceptable. This principle is based on the assumption that creative ideas and solutions to problems come after a number of unfamiliar solutions and less original ideas..(The Architect, 2006: 205-206)

4- Building on the ideas of others: that is, it is permissible to develop the ideas of others and come up with new ideas. The proposed ideas are not exclusive to their owners. They are a legitimate right for any participant to modify them and generate other ideas from them.(Muhammad, 2003: 3)

Brainstorming goals

1- Development of Hyper-Thinking (Divergent): Hyper-thinking is unleashing the mind to think in different and diverse directions. Through brainstorming activities, the mind is directed to think in different and varied directions.

2- Developing innovative thinking: Brainstorming activities are characterized by their ability to generate innovative and applicable ideas. Brainstorming activities are a common practice in major international companies

3- Developing Idea Generation Abilities: Fluency, flexibility, and originality abilities are key to generating ideas, and brainstorming activities help to develop these abilities as follows

• Fluency: It is the generation of the largest possible number of ideas. It is the set of ideas that students generate. Therefore, the degree of fluency in brainstorming is the sum of the ideas that the individual proposes to the question or problem presented

• Flexibility: It is the generation of ideas in different and varied fields. It is the number of areas to which the ideas generated by the students belong. In the brainstorming activity, it is calculated by the number of categories to which the ideas suggested by the students belong. All ideas are classified into main categories

• Authenticity: It means lack of commonality, i.e. generating distinct ideas from ideas distinct from the ideas of the rest of the students, it is the degree of non-commonness of the idea compared to the ideas of the rest of the students.From the categories of ideas in the total sample, then points are given for each category of repetitions

The idea that gets high marks is higher in the ability of originality than the idea that gets lower marks, and the degree of originality for students: is the sum of the degrees of originality of all the ideas he put forward. (Hosseini, 2003: 227)

4- Encouraging frankness and mental production: the traditional classroom suffers from the problem of one answer, where the vast majority of classroom questions search for only one answer written in the textbook or with the teacher, and there is no room for a single question to have another correct answer, and this type of question is known as closed questions, or Convergent questions, and thus there is no room for frankness, putting forward ideas and expressing the innermost self. Traditional education does not encourage much dialogue, discussion and putting forward ideas in free group discussions. Therefore, brainstorming with its divergent questions that encourages hyper-thinking gives the learner the opportunity to express frankly his ideas

5- Building the learner’s confidence: Brainstorming activities give a strong impetus to building confidence in the learners, as the learner finds himself in an atmosphere that welcomes all ideas and for his momentary thinking to be productive and not a requirement to be a memorizer of what is mentioned in the lesson or the information of books so that he can participate effectively inThe quota is in contrast to traditional education, in which many learners are reluctant to participate as a result

of not memorizing the scientific material or not having time to think about the question.

6- Free association of ideas: Brainstorming activities leave the space for ideas to fall apart freely, and the teacher writes all the ideas that come to his mind, and does not evaluate them in the stage of free association, as he leaves this to the evaluation stage and thus does not think about the stage of free association in the extent The effectiveness of each idea and the extent to which it can be applied. Rather, he writes in the place of what comes to his mind, thus practicing generating the largest possible number of ideas in the available time. Ideas may appear that at first glance are not related to the topic, but with the thought of developing them later in the evaluation stage, it becomes clear that they carry solutions. Innovative. The stage of free association of ideas from seeding ideas in different fields opens the way for generating ideas far from the narrow range of thinking that may limit the individual while thinking about the problem, and which may hinder the generation of innovative ideas.

7- Overcoming the problem of anxiety: there is no creativity with anxiety, nor innovative ideas with fear. Anxiety and fear are the two locks of the brain with which he cannot create, and the student may think about giving an answer to a question asked by the teacher in the class, but his fear of the inaccuracy of the answer, or Perhaps his exposure to criticism from the teacher and ridicule from the students push him to silence, so the anxiety of failure hangs over the atmosphere of the classroom, confuses the thinking process, and does not allow the mind to produce or the tongue to utter. Whereas, brainstorming activities based on open divergent questions that stimulate hyper-thinking, make it possible for the learner to contribute his ideas easily and declare when he realizes that all his ideas are welcome, and thus the learner gets rid of the anxiety on his mind, or the one who locks ideas in his skull.

8- Correlation between concepts and study materials: The brainstorming activity prompts learners to link between different scientific concepts, as well as link the scientific material to daily life. Brainstorming activities provide the learners with the opportunity to look at the scientific material with a holistic and coherent view, and to feel the importance of the scientific material and its connection to their daily lives.(Rochka, 1989: 183)

Brainstorming procedures

The brainstorming session is carried out in three stages:

1- The first stage: Sufficient information on the topic of the session is provided by the session chair and asks questions that show the participants that they are in front of a problem. The best way to solve it is to put forward the largest possible number of ideas, in which the session rapporteur is appointed to write down the ideas presented.

2- The second stage: in which solutions are visualized through the students' ideas presented and assembled, where the ideas are put forward individually and then the group members discuss the problem collectively. From this stage, the participants are reminded of the brainstorming rules by the session chair and emphasizing the need to adhere to them and avoid criticismAccept and develop any idea

3- The third stage: in which solutions are presented and evaluated, the best ones are selected and duplicate and wrong ideas are excluded.Another method of brainstorming activity is to give the participants a period of time to write down their ideas, then the ideas are collected from the participants periodically, and it is represented by putting forward their suggestions according to their sitting arrangement, then they are passed over again, and so on.In the event that the participant does not have a new suggestion, it is moved to the next participant, and this method may encourage everyone to participate, which is the common method, and the scientific research has relied on this method after dividing the research groups into three groups.(Majdi, 2000: 802)

General steps for implementing a brainstorming session

There are a number of steps that depend in the application of a brainstorming session

1- Determining the topic of brainstorming: The teacher determines the topic that he uses in the brainstorming activity and that he chooses from the lessons he teaches.

2- Drafting the problem in the form of a question: The topic or problem is transformed as a question as follows

- What are your suggestions
- What if it became
- What if you lost
- How can you develop
- What are possible solutions
- What if you are not
- How can you improve
- How to convert(Request, 1998: 18)

3- Creating creativity atmosphere: The teacher prepares the atmosphere for creativity and rain by preparing teachers psychologically, telling them the following:

- Remember everything that is on your mind
- Do not hesitate to present any idea, whatever the degree of its connection to the topic.
- Do not look at the possibility of applying it, write it only

Thus, the teacher makes sure that his students will not worry them to search for the correct answer and will not slow down the process of remembering ideas, and they will leave the way for the free threat to ideas to take its right time.

4- Starting the process of mental focus: The teacher raises the question of brainstorming to the learners, and asks them to start the process of generating ideas and sets a time between (3-10) minutes to write everything that goes on their minds and moves mentally between various fields and in different directions.
(Al -Sulamiyat, 2008: 102)

5- Review of ideas: The learners begin after the end of the period of remembrance of ideas by presenting their ideas to the rest of the group, and thus the teacher avoids criticizing any idea, whatever its content, unless he intends to offend intentionally or mockery, but otherwise, all ideas are welcomed.

6- Revision of ideas: The teacher asks students to choose the best ideas of the sum of the ideas presented and blocked on the blackboard.

7- Development of ideas: Learners choose one of the distinct ideas and work to develop and turn them into an applicable idea.

8- Comment on ideas: The teacher takes advantage of this stage to enhance the most distinctive ideas, and to show the importance of thinking in various and varied areas during brainstorming, in order to encourage learners to develop the flexibility and originality of the ideas they present, and also enhances learners who have presented a greater number of ideas, in order to encourageThe fluency of their ideas.The teacher also comments on the ideas presented and shows ideas that may carry scientific errors, but avoids referring to the student who presented the idea. (Abu Rayash, 2007: 320)

Secondly / Previous studies:

1- Aziz's study (1998): This study was conducted in Baghdad, and it was aimed at knowing the impact of mental storm on the development of innovative thinking of the preparatory stage students. The study sample consisted of (160) male and female students distributed in four groups, two of whom are two experiments and the others are two controls of (40) students per group, and they are from the fifth preparatory students, half of whom are scientific, and the other half is a literary and the researcher is the two groups of variables (time age, school stage , Intelligence, the economic level, the cultural level of the mother and the father). The researcher prepared a program

consisting of (13) topics presented to a group of specialists in the educational and psychological field to show the appropriateness of its content with the title of the topic, and the extent of its ability to consult the innovative thinking of students, and the program was applied to a random sample , Then he studied the two experimental groups in the method of brainstorming and studied the two groups that are controlled in the traditional way, and the researcher approved a test of innovative thinking after he was confirmed his sincerity and stability, then he conducted a test after the completion of the application of the program, and the test data was analyzed by using the triple contrast analysis, and the results of the study came as follows :

There is a statistically significant difference in the average degree of innovative thinking among students of the experimental group who received a program in brainstorming and students who did not receive this program in the interest of the experimental group.

There is no statistically significant difference in the average degree of innovative thinking among the students of the experimental group and its students. (Aziz, 1998, w-h)

2- Saleh Study (2004): This study was conducted in Iraq, the Arab International Institute for Educational and Psychological Studies of the General Union of Arab Educators, and aims to know the impact of brainstorming on the development of scientific thinking and academic achievement among middle school students, the study sample consisted of (80) A student and a student distributed four groups with (20) male or female students, the researcher between the two groups statistically in the variables (scientific thinking test (tribal test), and academic achievement for the sixth grade of primary school, the researcher applied the experiment to train the two experimental groups (students, students) in a method The brainstorming, and teaching of the two controlled groups (male and female students) in the traditional way. At the end of the experiment, the researcher applied the achievement test to the four groups and using the unilateral contrast analysis showing the presence of statistically significant differences between the four groups and to know the source of these differences and then use a chef for comparison and the results showed the presence of differences It has statistically significant between the average grades of students who study in the style of brainstorm In the interest of the two experimental groups. In light of the research results, the researcher has set a number of recommendations and proposals. (Saleh, 2004, b-h)

3- Mao MAW study (2006): This study was conducted in the class, and was aimed at knowing the impact of reinforcement and teaching methods with brainstorming on learning mathematics, direction, academic achievement and the ability to solve problems for first -grade students from the secondary stage.The research sample consisted of (70) students distributed in two groups, the first experimental number (35) students, who studied the reinforcement according to the method of brainstorming, the second group control and the number of its members (35) students, studied according to the regular method, the study period took a full semester.

The researcher prepared three tests, the first in educational situations that include (trust, attention, honesty) and the second test in academic achievement, while the third test was in the ability to solve problems, which included (verification of the problem, identification of factors, equipping information and determining the strategy) used statistical means to know moralThe difference between the two groups, the results were the following

There is no statistically significant difference in students' performance on the achievement test

- There is no statistically significant difference between the two groups in the ability to solve problems in both (identifying the problem, determining the strategy).
- The presence of statistically significant differences in (trust and interest)

• The presence of a statistically significant difference in the ability to solve problems in each of (investigating the problem, identifying factors and equipping information)

The results indicated that giving reinforcement in mathematics learning with brainstorming can improve the student's ability to solve problems. (MAW, 2006: P, 73)

4- The Alameat Study, (2008): This study was conducted in Jordan, and this study was aimed at revealing the influence of two methods of brainstorming and discovering in the development of creative thinking by teaching science to the eighth grade students in Jordan.The study was conducted to answer the following questions

• What is the effect of the method of brainstorming on the development of creative thinking among the eighth grade students

• What is the impact of the method of discovery on the development of creative thinking among the eighth grade students

• Are there statistically significant differences at the level of (0.05) in developing creative thinking among eighth grade students attributed to the method of teaching (brainstorming, discovery)

The study sample (the school) was chosen in the short way, and the number of its members reached (85) students from the eighth basic grade from the first basic basic school for boys. This sample was randomly divided into two groups;The first was studied in a way of brainstorming and the second in the way of discovery, and both divisions studied the same content and lasted for two months, equivalent to twenty classroom classes.A Torch scale has been used for creative thinking.Image of words (a) in its modified form of the Jordanian environment, and it was confirmed that this scale is established and stabilized in this study.

The results of the study showed that there is a clear impact for both the two methods of brainstorming and discovery in developing creative thinking among the eighth grade students through teaching science subject, and also showed statistical differences between the two methods in developing creative thinking and in favor of the method of brainstorming, and in light of the results of the study presented someRecommendations. (Al -Alamiyat, 2008: 16)

Search procedures

Experimental design: The research includes an independent variable (brainstorming) and a dependent variable, which is achievement, and the division of choosing a partially controlled experimental design

Striped(1) *Experimental design of the two research groups*

dependent variable	independent variable	equivalence	group
collection	Teaching according to brainstorming	1-Previous Achievement	empiricism
	Teaching according to the usual method	2- Previous information	control

2- Research community and sample: The research community includes fourth-grade students from Al-Samaha Primary School for Boys affiliated to the Baghdad Education Directorate / Al-Rusafa 1.For the academic year 2014/2015

The research sample consists of 50 students divided into two divisions. Division (A) consists of (25) students and represents the experimental group, which is taught according to brainstorming.And Division (B) consists of (25) students and represents the control group, which is taught according to the usual method.The repeaters were excluded and the subject teacher was assigned to teach the two groups as in Table (1).

Table(1) *Distribution of the study sample students to the experimental and control groups*

The number of students after exclusion	The number of students excluded	The number of students before exclusion	group	Division
25	2	27	experimental group	A
25	4	29	control group	B

3-Equivalence of research groups

Previous achievement in science: the grades of the research sample students were taken in science for the third grade of primary school, and obtained from the grade records at the school administration, and the averages were calculated for each group separately, and the arithmetic mean of the scores of the experimental group students was (3.25)The variance is 8.56, and the arithmetic mean of the scores of the control group students is (33.58), and the variance is 78.11.

Table(2) *Statistical significance of the equivalence of the two research groups in the previous achievement variable*

Statistical significance	The tabular t value	Calculated t value	variance	Arithmetic average	degree freedom	The number of sample members	group
nonfunctio n	2.011	0.56	80.56	3.5	48	25	experimental
			78.11	33.58		25	control

(26) choice, and it was presented to a number of experts and arbitrators, and most of the test items were agreed upon, and the average scores of the experimental group students, Division (A)(12.93) and variance (5.75), the average scores of the control group students (11.43) and variance (6.52). It was found that the calculated

(27) (t) value is (0.95) smaller than the tabular (2.011) value and is not significant at the level

(28) (0.05), which indicatesOn parity of the two groups

It was found from Table (2) that the calculated value of (t) (0.56) is smaller than the tabular value of (2.011) is not significant at a significance level of (0.05) and two degrees of freedom (48), and it means that the two groups are equivalent in the previous achievement variable for the subject of science.

Previous information in the subject of science: The researcher prepared a selection of the previous information consisting of (20) objective paragraphs of the type of multiple

Table (3)

Statistical significance	The tabular F value	Calculated F value	variance	Arithmetic average	degree freedom	The number of sample members	group
nonfunctio	2.011	0.95	5.75	12.93	48	25	experimental

n			6.52	11.43		25	control

4-Research Supplies -

Determining the scientific subject: -

The scientific subject taught for the two research groups was determined as the fifth unit / man and electricity and the sixth unit man and clothes from the science book for the fourth grade of primary school, (I 4/2012), the second semester of the academic year (2014/2015).

Formulation of behavioral objectives: The number of behavioral objectives reached about (110) behavioral objectives and were formulated according to Bloom's levels in the cognitive domain (remembering, comprehension, application).It was presented to a group of experts and arbitrators.

Table (4) *Shows the distribution of behavioral objectives at cognitive levels and academic content*

Total	the app	Comprehension	Remember	Content levels		ت
32	9	10	13	Electricity benefits	1	Fifth unit
25	2	8	15	Electricity sources	2	
25	3	7	15	our clothes	1	Sixth unit
28	3	5	20	clothes manufacture	2	
110	17	30	63	Total		

Preparation of Teaching Plans:

Teaching plans were prepared for the research group (6) of them according to brainstorming for the experimental group and (6) of them for the control group according to the traditional method.It was presented to a group of experts and arbitrators.The percentage of agreement was 80%.accessory(1)

5- Search Tool:

Preparation of the achievement test: An achievement test was prepared for the students of the experimental and control groups and it consists of (20) paragraphs of the type of multiple choice, which is usually used to measure the cognitive level of students and because of its interesting features, and many of its paragraphs can be answered in a short time.supplement(2)

Preparation of the test map: - A test map was prepared for the purpose of distributing the achievement test paragraphs to various scientific material and for all behavioral purposes and distributed on Bloom's cognitive levels (remembering, comprehension, application) Table (5)

Table (5) *Exam map for the achievement test itemsShows the test map*

Total %100	goal levels			Lesson time in minutes	Number of shares	chapter	Content Weight
	the app9%	Comprehension27.25%	Remember 57.20%				
30	2	10	18	120	3	chapter1 و/5	**25%**
17	2	5	10	120	2	chapter2 و/5	**20%**
25	3	7	15	120	3	chapter 1 و/6	**25%**
28	3	5	20	120	4	chapter2 و/6	**30%**
100%	10	27	63	480	12		Total

6- Test validity:

The apparent honesty was measured, which indicates the suitability of the test to the students and the clarity of its instructions, as well as the validity of the content, as the test covers all parts of the material studied by the students.%) and the test is considered valid

7- The stability of the achievement test:-

The reliability of the test was calculated using the equation (Kewder Richard Son-20) because all of its paragraphs are objective of a multiple-choice type, and the reliability coefficient was (0.82), and the reliability coefficient is good.The test is now ready for application in its final form.

8- Statistical means:

The appropriate statistical means were used.To get good results

Research results

Presentation of the results of the achievement test for the research sample

After the final achievement test was applied to the members of the research sample, the arithmetic mean and standard deviation were found. The average scores of the first experimental group students reached (26,85), with a standard deviation of (4.46), and the average scores of the control group (18.75), with a standard deviation (4.88) as in Table (6)

Table (6) *The arithmetic mean and standard deviation of the scores of the research sample in the achievement test*

Statistical significance	T value		standard deviation	Arithmetic average	the number	group
Statistical function	Schedule	calculated	4,46	26,85	25	experimental group
	2.011	2.336	4,88	18,75	25	control group

It was found from Table (6) that the calculated t-value is 2.336 greater than the tabular value of (2.011) at the significance level (0.05) and the degree of freedom (48), which indicates the existence of a statistically significant difference between the two research groups in achievement.

Table (7) *Tukey's test results between the mean scores of the experimental and control group in the achievement test*

Statistical significance at the 0.05 . level	Q value table	Calculated Q value	Arithmetic average	The number of people in the group	group
Statistical function	3,40	8,10	26,85	25	experimental group
			18,75	25	control group

It was found in Table (7) that the calculated Tukey value is greater than the tabular Tukey value at the significance level (0.05), which indicates the existence of a statistically significant difference between the two groups and in favor of the experimental group students, which were studied according to brainstorming and therefore rejecting the null hypothesis

Interpretation of the results: -

The results showed the superiority of the experimental group, which studied according to brainstorming, over the control group, which studied according to the usual method in the achievement test in science. The solutions offered by the students. Classifying, discussing and choosing the best solutions, thinking about solving the problem and participating in the discussion have contributed to the students' learning and enhanced the students' perception and innovation in solving problems, generating and creating new ideas, opening the mind, absorbing new ideas and developing them, and reaching solutions and conclusions, which resulted in the acquisition of scientific knowledge and increasing the students' abilities. On understanding the study material and keeping it in the mind for a longer period, and this came in contrast to the results of the control group, which was studied according to the traditional traditional method, where it focused on the principle of memorization and reliance on the explanation of the scientific material

Conclusions

light of the results of the current research, we can conclude the following

1- The effectiveness of brainstorming in raising the level of academic achievement of students compared to the usual method

2- Students at all levels can be taught according to brainstorming in the secondary stage

Recommendations

In light of the search results

1- Training the teaching staff on teaching methods according to brainstorming

2- Inclusion of subjects related to brainstorming in the teaching curricula in faculties of education

3- Teaching students of the College of Education on the method of brainstorming

Suggestions

The researcher suggests

1- Conducting a study similar to the current research in the topics of chemistry, physics, and biology at different academic levels

2- Conducting comparative studies between boys and girls schools

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