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Using cooperative learning strategy and teaching aids in improving the performance of eighth grade students' learning of mathematics and their attitudes towards it

Dr. Kawthar Abdel Qader MohammedWahdan

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Abstract

The objective of this action research is to find out the effectiveness of using the cooperative learning strategy and teaching aids in improving the performance of eighth grade students in mathematics and their attitudes towards it in the academic semester 2022/2023. The study sample consisted of (72) students who were deliberately selected from Zahrat Al-Madaen School. One of the most important reasons that led to this research is the poor achievement of students in mathematics and their lack of attention during the lesson For this, the researcher prepared a treatment plan to improve students' performance and skill in mathematics by using cooperative learning strategy and teaching aids. To study and analyze the results, the researcher used the observational method, and the mathematical knowledge test was applied in order to measure the level of improvement in the performance and skill of students in mathematics. A questionnaire was used to measure students' attitudes towards mathematics. The results showed that a significant improvement occurred in the performance of the students, and that there was a positive trend towards the content of the questionnaire items. Therefore, the researcher recommends the adoption of cooperative learning strategy and teaching aids by male and female teachers in different subjects in order

to improve the performance and skills of their students.

*** Introduction**

The science of mathematics arose to meet the needs of society and facilitate its transactions and life, and it is still being renewed and developed to develop the accelerating needs and circumstances of society. Therefore, it was necessary for our educational institutions to keep pace with this era, to adopt modern means and methods and the latest findings of modern theories in teaching, and to move away from traditional methods and techniques. And promoting everything that is new and useful to society, including developments in mathematical methods (Sbitan, 2017). Since mathematics occupies a distinctive place among knowledge, it is a science that has its origins starting with sensory and abstract concepts, a language that uses specific symbols and expressions that contribute to intellectual communication, and a tool for its role in daily life and other sciences (Al-Arsan, 2003).

Mathematics is a useful language for symbolic expression, and the most prominent characteristic of mathematics is that it is a method of research that relies on logic and mental thinking, using quick wit, breadth of imagination, and accuracy of observation. Therefore, it has been said that mathematics is the undisputed master of science and at the same time its servant, and this is the place of greatness for mathematics (Salama, 2005).

Therefore, many countries, especially developed ones, seek to develop methods and techniques of teaching mathematics, realizing the importance for this subject in developing society and entering the world of scientific competition and technological development. It is no secret to anyone who follows the path of education in developed countries the efforts of the United States in developing the content, methods, By providing him with basic information and skills in mathematics and developing and techniques of teaching all aspects of science and mathematics (Al-Muqbel, 2009).

Therefore, there is an urgent need to reconsider the mathematics curricula in Palestinian schools in a way that meets the demands of the times and the needs of the individual, as well as the means and methods of communicating knowledge easily and conveniently to individuals. Perhaps the reason for this is that the goal of teaching mathematics is to contribute to preparing the individual learner who is able to face practical life. By providing him with basic

information and skills in mathematics and developing a By providing him with basic information and skills in mathematics and developing positive attitudeand one of the teaching methods that towards learning it (Al-Maliki, 2002).

Developing positive attitudes towards mathematics is one of the basic goals of teaching mathematics. A student who has a positive attitude towards mathematics will study mathematics with passion, try to explain some social phenomena and situations mathematically, ask a lot about new mathematical ideas, and try to deduce some ideas on his own (Al-Raddadi, 2007), and this was supported by Maddah (2001) at the Twelfth Scientific Conference on Curricula and Teaching Methods held in Cairo in 2000 AD, who recommends the necessity of adopting advanced teaching strategies.

The Center for Measurement and Evaluation has recommended the necessity of training teachers on specific methods of teaching students, in order to allow the teacher to diversify his teaching methods to suit the needs and inclinations of students, and at the same time help to stimulate their motivation to teach and raise their level of achievement (Matar and Al-Khalili, 2002). The Palestinian Ministry of Education and UNRWA encouraged teachers to use the collaborative group learning method in teaching, through course brochures that were given to teachers in the past few years (Abu Attia, 1999).

As a result of scientific and technological progress in light of the changes that have occurred in teaching mathematics and the modern view of science, attention has become focused on both content and method because they are among the basics of teaching mathematics in the present era (Al-Maliki, 2002). Researchers in scientific education have made many and clear contributions to the main shift from seeing the educational process as training students to memorize information without absorbing it, to teaching them how to employ the information they learn, in order to deepen their understanding and develop their scientific thinking. In this approach, researchers relied on constructivist theory, and one of the teaching methods that are compatible with the constructivist theory of the teaching-learning process is cooperative education (Saundres, 1992).

Davidson (1990) pointed out in one of the topics of the yearbook (NCTM, 1990), under the title “Cooperative Learning in

Mathematics through Small Groups," that methods of cooperative learning within small groups can be applied with all age levels of students, as well as all levels of mathematics education from primary school through university study. Moreover, working cooperatively in small groups can be used for many educational purposes such as discussing concepts, discovery/investigation, problem solving, mathematical modeling, and use of technology.

Many educational studies and research have focused on identifying the importance of methods and techniques that facilitate the learning process, which has led to the emergence of many strategies and metwork to shedhods for teaching whose philosophical origins are derived from learning theories, and are more deeply concerned with actual practices and applications within the classroom, such as interaction patterns, feedback theory, and classroom management. Despite the emergence of many studies in these different fields, learning within the classroom and cooperation between its members has been subject to only a small amount of studies (Al-Harbi, 2001).

Despite the emergence of modern sciences in various fields, mathematical sciences remain at the top of the important disciplines that have a close relationship with various sciences. In addition, teaching them is considered one of the most difficult types of teaching. Therefore, it is necessary to give more attention to developing methods and strategies for teaching mathematics to keep pace with the demands of the current era and the terrible development it is witnessing, which in turn have a significant impact on developing thinking skills and linking what is taught and learned to life (Hamdan, 1988).

Cooperative learning has received wide attention among educational officials globally as an educational-learning strategy because it has many positive effects on both the teacher and the learner together, and then on educational work in general. It works to improve the professional performance of the teacher and creates an effective input in developing learning strategies (Al-Najaz, 2006), it also turns the learner into an active element in the educational process as it gives him the opportunity to practice dialogue and discussion, clarify ideas and issues, compare different points of view, increase academic achievement, and develop problem-solving skills, scientific thinking and

decision-making (Marazano, 1998, and Al-Muqbel, 2000).

In light of these advantages of cooperative learning, in addition to the possibility of using it in different educational stages, starting from kindergarten to university education, the importance of adopting this strategy by teachers and distributing it to various schools to benefit from its many positive effects is highlighted, and since educational research would work to shed a light of everything that is new and useful to advance the educational process, it is noted that research has included studying trends, as one of the important components of personality, towards many components of the educational process, including the trend towards different curricula, various study methods, and the use of modern educational technologies, etc. This highlights the importance of identifying trends toward these topics as a preliminary step that gives an idea of how to deal with them in the future in a way that guarantees the educational system greater opportunities for success and development, especially since the positive trend toward a specific subject makes it easier to learn and individuals perform better toward it (Akubuiro, 2004). Perhaps the reasons for students' trends towards a modern educational strategy produced by the contemporary educational movement, which is cooperative learning, are among the things that should be taken into consideration if this strategy is to emerge and spread in various schools.

The current study may contribute to providing an initial perception of students' attitudes toward cooperative learning and educational methods in preparation for studies that address these trends by modifying or developing methods for benefiting from everything that would support the educational process in our society.

Through the previous presentation, the importance of the study is highlighted through cooperative learning strategies for teaching mathematics in developing students' skills. As a result, many attempts have emerged to develop teaching methods that are centered around the student and involve him in obtaining education. In order to achieve the cooperative learning process learners must participate in identifying and discussing problems, formulating hypotheses, and arriving at solutions to these problems related to the curricula they are learning. More precisely, cooperative learning is considered to be the one that requires students to use higher-order

thinking skills such as analysis, synthesis, and evaluation during the learning and study process.

After reviewing previous research and studies in this field, it was found that the Arab studies that dealt with the cooperative learning strategy and educational methods are limited despite the presence of several studies at the global level. Therefore, this study was conducted to find out the effect of using the cooperative education strategy and educational methods in developing and developing the skills of eighth grade students in mathematics and their attitudes towards it at Zahrat Al-Madaen School.

Until recently, officials and teachers used to focus on educational patterns in teaching, in training courses, and the way teachers explain and present lessons in order for the parties to the educational and learning process to succeed in achieving the goals and objectives they aspire to.

However, as a result of research and studies conducted in education and psychology, and the problems faced by teachers in conveying ideas and information to students, and the complaints of these students about their lack of engagement in the lesson session and their weak comprehension of the information contained in it, as well as the complaints of parents about the weak level of their children's achievement, for all of this it was found that learning patterns in teaching alone is not sufficient to achieve that desired success, if they are not linked to the learning patterns of the students themselves, who constitute the focus of the teaching and learning process. My idea of action research has grown from this standpoint by applying the cooperative learning strategy and educational methods to teach mathematics to eighth grade students at Zahrat Al Madaen School.

*** Rationale**

While teaching mathematics, the researcher noticed that the students did not show any interaction while receiving the educational material. This was clearly evident from the results of the mathematical knowledge test that was presented to the students during the first period, as only a small number of students were able to answer the questions related to the basics of mathematics correctly, and they were their answers were random and lack the mathematical skills that a student is expected to master after studying mathematics in previous years.

The problem of the study arose as there is increasing anxiety among

the mathematics teachers because the students have been studying mathematics for twelve years, but they cannot use mathematics in life situations (Joaler, 1998). Therefore, teaching methods must be developed in order to develop students' thinking in learning mathematics to be based on building mathematical knowledge, as this encourages students to view mathematics as a daily activity that they can employ to create complete meaning around them in light of what some previous studies in the field of cooperative learning indicate about the importance of developing some of the thinking skills of students through cooperative learning, and practicing it through some educational methods. The problem of the study emerged through the observation of the researcher, who is a mathematics teacher, that there is an urgent need for cooperative learning and the use of mathematics in practical life as a result of a group of reasons, the most important of which are the fear, tension, and shyness that students complain about after the learning process, the factors of which are the learners' inability to integrate new information. In a correct and realistic way in their minds after traditional educational activities and situations.

*** Problem formulation**

Through this action research, the researcher wanted to identify the reasons behind the low academic achievement of students in mathematics, and after using several of teaching methods and the diversity in them, she found that the students' lack of understanding of the subject in the traditional way, and the lack of diversity in modern teaching methods among mathematics teachers, and being limited to traditional methods, and not having a stock of information for students, which requires a lot of effort from the subject teacher when explaining the lesson, and not attracting students' attention during the lesson.

The researcher confirms that there is a problem of weakness in the level of academic achievement in mathematics, as the process of teaching mathematics in our school faces several difficulties, the most prominent of which are difficulties related to the teaching strategies currently used, which focus on the theoretical aspect of teaching mathematics, which negatively affects the quality of learning. In light of this, there has become an urgent need to develop education, use cooperative learning, and teaching-learning methods within the classroom, and try to determine the

impact of this on students' performance, skills, and attitude toward mathematics. Based on the above, this study came to show the importance of the cooperative learning strategy and educational methods in improving performance and developing skills and creativity in mathematics among eighth grade students at Zahrat Al-Madaen School.

This research aimed to answer the following two questions:-

1- What is the effect of using the cooperative learning strategy and educational methods in improving the performance, achievement, and skills development of eighth grade students?

2- What are the attitudes of eighth grade students towards mathematics?

*** Problem description and analysis**

The researcher studied a performance test to measure the level of her students in previous mathematical knowledge and the basics of mathematics, and it became clear to her that their average scores were low. This means that there is some problem or weakness in the student's mathematical thinking skills and the basics of mathematics. Then the researcher asked her students about their level of performance in the test, and she found out that most of the students were dissatisfied with their results and that they lacked mathematical thinking skills and were weak in the basics of mathematics.

The researcher realized that there was a problem with the students in mathematics, which had led to a decline in their level of performance on the performance test. To identify the problem that led to the students' low level in the test, the researcher asked her students to mention the reasons they saw as appropriate so that he could determine the direction of the research and how to treat the problem. The researcher concluded that the problem lies in cognitive achievement and the method of teaching the educational material.

What the teacher noticed about the parents' complaints about a decline in students' achievement in the field of arithmetic skills, as arithmetic skills is the basis of all an individual's daily dealings, and any deficiency or defect in their mastery will be reflected on the student in his daily life and in the rest of the other academic subjects that dispense with mathematics, and also one of the reasons that made the teacher make this subject a focus of study is that the students suffer from negative attitudes towards mathematics, and their belief that it is one of the most difficult academic subjects. We may

find a student excelling in most academic subjects, including mathematics, but when their opinions are taken into account in mathematics, they are... Therefore, this study tried modern teaching methods that could contribute to making students master the skills and develop positive attitudes toward mathematics and its academic session. However, when their opinions about mathematics are considered, they are negative towards it. Therefore, this study tried modern teaching methods that could contribute to making students master the skills and have positive attitudes towards mathematics and its class.

Through the researcher teaching the eighth grade for a period of more than thirteen continuous years, she noticed that mathematics constitutes a burden on students during exams, even though the level of questions is not complex or difficult, and with the diversity of questions and their different levels, and with follow-up and scrutiny through attending some field classes, she discovered the following:-

1- Forgetting to focus on what is important during the explanation led to students being distracted while studying.

2- Mathematics contains a large amount of information that needs to be organized.

3- Lack of diversity in the use of educational aids and teaching methods, which causes boredom for many students.

4- Neglect of the subject by students due to overcrowding of the curriculum in the eighth grade.

*** Hypotheses**

The researcher pondered the reason for the poor performance of students in mathematics. It turned out that the educational subject needs to follow a different method of teaching that differs from its current method, and that mathematics requires the use of an interactive method to train students in thinking and creativity skills. The researcher believes that this is one of the most important challenges facing the educational process in the information society is the ability to explore new methods of education, devise solutions based on knowledge of modern technological means for use in education, the ability to design an environment suitable for interactive learning, and creativity in using these means, investing in them, and subjecting them to the needs of the learners. Cooperative learning is considered one of the most important educational methods that allow building an appropriate educational

model that takes into account students' cognitive differences, fulfills their needs and desires, raises their level of education, and provides access to the educational material. Accordingly, the researcher settled on using the cooperative learning strategy and educational methods in teaching mathematics. Neglect of the subject by students due to overcrowding of the curriculum in the eighth grade.

Through the above, the researcher worked hard and tried to develop solutions to this problem, which are:-

1- The performance and skills development of eighth-grade students at Zahrat Al-Madaen School are improved if the cooperative learning strategy and educational methods are used in teaching mathematics.

*** Sample**

The study subjects were intentionally selected from the eighth grade students studying mathematics for the academic year 2022/2023. They numbered (72) students, selected from Zahrat Al-Mada'in School from three sections.

*** Tools**

The observation method was used to measure the improvement in students' performance by teaching mathematics to eighth grade students using the cooperative learning strategy and educational methods from the point of view of the mathematics teacher. An observation scale was prepared by arriving at a list of the student's performance and skills by the mathematics teacher, and the mathematics knowledge test was applied from In order to measure the level of improvement in students' performance and skill in mathematics, a questionnaire was used to measure students' attitudes towards mathematics, prepared, developed and published by Abdul Rahman Al-Maqushi referred to (Al-Shahrani, 2010), and a cooperative learning strategy and educational methods were used to teach mathematics to eighth grade students

*** Observation scale**

A list of skills was prepared by the teacher to arrive at a measure of the student's performance. Observation was conducted by the mathematics teacher on her students in the classroom. The measure consisted of the following items

*** Questionnaire to measure students' attitudes towards mathematics**

The questionnaire was applied to eighth grade students to measure their attitudes towards mathematics. The questionnaire consisted of the following statements:-

*** Treatment plan**

The cooperative learning strategy was applied to eighth grade students to teach mathematics, where the students were distributed into groups so that the number of students in the group was 4-6 students, and parity was provided between the groups in terms of the diversity of abilities and aptitudes among the students of one group, and equality with other groups, and then the standards of cooperative education were determined by appointing the group rapporteur and determining his tasks, as well as the rest of the roles of the group members, and clarifying the mechanism of interaction between the group members in carrying out its work to ensure a safe interactive atmosphere. After that, the topic of cooperative learning was prepared, so that the teacher gave an idea about the learning topic so that it was brief and clarified the connection between it and the needs of the students, and stimulates the students to work cooperatively to reach new information and new understanding. Then the teacher wrote the learning topic on the blackboard or on worksheets distributed to the students. Questions, problems, and exercises were used. The time allocated for joint work was also determined. Joint interaction between members of one group was allowed until a common understanding of the learning topic was reached. The teacher encouraged the students in the group to give a number of ideas, especially new ones, discuss each idea within the group, help students overcome the difficulties they encounter in learning without giving them the correct answer, prepare reports on the learning outcomes, and then stop joint work in preparation for presenting what the groups have reached in a general dialogue session that included the entire class, after which each group was asked about the extent of satisfaction with the results of its work, and each group was given the opportunity to present its work to the other groups, listen to the points of view in its work, discuss the knowledge results that had been reached, and allow each group to defend its points of view. She looks at her products, extracts new ideas, and writes them on the board. The teacher observes creativity in practicing learning duties, nurtures them, and assigns students homework.

The teacher used interesting educational cards with numbers written on them. The student added or subtracted numbers within a short time at the beginning of each class session to attract the students' attention, excite them, and attract

them to the class. She used colorful cards with mathematical knowledge written on them to support and prepare for the lesson that had been learned previously. She designed educational tools for mathematics made of wood or reinforced plastic, according to the number of class groups for the eighth grade curriculum, she also used materials from the surrounding environment, such as the classroom floor, for the students to draw identical or similar triangles or any geometric shape we want to know, find its area, and create a square on the hypotenuse of the right-angled triangle using black adhesive. The student's role in the educational process was activated and attracted to the class. The teacher distributed the method for each lesson to the groups after introducing them to the general goal of the lesson. Through sensory perception, touch, and play, the student arrives at a conclusion about a theory or mathematical concept specific to the lesson.

*** Results**

As for the progress in treatment, the improvement was clear in the students' performance and in all the skills that were the subject of observation. By tracking the students for three and a half months after the end of each class session and through the results of tests, both daily during the first and second periods, and the tests at the end of the first period, progress in these skills was continuous and the improvement in performance has continued among the students, which was affected by the cooperative learning strategy and educational methods with the aim to master the skills. Also, performing the duties included in the educational methods had a clear impact on the continued improvement as the student transferred what he learned in the class session to his community and began practicing these activities continuously in his daily life, and his outlook towards himself and towards others changed positively, which had an impact on his continued improvement. The information and mathematical concepts became entrenched in the student's mind because he learned them with pleasure, a desire to learn, and used his senses. The class students competed in the use of educational games and the participation of his group members in discussion and conclusion. The subject of mathematics was simplified, clarified and deconstructed and linked to practical life and its daily uses. It made it easier for the student to solve word problems and helped him answer many of the questions asked

within the classroom. The talents and creativity of the students were highlighted through their sensory awareness of the means and learning with pleasure, the following table shows the results of the teacher's observation on a measure of the student's performance and skills in mathematics:-

Table 1: ***Results of the teacher's observation of her students' performance in mathematics after using the cooperative learning strategy and educational methods.***

No.	Statement	excellent	very good	Good	average	Low
1	Interaction between teacher and student.	%47.2	%23.6	%20.8	%8.4	%0
2	Sensory perception and achieving understanding by the student.	%23.6	%33.4	%36.1	%6.9	%0
3	The student's ability to remember.	%16.7	%19.4	%47.2	%16.7	%0
4	The ability to arrange educational material and present it in an interesting manner that arouses interest and a desire to learn.	%26.4	%40.3	%26.4	%4.2	%2.7
5	Students' positive tendencies and desires towards the teacher and the educational subject.	%63.9	%22.2	%11.1	%0	%2.8
6	Simplify, clarify, interpret and understand information.	%30.6	%38.9	%26.4	%4.2	%0
7	Ability to self-learn.	%23.6	%20.8	%34.7	%18.1	%2.8
8	Connecting different thoughts and sensory changes.	%23.6	%20.8	%34.7	%18.1	%2.8
9	The joy of learning, renewed activity, and continuity in learning.	%34.7	%45.8	%13.9	%1.4	%4.2
10	Deducing theories and activating self-learning.	%26.4	%19.4	%41.7	%12.5	%0
11	Create a positive emotional atmosphere, especially for shy students who do not want to participate in the class.	%56.9	%36.2	%6.9	%0	%0
12	Developing curiosity in the learner.	%47.2	%23.6	%29.2	%0	%0
13	Pays attention to teacher's instructions easily.	%41.7	%26.4	%22.3	%7.3	%2.3
14	He is quickly distracted by external stimuli.	%1.4	%3.4	%26.4	%23	%45.8
15	Understand thoughts and express feelings in a meaningful way.	%63.9	%19.4	%11.1	%2.4	%3.2
16	It gives all students have the opportunity to feel successful.	%38.9	%26.4	%34.7	%0	%0
17	He suffers from boredom while sitting on the chair.	%1.2	%10.3	%16.6	%25.7	%46.2
18	He leaves the class quickly before the teacher.	%0	%12.5	%19.4	%41.7	%26.4
19	Student achievement in mathematics.	%23.6	%41.7	%22.2	%12.5	%0
20	Gaining experience and understanding the student better of the lesson.	%10.2	%63.9	%19.4	%4.5	%2

It is noted from the table that most of the percentages of the teacher's observation of item grades were high percentages, and this shows that the student's performance became high and the student began to eagerly wait for the mathematics class and the percentage of achievement increased. Learning with teaching aids for mathematics in a cooperative learning manner reflected positively on the student's behavior within the class session, and reduced boredom, excessive movement, and fiddling with his things, and he began to understand, absorb, discuss, deduce, and realize relationships. This increased the level of focus and attention to the teacher's instructions during the class, and this helped him carry out tasks and activities easily.

When teaching the educational material without using the cooperative learning strategy and educational methods, the researcher applied the mathematical knowledge test during the first period to the study sample, and after using the cooperative learning strategy and educational methods, the mathematical knowledge test was applied to the same sample during the second period, and a score was monitored for each student. Thus, each student has two grades, the first before using the educational methods and the cooperative learning strategy, and the second after using the educational methods and the cooperative learning strategy. Then the arithmetic mean and standard deviation of the students' grades in the first and second tests were extracted, and a t-paired test was implemented to make a comparison between the arithmetic mean of the students' grades in the first test and the second test on the same sample, the table displays the results of the analysis:

Table (2): ***Arithmetic means, standard deviations, and t-test for the observation scale before and after using the cooperative learning strategy and educational methods***

Test	Number of students	Arithmetic mean	Standard deviation	The arithmetic means of the difference	Standard deviation of the difference	Degree of freedom	t-value	p-value
Before	72	2.7	0.59	1.41	1.26	71	-6.2	0.00
After	72	4.1	0.85					

The results of the table showed that the arithmetic mean of the students' scores after using the cooperative learning strategy and educational aids exceeded the acceptable standard for the arithmetic mean, which indicates an improvement in the students' results on the test as a result of employing educational aids in teaching mathematics.

The results of the analysis showed that the p value in the t-test is less than α, that is, less than 5%. This means that there is a statistically significant difference between the two means calculated for the student's grades before and after using the cooperative learning strategy and educational methods, and this difference is in favor of the test after using cooperative learning strategies and educational methods, which means that there is a noticeable improvement in student's performance in mathematics skills, and that the cooperative learning strategy helps improve students' performance when used in the educational process.

* Questionnaire analysis

Table 3: ***Arithmetic means and standard deviations of the responses of study sample members to the questionnaire items***

No.	العبارة	Arithmetic mean	standard deviation	Direction toward the paragraph
1	Math lessons are fun.	4.03	0.993	Positive
2	Reading a math book is a waste of time.	3.43	1.136	Positive
3	Math lesson activities are good	4.03	0.919	Positive
4	I enjoy reading mathematics book.	3.43	1.173	Positive
5	I feel stressed when I study mathematics.	2.64	1.006	Neutral
6	Mathematics is essential for all students.	4.35	0.858	Positive
7	The issues we study are unimportant.	3.93	1.079	Positive
8	Mathematics is a useless subject.	3.00	1.322	Neutral
9	Mathematics helps develop methods of sound thinking.	4.28	0.697	Positive
10	Mathematics is not necessary in our daily life.	3.97	1.087	Positive
11	Mathematics plays a major role in most scientific discoveries.	4.25	0.599	Positive
12	Mathematics is a difficult subject.	2.69	0.954	Neutral
13	Mathematics is a valuable and necessary subject because it benefits society.	4.35	0.790	Positive
14	There is no need for mathematics to be in the curriculum.	3.83	1.353	Positive
15	I prefer mathematics over other subjects.	3.63	1.227	Positive
16	Mathematics is hated by all students.	3.28	0.826	Positive
17	Mathematics is one of my favorite subjects.	3.68	1.032	Positive
18	No one would be harmed if we did not study mathematics.	3.68	1.005	Positive
19	Studying mathematics is hard work.	2.70	1.162	Neutral
20	All people need mathematics.	4.22	0.876	Positive
21	I don't care much about mathematics.	3.18	1.226	Positive
22	Mathematics is a basic subject.	4.40	0.763	Positive
23	I enjoy studying mathematics.	4.04	0.830	Positive
24	I prefer studying science to mathematics.	3.72	1.116	Positive

It is clear from the table that the arithmetic means of the students' responses to the response items ranged between (2.64-4.40) and that the standard deviations of the responses to the items ranged between (0.599-1.353). It is clear that there are (20) items for which the response averages ranged between (3.18 -4.40) all of them reflected a positive attitude towards the content of the questionnaire paragraphs, while there were (4) paragraphs for which the average response ranged between (2.64-3.00), and all of them reflected a neutral attitude of the students towards the paragraphs,

while there were no negative attitudes among the students toward the paragraphs.

*** Recommendations**

1- Using cooperative learning strategies and educational methods in teaching mathematics because they have a significant impact on developing students' thinking skills and trying to find more enjoyable ways to attract students' attention to mathematics.

2- Conducting more procedural research on employing cooperative learning strategies and educational methods in teaching various subjects in school.

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