

The Effect of Thinking Maps in The Achievement of Mathematics for The Fourth Scientific Grade Female Students And Their Beliefs Toward Mathematics

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Abstract

The present study aimed to identify the effect of teaching using thinking maps in the achievement of mathematics for the fourth scientific grade female students and their beliefs toward mathematics .

The study sample consisted of (54) students distributed in two divisions, one of which was randomly selected to represent the experimental group that was taught using the thinking maps, while the other group represented the control group and were taught by the usual method .

The design of the two equivalent groups with the post-test was used. The researcher prepared two tools, the first was test to measure the achievement consist of (25) paragraphs (13 objectivity items of multiple-choice type with four alternatives, and 12 subjectivity items) and the second tool were beliefs scale similar to the fifth Likert scale where it contains (30) items ,the sincerity and reliability of each tool has been verified.

The results were treated using the t-test equation for two independent samples.

The results showed that there was a statistically significant difference at (0.05) level of significance between the means performance of the experimental group and the control group in favor of the experimental group in each tool.

Key words : Thinking Maps , Achievement , Mathematics , Beliefs

El efecto de los mapas de pensamiento en el logro de las matemáticas para las estudiantes de cuarto grado científico y sus creencias hacia las matemáticas

Resumen

El presente estudio tuvo como objetivo identificar el efecto de la enseñanza utilizando mapas de pensamiento en el logro de las matemáticas para las estudiantes de cuarto grado científico y sus creencias hacia las matemáticas. La muestra del estudio consistió en (54) estudiantes distribuidos en dos divisiones, una de las cuales se seleccionó al azar para representar el grupo experimental que se enseñó usando los mapas de pensamiento, mientras que el otro grupo representó al grupo de control y se les enseñó por el método habitual.

Se utilizó el diseño de los dos grupos equivalentes con la prueba posterior. El investigador preparó dos herramientas, la primera prueba para medir el logro consistió en (25) párrafos (13 ítems de objetividad de tipo de opción múltiple con cuatro alternativas y 12 ítems de subjetividad) y la segunda herramienta fue una escala de creencias similar a la quinta Likert escala donde contiene (30) elementos, se ha verificado la sinceridad y la fiabilidad de cada herramienta.

Los resultados se trataron utilizando la ecuación de la prueba t para dos muestras independientes.

Los resultados mostraron que hubo una diferencia estadísticamente significativa en el nivel de significancia (0.05) entre el rendimiento medio del grupo experimental y el grupo de control a favor del grupo experimental en cada herramienta.

Palabras clave: mapas de pensamiento, logros, matemáticas, creencias

a. Introduction

The world is witnessing major developments in the field of science and technology and in the development of brain research, and in psychological and educational sciences.

In the past two decades, educational research has seen a fundamental transformation by researchers in the vision of the educational process. It draws attention from the question of what affects the process of learning from external factors to the question of how to build knowledge and acquire it, and what is

going on (Kuhn & Dean, 2004) Within the brain of the learner is his ability to remember previous information and address information (Khatib et al., 2010: 4).

Mathematics is one of the most important curricula and the science on which all other sciences are based. It is a abstract science of the creation of the human mind, the science associated with technological development and all the different fields of knowledge that contributed to scientific progress and the building of human civilization. Mathematical skills that enable them to understand other subjects, as well as make them think properly in the face of different life situations

(Majid and Fatima, 2009: 137 185 Mason et al., 2010:

Al-Kubaisi (2007) argues that the learner's preparation for co-existence with his society requires that he take care of his thinking methods, reveal his potential energies and guide them in a direction that makes the learner able to solve his problems or reflect on the ways of solving them (Kubaisi, 2007: 20).

Brain research has shown that "the use of thinking maps increases mental intelligence IQ" and that thinking maps help learners to learn independence, to meditate and to solve their problems in life (Nofal and Sivan, 2011: 242).

The proposals of the Mathematics Teachers Council (NCTM, 2000) suggest that mathematics education and learning provide opportunities for learners to connect shapes and images with their mathematical ideas, and to create a positive direction towards mathematics (Obaid, 2010, 52-53).

The strategy of thinking maps is used to present ideas in a way that organizes the thinking of the learners, enables the teacher or learners to register their information, and after the learners gain their experience in using the thinking maps, they should be able to design their own plans (Badawi, 2010: 532).

Gerald & Scouts (1991) noted the need to work on what learners think about mathematics. The need to change their belief about their view of mathematics as a set of arithmetic operations that are learned within the field of preparation, as well as other activities and processes such as planning, determining the course of action, organization, imagination and perception (Kubaisi, 2011, 20). The beliefs are influenced by the teaching style and abilities of the mathematics learners and their confidence and motivation towards learning (Kubaisi and Abdullah, 2018, 35).

Therefore, the researcher intends to use maps of thinking in teaching to increase the achievement of students in mathematics and to promote their positive belief

s towards them.

2. Problem study

Mathematics is an interesting subject and is often inclined to study and study in depth, but it is often a stumbling block in front of some of them because of their lack of understanding of its laws and nature. Most learners have used it for the purpose of passing the tests only, without penetrating and deepening the broad aspects of this science , On the other hand uses the teacher traditional methods in teaching them, follows the teaching of mathematics wrong beliefs of learners such as hatred and fear and anxiety and alienation, despite the importance and being the basis of scientific progress in the twenty-first century, that such beliefs and classification It may be widespread among learners at different levels and has a negative impact on the achievement of learners in mathematics, and many mathematics teachers have supported this view. In one of the social networking sites for groups interested in teaching mathematics, the researcher sent an open questionnaire containing two questions; Mathematics ? Are the current teaching methods having a role in influencing their beliefs? (50) teachers and teachers. Most of the responses were identical to those presented above. They emphasized that the method of presenting the material in the school mathematics book has a role in these beliefs. Several studies have indicated that there is a decrease in the level of mathematics achievement among the fourth grade students. The study is (Saadi, 2016) and (Obaid, 2018). There are studies pointing to the weakness of the trend toward mathematics among fourth grade students, , 2015). The researcher used one of the thinking-based research strategies, thinking maps as thinking-based learning tools that make the brain develop patterns to create links between thought processes. It is referred to as a set of structured sequential questions posed by learners who are skilled in the process of thinking , 2011, 241).

In light of the above, the problem of the current study is framed by the following main question:

What is the impact of thinking maps on the achievement of the fourth grade students in mathematics and their beliefs towards them?

3. Importance of study

The theoretical and practical importance of the current study stems from the following:

- The role of thinking maps in the development and improvement of student learning and the height of their intellectual abilities (Hyerle, 2009: 148), which in turn will increase their achievement.

Maps of thinking may help students to become aware of their beliefs, motivate

them to challenge them, give them opportunities to express their views, and encourage interaction between students as social cooperative groups (Kubaisi and Abdullah, 2018: 35).

- This study may benefit the authors of mathematics curricula for the preparatory stage to include maps of thinking in the content of the study may increase the achievement of mathematics in demand and improve their beliefs towards them.

- This study may be useful in the training of teachers of mathematics during the service to identify maps of thinking and importance and philosophy and how to prepare and use in teaching.

My study goals

The current study aims at knowing:

- Effect of teaching using maps thinking about the achievement of students in the fourth grade in mathematics.

- The impact of teaching using the maps of thinking about the beliefs of students of the fourth grade towards mathematics.

My hypothesis is study

To achieve the objectives of the study, the following two hypotheses were formulated:

- There was no statistically significant difference at a mean level (0.05) between the average scores of the students of the experimental group and the adjustment in the achievement test in mathematics.

- There was no statistically significant difference at the level of significance (0.05) between the average scores of students of the experimental group and the adjustment in the measure of beliefs towards mathematics.

The limits of the study

The current study is limited to:

- Fourth grade students in the preparatory and secondary schools of the General Directorate of Education Baghdad / first Rusafa.

- Topics of the chapters (V: Vectors and Sixth: Coordinate geometry) of the book of mathematics course, tenth edition, for the year (2018).

- The second semester of the academic year (2018-2019).

Procedural definitions of study terms

- Effect: It is defined as a change in the strategy of thinking maps as an independent variable in the achievement of mathematics (under study) and in beliefs towards mathematics in the students of the study sample, and is statistically measured by calculating the ETA box.

Thinking maps: It is defined as a teaching strategy in which the material to be taught is organized with visual plans, each of which is linked to a basic thinking process, to help the students of the study sample to organize the mathematical

knowledge of the subject.

- Achievement: It is known that the amount of mathematical knowledge acquired by the students sample study of the subject (under study), as measured by the degrees obtained in the collection test prepared by the researcher.

Beliefs:

It is defined as an interconnected system of emotions and perceptions possessed by students of the study sample towards subject matter (under study), as measured by the scores obtained in the measure of beliefs towards mathematics prepared by the researcher.

Theoretical framework

Thinking about philosophers, scientists and researchers over time, the theorists in different fields have worked hard to identify the secrets of this phenomenon and to develop strategies to develop the individual's thinking process to adapt to his environment and to face the difficulties and obstacles in his life (Nofal, 2008: 21).

In 1988, David Hyerle, a world-wide think tank, developed eight techniques, which were used by the teacher and learner to teach and learn the content of the subject. The goal was to help the learner To generate and organize ideas using paper or software (Hyerle, 1996: 85-86).

They are "visual schemes linked to basic thinking skills that enable the learner to rework the cognitive content in his own way" (Benny Moussa, 2012: 9).

Thinking maps are visual thinking tools that provide a common language for both teacher and learner in all subjects and for all levels of learners to organize information and ideas (Burden & Silver, 2006: 39).

Each map of thought is linked to a process of eight basic thinking processes (definition, description, comparison, classification, analysis to parts, sequence, cause, result, and similarities) and a map (circle, bubble, double bubble, tree, analysis, flow , Multi-flow, and bridge) (Hyerle, 2008: 163).

The following is a description of each map (Holzman, 2004: 1-4; Hyerle, 2000a: 71-102)

1 - Circle Map: Used to define the concept or give an idea and to link the previous knowledge with the current knowledge of a particular subject and used for the brainstorming of ideas. And consists of two circles have the same center and different in the country, put in the micro-circle idea to be defined and put out of the circle all the ideas that have to do with the main topic. For

example, create a circular map to define the fractions (according to their spread and position)

2. Dubble Map: It is used to describe the characteristics or characteristics of a particular concept or object that is placed in circles and around open circles. The endings are made by attributes and properties. For example, a bubble map is designed to describe the parallelogram.

Double Bubble Map: Used to highlight similarities and differences between two things. It consists of two central circles adjacent to each other, a number of circles that write similar characteristics and a number of circles on both sides of the two concentric circles. Eg; designed a map to compare the rectangle and square.

Tree Map: used to classify ideas and organize them and to clarify the relationship between the idea of the president and the ideas of the sub-support it with details of these ideas. For example, a tree map was designed to classify triangles by length of the sides and measure the angles.

5. Map Map: Used to determine the relationship between all and parts of a given object or subject. The subject name is written on the right side and the left side of it is written in the sub-sections of the topic followed by the sub-sections of each component. For example, a map is designed to determine the data required in a particular geometrical question.

6 - Flow Map: Used in the process of the sequence of events and organize and arrange, writes the event name and events followed by the basic rectangles can flow from the bottom of each of the number of rectangles may write the results. For example, create a map to find a specific algebraic solution set.

7. Multi Flow Map: Used to determine the causes and results of a particular event, consisting of a central central rectangle placed in the middle of the event, and to the right of it are rectangles where the causes of the event are written and its society is directed to the rectangle of the central event from which arrows move to rectangles On the left side, write the results of the event, so that it is written on the principle (as ... the). For example, create a map to demonstrate a particular proof.

8 - Map Map: Used to clarify to illustrate the symmetries or similarities between two things, and the map consists of two parties between them Qantrh, placed at the right end of the thing to find a counterpart to him and put the left-hand thing similar to him. For example, a bridge map is designed to represent a particular geometrical question with a corresponding drawing

The importance of thinking maps

Hyerle was interested in making visual maps inspired by the way the brain works

XI).

The following are important for the learner and teacher:

- For the learner: make him active contributing to the process of learning, the participation of colleagues in the processes of thinking and problem solving, interactive and classified and organized ideas, creative, able to see his thinking, able to self-assessment

(Hyerle, 2008: 151-152).

ard

- For the teacher: help him to plan the teaching, enable him to use to prepare for the lesson and during the presentation of the lesson and in the assessment of the lesson, and help him to choose the appropriate educational activities, make it able to focus the attention of learners and guide them to the way to organize their ideas, enabling it to provide a collaborative environment for meaningful learning , Reveal the misconceptions of the learners and work to correct them (Nofal and Saifan, 2011: 229-230).

In fact, thinking maps give both learner and teacher opportunities for positive interaction and reflection on how to work together during the learning process. (Spiegel, 2007: 50).

Beliefs

Psychological beliefs are defined as "an objective, non-objective knowledge of the individual that includes his feelings towards something specific and defensible

"(Pehkonen, 1999: 389).

Erik & Peter defined the pattern of the student's beliefs toward mathematics as self-confident perceptions or perceptions implicitly or implicitly applied to mathematics (Rough, 2015: 103).

Leder & Grootenber defines it as "a subjective, relatively static knowledge of the individual that includes its feelings towards a specific subject that can be defended and refers to an internal representation of a cognitive nature" (Leder & Grootenber, 2005: 2).

The teaching and learning of mathematics suffers from disadvantages in the outcomes of evaluating the achievement of the student at all levels of teaching and the negative aspects, including; twice the level of achievement of mathematics in demand and this is evident in the results of the Arab students participating in international competitions of science and mathematics, the mistaken belief in the difficulty of learning mathematics in terms of material And the

need to preserve and memorize many laws and predictions, as well as the negative direction of the student towards learning mathematics, and this is evidenced by the decline in applicants to the specialization of mathematics in colleges of education and science, the wrong direction towards the education Children This is evident in the content authoring and style of teaching it is prepared to be the only mathematically and not to prepare him mentally and emotionally and to increase his learning and use it as a utilitarian tool.

In the view of (Obaid, 2010) that it is necessary to eliminate the beliefs of false demand in the process of teaching and learning mathematics while giving mathematics a great deal of vitality as an educational material reflecting the novelty of its subjects and progress and role as a useful tool in the lives of individuals and in what is taught in other study materials with The pursuit of making mathematics interesting by highlighting the mental comfort in solving the problems contained in its subjects, which raises the student's motivation and emotional and mental challenge to insist on further study

(Obaid, 2010: 17-20).

Previous studies

First: Studies related to thinking maps:

There are many previous studies that dealt with maps of thinking as a strategy to teach different subjects, but the researcher offered to introduce studies related to the competence of mathematics, including:

- The Hickie (2006) study was conducted in the United States of America to learn about student performance in reading and arithmetic. Two years after the application of thinking maps, the study sample consisted of (101) students and students of the fifth grade in three schools. The results revealed a statistically significant difference between the average performance of the experimental group and the control on the reading test in favor of the experimental group, and the absence of statistical difference between the average performance of the experimental group members and the adjustment on the test account.

- The study (Asfour, 2011) was conducted in Egypt to learn the effectiveness of maps thinking in the development of achievement and skills beyond the knowledge of students in the first grade secondary in logic. The study sample consisted of (60) students, and the results revealed a statistically significant difference between the average scores of the experimental group and the adjustment in the achievement test and the measure of skills beyond the knowledge for the benefit of the experimental group.

- A study (Bani Musa, 2011) conducted in Egypt to learn the effectiveness of the use of maps thinking in the development of creative thinking and achievement in engineering students in the first grade secondary.

The study sample consisted of (73) students. The results of the study revealed a statistically significant difference between the average scores of the experimental group students in the tribal and remote applications to test the creative thinking and the achievement test in engineering for the benefit of the post application.

- A study (Abu Sakran, 2012) was conducted in Palestine to know the effectiveness of the use of maps thinking in the development of the skills of solving the engineering question and the direction of engineering among the eighth grade students, the sample consisted of (74) students. The results of the study revealed a statistically significant difference at a mean level (0.01) between the mean scores of the experimental group and the control group in the post-application to test the engineering solution and the direction towards engineering for the benefit of the experimental group.

Second: Studies on beliefs about mathematics:

- The study (Ryan, 2010) was conducted in Palestine to learn the beliefs of teacher demand towards learning and teaching mathematics. The study sample consisted of (161) students and students of Al Quds Open University. The study concluded that the beliefs demanded by teachers towards learning mathematics and teaching them were consistent with their general orientation.

- The study of (Nimrawy, 2014) conducted in Jordan to learn the effect of using the strategy of teaching built on the theory of multiple intelligences in the acquisition of students of the teacher of mathematical concepts and in the development of their beliefs towards learning mathematics. The study sample consisted of (58) students. The results showed that there was a statistically significant difference at a mean level (0.05) between the average score of students of the first grade teacher of mathematical concepts and the development of their abilities towards learning mathematics for both experimental and experimental groups in favor of the experimental group.

- The study of (secret, 2016) conducted in Palestine to know the impact of the diversification of teaching on the teaching decision and beliefs towards the teaching of mathematics and learning in the light of cognitive learning theories, the sample of the study (76) university students that there is no significant statistical impact of the diversification of teaching on Instructional decision and beliefs about teaching and learning mathematics.

The study of (Khattar, 2016) was conducted in Algeria to determine the effect of the belief in the ability to solve sports problems - the desire to go to the sports people and the achievement in mathematics, and the study sample consisted of (151) students in secondary education who study in Specializa

tion. The study concluded the impact of beliefs and perceptions built by the student on his ability to solve mathematical issues on his choice of people's sports and technical.

- The study (Audi, 2016) conducted in Palestine was aimed at knowing the level of mathematical thinking skills and their relation to the beliefs about mathematics among the students of An-Najah National University from the specialization (Mathematics and Methods of Teaching Mathematics). The study sample consisted of 220 students and students. (0.05) between fields of mathematical thinking and areas of beliefs towards mathematics.

Comment

The previous studies show that:

- Thinking maps have a clear effect on

Achievement and direction towards engineering as stated in the study (Sukran, 2012; Bani Musa 2011),

And logic as stated in the study (Asfour, 2008)

, And the calculation as stated in the study (Hickie, 2006), attempted current study experimentation taught in geometrical geometry.

- The existence of a relationship between mathematical thinking and beliefs towards mathematics as stated in the study (Audi, 2016), and the existence of the impact of the belief in the ability to solve mathematical issues on achievement in mathematics as stated in the study (Khattar, 2016), and the current study dealt with the impact of

thinking maps of achievement And beliefs towards mathematics in fourth grade students.

Method and procedures:

Study Approach

The experimental approach and experimental design were adopted with partial control of two equal groups and the post-test.

The study sample

Al-Nu'man Secondary School for Girls was selected to represent the sample of the study. The school consisted of two divisions for the fourth grade, one of which was randomly selected to represent the experimental group and the other was represented by the control group. After the exclusion of students, the total number of students was 27 students. That the two groups are equal in the social and economic level and the general level in the grades of the first semester.

Study Tools

The researcher prepared the test in subjects (vectors and geometrical engineering) after conducting a content analysis of subjects (concepts, generalizations, mathematical skills, and mathematical issues). The objectives of the students' behavior were to be achieved after their study of the subjects (under study)) In the levels of Bloom cognitive six, the researcher prepared (13) thematic paragraph of the type (multiple choice of four alternatives), and (12) paragraphs, the total number of paragraphs of the total test (25) test paragraph, and prepared the test map, The test was presented to a group of experts and experts Maine to make sure the virtual honesty to him, then prepared instructions to answer the paragraphs of the test and gave one grade to answer and the correct answer is zero wrong or abandoned all his poverty objectively

As for the paragraphs, one step was given for each correct step in the solution for each paragraph, and the overall grade of the test was (50) degrees.

The test was then applied to a sample of 20 students who did not sample the study to ascertain the clarity of the test paragraphs and the time taken to answer the test paragraphs. The test was then applied to a sample of 100 students from outside the study sample to analyze paragraphs the test .

The researcher applied the equation of the coefficient of difficulty of paragraphs and the force of the discriminatory paragraphs of each of the substantive paragraphs and the test and the values were within the acceptable range was also confirmed the effectiveness of the wrong alternatives to the paragraphs of the subject as the values of the transactions are all negative.

In order to verify the stability of the test, the test was applied in its final form to the sample. It consisted of (35) students from the analysis sample. The coefficient of stability was calculated by using the alpha-cronbach coefficient for the thematic paragraphs which reached (0.83) Her (0.87).

Second: the measure of beliefs towards mathematics - the researcher prepared a measure of beliefs towards mathematics for the students of the preparatory stage after studying the literature and educational studies and previous Arab and foreign related, including: (Lazim et al., 2004; Beswick, 2005; Yates, 2007; Ryan, 2010 ; Audi, 2016).

The goal of the scale was to measure the beliefs of the students of the sample of the study towards mathematics, the number of paragraphs in the first instance (30) paragraph, and was prepared on the scale of the Likert Quintet according to the alternatives (very high, high, medium, weak and very weak) 4, 3, 2, 1) respectively in the positive paragraphs (20) paragraphs, and reflect the scores in the negative paragraphs and the remaining (10) paragraphs. In order to identify the validity of the content of the scale, the scale was presented to a group of professors specialized in education and psychology to express their

opinion on the validity of each paragraph to measure the expression of the beliefs of the students of the sample of the study, has been made amendments to some paragraphs, and thus the number of paragraphs of the scale (30) . The sample was then applied to a sample of (20) students from outside the study sample to determine the time taken to answer, and the average response time of the students on the scale (20) minutes.

The measure was applied to 100 students (outside the study sample) to represent the sample of the statistical analysis. In order to achieve the validity of the construction, Pearson correlation coefficient was used to calculate correlation coefficients between the grade of each grade and the total grade of the scale. Statistically significant (0.05).

In order to calculate the coefficient of stability of the scale, the researcher applied the test to the sample consisted of (20) students of the sample of the analysis and using the equation (alpha - Kronbach) reached the coefficient of stability (0.91).

Preparing teacher guide

The researcher prepared a guide for the school to teach the subject (under study), which included general guidance for the teacher to teach using maps thinking about the definition of maps of thinking, types and importance, and the preparation of instructional plans.

Preparing electronic thinking maps

The researcher prepared the empty thinking maps of the information (used in teaching each lesson at the beginning), then prepared the maps of thinking loaded with information, and was presented using the data show (at the end of the lesson) after the collective discussions between the students between them and the students and the school The material is on paper, and only four types of maps are used (map, bubble, tree, flow) according to the educational content (under study).

Application and application experience

The Significant level at 0.05	T value		The degree of freedom	Variance	Arithmetic Mean	The Number	the group
	Table	Calculated					
			52	57.279	32.232	27	Experimental
D. Statistically	2	3.0838		64.223	25.694	27	Control

The research adopted descriptive analytical method.

Second: Research Community: The current research community consists of the supervising professors in the Mathematics Department / Faculty of Education / Mustansiriyah University, the school principals and the mathematics teachers who cooperate in the implementation schools for the academic year (20182019) and for the second semester.

Third: The sample of the study: The sample of the study was randomly selected and numbered (60) as follows: (20) supervisors in the Faculty of Education / Mustansiriyah University, (20) principals and (20) In which students (stage IV) were applied in the mathematics department.

Fourth: The research tool: A closed questionnaire was constructed by the researcher representing the performance skills of teaching the mathematics of the applied students. The construction process went through many stages:

1. Review literature, research and previous studies on student-applied skills related to mathematics and teaching.

2) Classification of the performance skills according to the following three areas: planning and preparation in the plan book, implementation of the lesson and evaluation, personal characteristics of the student - applied) and included the first and thirteenth paragraphs in the second area included twenty paragraphs so that the total of the final paragraphs (40) 5-gauge according to the alternatives (excellent, good, good, average, weak) and distribution of grades 5-4-3-2-1 and in order.

Fifth: Validation of the tool: The virtual honesty was calculated where the questionnaire was distributed to the teachers of the curriculum and teaching methods for arbitration. The agreement was taken by 80% and all experts agreed that most of the paragraphs remained.

Sixth: Stability of the tool: Using the statistical program (SPSS) and using the Alpha Cronbach formula was found to be stable (0.978), applied to a random sample of (15) represented by (5) supervisors supervisors and (5) 5) of the cooperating teachers, which is a high stability ratio.

Final Application: The questionnaire was applied in its final form to the research sample of (20) university professors, (20) school principals and (20) cooperative mathematics teachers.

Seventh: Statistical Means: The researcher used the following statistical means:

1 Percentage 2 - Alpha Cronbach equation 3 - Law of the weighted average 4 - Law of percentage weight.

View and interpret results:

For the purpose of achieving the first objective of the research: the weighted

The experiment was applied for four weeks in the second semester, and after the completion of the teaching, the test of achievement was applied to the experimental and the control groups on Thursday, 21/3/2019. The belief scale was applied to mathematics on Sunday, 24/3/2019, And then supervised by the researcher, and then the researcher corrected the study tools and monitoring the grades of the two groups to address the results statistically.

Results

I. Presentation of the results of the collection test:

the group	The Number	Arithmetic Mean	Variance	The degree of freedom	T value	The Significance level	at 0.05
Experimental	27	32.232	57.279	52	Calculated	Table	
Control	27	25.694	64.223	52	3.0838	2	D .Statistically

For the purpose of analyzing the results of the study on the test of achievement and related to the first zero hypothesis, which states that: "There is no significant difference between the average scores of the students of the two groups (experimental and adjustment) in the achievement test in mathematics," the test formula was adopted for two independent samples, The significance of the difference between the two arithmetic averages is shown below:

Table (1)

Results of the T-test to indicate the difference between the average scores of the students of the two groups of the study sample in the mathematics collection test

Thus, the first zero hypothesis is rejected for the existence of a difference of statistical significance at a level of significance (0.05) between the mean scores of the two groups and for the experimental group of the achievement variable in mathematics. In order to measure the size of the effect of the thinking maps on achievement, the ETA square was calculated at 0.154. Thus, the effect size is high, as shown in Table (2) below (Afana et al., 2012: 24)

Table (2)

Size and level of impact

0.14	0.06	0.01	Size of impact
High	Median	Low	Level of impact

View the results of the measure of beliefs towards mathematics:

For the purpose of verifying the validity of the second zero hypothesis, which states that: "There is no difference of statistical significance at the level of significance (0.05) between the average scores of the students of the two groups (experimental and Adjustment) in the measure of beliefs towards mathematics," was adopted the formula of the test of two independent samples, (3) below illustrates the difference between the two arithmetic averages in the following:

Table (3)

The results of the T-test to indicate the difference between the average scores of the students of the two groups of the study sample in the measure of beliefs towards

The results of the T-test to indicate the difference between the average scores of the students of the two groups of the study sample in the measure of beliefs towards

The Significan ce level at 0.05	T value		The degree of freedom	Varia nce	Arithm etic Mean	The Number	the group
	Tab le	Calcul ated					
D .Statistical ly	2	10.406	52	47.34 8	120.93 3	27	Experim ental
				53.59 7	100.12 2	27	Control

mathematics

Thus, the second zero hypothesis is rejected because there is a difference of statistical significance at a mean level (0.05) between the mean scores of the experimental and adjustment groups and for the experimental group of the variable beliefs towards mathematics. Calculates the ETA box which is high, as shown in Table (2) above.

Discussion of results

The results of tables (1, 2) above indicate that there are statistically significant differences (0.05) between the mean of the experimental group and the experimental group (which were studied using the thinking maps) in achievement and beliefs towards mathematics. The use of thinking maps in teaching:

- Provide students with schemes helped them to organize ideas and information

and arrange and find relationships between them, which helped to absorb the scientific material better.

- Helped to make the student active contribution to the process of learning, participation of colleagues in their thinking, and interacting and classified and the salary of ideas, and collaborating with colleagues in the solution of problems, and able to self-assessment to enable them to see their thinking, increased their achievement in the educational material.

- Provide students with a collaborative classroom environment for learning meaningful to them, and gave opportunities for students, researchers and students among them for positive interaction, reflection and reflection and linking new information with previous information.

This study was agreed with the study of Abu Sakran (2012), which proved effective use of thinking maps in the development of achievement and towards mathematics (engineering).

conclusion:

Teaching using Thinking Maps has an impact on the achievement of fourth graders in mathematics and in their beliefs towards mathematics.

Recommendations and proposals

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

- Include the programs of professional preparation for the teaching of mathematics to the basic education colleges strategies of research based on the theory of the brain, including the strategy (thinking maps) in the curricula of teaching methods.

- Training the teachers of mathematics school through training courses for the General Directorate of Education of the Ministry of Education on how to use maps thinking in the teaching of mathematics, which increases the achievement of mathematics among learners and improve their beliefs towards mathematics.

- Conducting further studies that examine the strategy of "thinking maps" and their impact on the development of systemic thinking in mathematics and the taste of mathematical aesthetics and for various classes and stages of study.

References

- Abu Sakran, Mohammed Naeem Al-Abd (2012). The Effectiveness of the Use of Thinking Maps on the Development of the Problem Solving and the Problem of the Engineering Question in the Eighth Grade Students, Master Thesis (unpublished), Islamic University, Gaza, Palestine.

- Badawi, Ramadan Massad (2010). Active learning . Dar Al Fikr, Amman, Jordan.

- Bani Mousa, Mohammed Musa Mohammed (2011). Effectiveness of the use of maps of thinking in the development of creative thinking and achievement in engineering students in the first grade secondary. *Studies in Curriculum and Teaching Methods*, p. 168, Egypt, (133-178).

- Khattar, Zahi (2016). The impact of belief on the ability to solve mathematical problems in the desire to guide the people of sport and the achievement of mathematics in secondary school students, *Journal of Human Sciences*, p 6, Algeria 165-181.

- Khateeb, Omar Salem, Khalid Abu Taya, Osama Marzouk Krishan, Eid Hassan (2010). The effect of using the shape map (V) in the collection of the concepts of jurisprudence and the formation of a conceptual structure integrated with the students of the University of Hussein bin Talal. *Journal of Human Sciences*, Year Seven, (45)

<http://platform.almanhal.com>>Files

- Ryan, Adel (2010). The beliefs demanded by teachers towards learning mathematics and teaching them. *Journal of the Islamic University (Series of Humanitarian Studies)*, Volume 18, Issue 2, Hebron, Palestine, 715-751.

- Saadi, Ammar Taemeh Jassim (2016). The Effect of Daniel's Model on the Collection of Mathematics and the Habits of Reason among the Fourth Grade Students. *Missan Journal of Academic Studies*, Faculty of Education, University of Missan, Missan.

The Secret, Khaled Khamis (2016). The impact of the diversification of teaching on the teaching decision and beliefs towards the teaching and learning of mathematics in the light of theories of cognitive learning among female students of Al-Aqsa University in Gaza. *Journal of Al - Aqsa University (Series of Human Sciences)*, Volume 20, Issue 2, Gaza.

- Abdullah, aware of Saleh and his brother Mazen Karim (2014). Teaching using the skills of systemic thinking and its impact in the direction of mathematics in the fourth grade students, *Journal of the Faculty of Basic Education*, University of Mansuriyah, Baghdad.

- Obaid, Qassem Mesir visit (2018). The impact of the learning strategy reflected in the achievement and mathematical interconnectivity of the fourth grade students in mathematics. Master Thesis (unpublished), College of Education for Sciences of Drainage - Ibn al-Haytham, Baghdad, Iraq.

- Obaid, William (2010). Teaching mathematics to all children in light of the requirements of standards and culture of thinking. , *Dar Al-Masirah*, I2, Amman, Jordan.

Asfour, Iman Hassanein Mohamed (2008). The effectiveness of thinking maps in the development of achievement and skills beyond the knowledge of students in the first grade secondary in logic. *Journal of Studies in Curriculum and Teaching Methods*, p. 132, (Part II), Egypt, 20-81.

- Odeh, Hadeel Salman Ali (2016). The skills of mathematical thinking and its relation to the beliefs towards mathematics in the students of An - Najah National University of the two disciplines: Mathematics and teaching methods. Master Thesis (unpublished), An-Najah National University, Faculty of Graduate Studies, Nablus, Palestine.
- Kubaisi, Abdul Wahid Hamid (2007). Developing thinking in interesting ways. Dar Debono, Amman, Jordan.
 - Kubaisi, Abdul Wahid Hamid and the liberation of Mahdi Awad (2011). Teaching mathematics (modern visions). Arab Community Library, Amman, Jordan.
 - Kubaisi, Abdul Wahid Hamid and the mentor Saleh Abdullah (2018). Thinking and Mind Maps in Teaching Mathematics. Arab Community Library, Amman, Jordan.
 - Majidil, Abdullah and Fatima Abdullah Al-Yafi'i (2009). Difficulties in learning mathematics for students in the first cycle of basic education in Dhofar from the point of view of mathematics teachers (field study, Damascus University Journal, Vol. 25, No. (3,4), Damascus, 135-177.
 - Afane, Ezzo Ismail and others (2012). Strategies for Teaching Mathematics in General Education, II, Dar Al Thaqafa, Amman, Jordan.
 - Nimraoui, Zaid (2014). The impact of the use of a structured teaching strategy on the theory of multiple intelligences in the acquisition of students of the first grade teacher of mathematical concepts and in the development of their beliefs towards learning mathematics.
<http://www.zuj.edu.jo/wp-content/staff-research/art/education/dr.ziad/6.pdf>
 - Nofal, Mohammed Bakr (2008). Practical applications in the development of thinking using habits of mind. Dar Al Masirah, Amman, Jordan.
 - Nofal, Mohammed Bakr and Mohammed Qasim Saifan (2011). Integrating thinking skills into academic content. Dar Al Masirah, Amman, Jordan.
 - Majidil, Abdullah and Fatima Abdullah Al-Yafi'i (2009). Difficulties in learning mathematics for students of the first cycle of basic education in Dhofar from the point of view of mathematics teachers (field study), Damascus University Journal, vol. 25, No. (3,4), 135- 177).
 - Melhem, Sami Mohammed (2002). Research Methods in Education and Psychology, I 2, Dar Al-Maseerah, Amman, Jordan.
 - Beswick , K .(2005) .The beleiefs/ Practice Connection in broadly Defined . Mathematics Education Journal , 17 (2) , 39-68 .
 - Burden , B . & Silver , J .(2006) .”Thinking Maps in Action”Teaching Thinking& & creativity , (Available online) , Retrieved july 2009 from

<http://www.Thinking foundation.org>,38-42.

- Hickie, Katharine Mabie (2006). An Examination of Students Performance in Reading/Language and Mathematics after Two Years of Thinking Maps Implementation in Three Tennessee Schools. Unpublished Doctoral Dissertation, East Tennessee State University .
- Holzman, S. (2004) . Thinking Maps : Strategy -Based Learning for English Language Learners and Others. Paper Presented at 13th Annual Administrator Conference : “Closing the Achievement Gap for Education Learner Students” , Sonoma County Office of Education , California .
- Hyerle , D. (1996) . Thinking Maps seeing is Understanding . Educational Leadership , 53 (4) , 85-89 .
- Hyerle, D. (2000a). A field Guide to Using Visual Tools. Alexandria, VA: Association for Supervision and Curriculum Development.
- Hyerle, D. (2004) . Thinking Maps as a Transformational Language for Learning. In Student Successes with Thinking Maps School-based research results and models for achievement using visual tools , Alexandria , VA : ASCD .
- Hyerle, D. (2008). Thinking Map : visual tools for activating habits of mind . In Costa , Arthur & Kallick , Bena (Eds.) Learning and leading with Habits of mind : 16 Essential Characteristics for Success. Alexandria , VA : ASCD .
- Hyerle , D. (2009). Visual Tools for Transforming Information into Knowledge. Alexandria , VA: ASCD.
- Kuhn, D. & Deen, D. (2004). Metacognition : A bridge between Cognitive Psychology and Educational practice . Theory in the Practice , 43 (4) .
- Leader , G. & Grootenborer , P. (2005). Affect and Mathematics Education . Mathematics Education Research Journal , 17(2) , 1-8 .
- NCTM (2000) . Principles and Standards for School Mathematics , Reston , VA : Author .
- Spiegel , J. (2007) . The Metcognitive School : Creating a Community where children and adults reflect on their work . The New Hampshire Journal Education , VII .
- Yates, S.M. (2007). Primary Teacher’s Beliefs , teaching practices and curriculum reform experiences in mathematics . Referred Proceedings of the Australian Association for Research in Education Conference , Adelaide , South Australia .