

# The Effect Of The Cooperative Learning Method On Students 'Academic Achievement In Mathematics

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Article Info	Abstract
<p><b>Article History</b></p> <p>Received: December 28, 2020</p> <p>Accepted: March 30, 2021</p> <p><b>Keywords :</b> Cooperative Learning, Academic Achievement, Numeracy, Elementary School, Mathematics.</p> <p><b>DOI:</b> 10.5281/zenodo.4647901</p>	<p><i>The study aimed to uncover the effect of using the cooperative learning method on students 'academic achievement in mathematics for elementary school students in northern Israel. The study sample consisted of (130) male and female teachers in elementary school mathematics and (40) students of sixth grades in Arab schools in northern Israel, divided into two groups: an experimental group and a control group. The experimental group studied using the cooperative learning method, and the control group studied using the traditional learning method. The following research tools were used: (1) A questionnaire to examine the impact of cooperative learning on students 'academic achievement from the teachers' perspective (2) Post-test with the experimental and control group to examine students 'achievement in the mathematics subject. The study results showed that the results of students 'academic achievement in mathematics using the cooperative learning method are better than the results of students' academic achievement in mathematics using the traditional learning method.</i></p>

## Introduction

Cooperative learning has received wide attention among researchers as an educational learning strategy because of its many positive effects on both the teacher and the learner. It works to improve the teacher's professional performance. It turns the learner into an effective element in the educational process. It allows him to practice dialogue and debate, increase academic achievement and psychological harmony, and develop problem-solving skills (Ali and Ali, 2011).

Cooperative learning is one of the educational methods that have been referred to for a long time. Sharan (1980, indicating that the roots of cooperative learning go back to Dwnetsh) advocated its use as an educational method instead of traditional. The concept of cooperative learning refers to the classroom techniques in which students work in small groups consisting of two or more members. Each group performs specific tasks to achieve a specific goal. Group members receive appropriate reinforcement based on the performance of their groups (Al-Tarawneh, 2012).

Al-Heela (1999) indicates that cooperative learning is considered one of the teaching methods advocated by the contemporary educational movement after research and studies have proven their effectiveness and positive role in raising learners' academic achievement and developing teamwork skills have the greatest impact on their daily lives.

Cooperative learning is considered one of the modern educational methods that call for linking the school reality because it is based on the formation of a coherent, heterogeneous group that can be organized into small workgroups as it fulfills the students' psychological needs on the one hand and communicates the content of the material to them on the other hand (Abu Amira, 2000). Besides, learners can practice two types of activities: innovative activities that stimulate students' motivation for interaction and cognitive activities. Their mission is to acquire knowledge for students and teach them facts and laws. This method also increases the effectiveness of education, especially for students.

In light of the above, it can be said that cooperative learning is one of the strategies adopted by many studies, which are unanimously agreed that it increases students' achievement and retention of school information, mastery of it and its application in other educational situations, and it increases the desire to learn. Hence, this study shed light on the role of cooperative learning in enhancing students' academic achievement from primary school teachers' points of view in Northern schools.

## Collaborative learning

Educators have paid increasing attention in recent years to activities and events that make students the center of the learning and teaching process. Among the most prominent of these activities is the use of the cooperative

learning method, which means arranging students into groups and assigning them to work or an activity that they carry out together with cooperative societies so that learning takes place in a comfortable environment in which the students motivation increases significantly (Mari and Al-Haila, 2002).

Collaborative learning is defined as how students are divided into different groups in achievement, which includes students of high, medium, and low achievement (Al-Saadi, 2008). It is also referred to as a teaching strategy that includes a small group of students working together to develop each member's educational experience to the maximum extent possible as students work in heterogeneous groups to achieve a common educational goal (Al-Omar, 2000).

A group of researchers (Al-Wadaei, 2000; Khader, 2006; Al-Baghdadi, 2005) indicates that cooperative learning is a unique model among teaching models because it uses a different task or a different action, as well as uses a different reward structure to improve students' learning and what it requires from work to achieve goals. Common to cognitive, affective, and skillful aspects. The researcher Yaqoub (1995) confirms that the individual in the group bears the responsibilities of his work and the group's work, and therefore the work of the group does not succeed. Its goals are achieved only if its members acquire the skills of cooperative and participatory work.

Cooperative learning is one of the ways that seeks to organize the group's work, intending to enhance learning and developing academic achievement, through an accurate structural organization of how the learner interacts with other learners and their participation together to achieve the goals (Toaima and Al-Shuaibi, 2006; Zaitoun, 2003).

### **Objectives of cooperative learning**

A group of researchers (Al-Deeb, 1998; Abdel Hamid, 1999; Suleiman, 2005; Al-Qala and others, 2006) agree that the cooperative learning model is used to achieve at least four important educational goals:

1- Improving academic achievement: aims to improve student performance in important achievement tasks. Its developers have demonstrated that the cooperative reward structure model increases the value of students' academic learning and changes the criteria associated with achievement and that the group's focus on cooperative learning can change the standards of students' culture or make it Most receptive to excellence at the end of academic learning.

2- Acceptance of diversity and differences or differences between students: It is the broadest and widest acceptance of people who differ in culture, social level, level of abilities and achievement, and cooperative learning provide opportunities for students with different backgrounds and different circumstances to work depending on each other in common tasks, and through the use of reward structures The cooperative learning to appreciate each other.

3- Development of social skills: Cooperative learning includes various social goals and skills, which is for students to learn the skills of cooperation, collegiality, discussion, dialogue, participation, self-confidence, respect for others, and appreciation of cooperative work.

4- The necessity of life: Cooperation is a basic feature in societies, and therefore it is necessary to train on it in school, just as it is trained on it in daily life, and thus cooperative work is necessary for modern life skills.

### **Conditions for cooperative learning:**

A group of researchers (Johnson and Johnson, 1998; Mari and Al-Haila, 2000; Ibrahim, 2004) explains that cooperative learning is not just putting students in small groups and telling them what they will do, but several conditions must be met in the educational situation, namely:

1- Positive interdependence: It is meant by the student's realization that his success is linked to his colleagues' success and clearly that he will not succeed unless they succeed.

2- Individual accountability: Each member is responsible for learning the task assigned to it and also for his colleagues' learning for this task.

3- Direct face-to-face interaction: the group members are in a position that allows them to easily and easily engage in dialogue and discussion.

4- Teamwork skills: Implementing the cooperative lesson requires training students in working skills positively and effectively.

5- Group programming: that is, the group's discussion of its work method after completing the lesson (the task) to determine the factors that helped the group or prevented the work from achieving its goals.

### **Collaborative learning strategies**

The strategies by which cooperative learning is implemented vary, but all of them emphasize student cooperation. Among these strategies are:

1- Group cooperation method: This method is based on placing students in the classroom; each group has five randomly selected and heterogeneous members in the achievement. Groups are formed once throughout the learning period, and the teacher submits to each group the papers assigned to it to present a collective report on their work. The teacher's role in this method is to observe the pupils within each group, to form the members of the group and to choose the academic topic that they will learn and provide them with scientific content, and to distribute the roles among the pupils so that the work of each member is integrated to reach the common goals. The teacher has to compare each group's performance with its previous performance to find out the extent of cognitive progress. The skill is for each group, and this method's application takes four to five classes (Eurbo, 2012).

2- The method of dividing students into teams based on achievement: This method is based on dividing the class's pupils into small groups of tetra and between (4-5) students who are not homogeneous in achievement, and competitions are conducted in the educational subject so that the competition is between every three pupils who divide once. Second, based on their previous achievement, meaning that the student learns in his team and then competes with others in another team equal to him in positive ability, and the score he achieved in this competition is added to his main team. The teacher's role in this method is in organizing students, presenting papers to them, putting tests for them, and arranging the highest-ranking pupils in each team according to the following criteria: six points for the high, four points for the middle, two points for the low, then these points are added to the main team to which he belongs (Solomon, 2005).

3- Jigsaw method of integrating fragmented information: This method is also called the jigsaw method, and it was first used by (Arntson jigsaw) and his followers in 1978 at the University of Texas, then it was adopted by Slaven (Hamdan, 2011). This method is distinguished by the fact that it combines in its implementation steps the characteristics of some of the previous models and follows in its implementation the following steps:

- The teacher or pupils determine the subject of study.
- The teacher divides the topic into a group of paragraphs or sub-topics and is distributed among 5 to 6 students.
- Students determine the responsibilities and roles among themselves, or the teacher helps them in this.
- The students who are required to study a specific part of one group, known as the expert group, meet, and they study the sub-topics and come up with common solutions.
- Each student in the group of experts returns to his group what he has learned or achieved.
- Each pupil teaches what he has learned to his classmates and at the same time learns from them what they have learned in the group of experts.
- The teacher gives a test to each group according to the subject assigned to it.

4- Group research strategy: students work according to this strategy in small groups, the group consists of two to six individuals, and sub-topics are selected from a unit studied by the whole class, and the sub-topics are divided into individual actions that the pupils work on implementing using the cooperative inquiry method and group discussions. And planning, cooperative projects, and carrying out the necessary activities necessary to collect information from various sources inside and outside the school to prepare reports for the group (Al-Tanawi, 2002). At the end of the work within this strategy, the teacher provides a group test in which each student contributes by answering him. The group as a whole is rewarded according to the participation of its members, their work, and the quality of its production.

5- A strategy for cooperation and integration in reading and expression: Under this strategy, students are divided into groups, and while the teacher works with one of these groups, students of the second group work with their peers in a series of cognitive activities such as reading, summarizing stories and writing reports on the topic that he studied (Ibrahim, 1999).

### **Factors helping to make cooperative learning successful**

A group of researchers (Zaitoun, 2003; Faraj, 2005; El-Deeb, 2004) pointed out a set of factors that help the success of cooperative learning, the most important of which are:

1- Classroom discipline: The climate that is dominated by discipline helps the success of cooperative learning.

2- Availability of sufficient time to complete the cooperative learning lessons: The cooperative learning lessons need more time than the lessons applied in the traditional methods. Therefore, study schedules should be well planned to consider this, as if one lesson is taught in more than one consecutive lesson.

3- The size of the classroom and its organization: The size of the classroom must be appropriate, so if the room is small and crowded with students and it is difficult for them to move their seats, it may restrict the teacher's movement and his movement between groups to notice what they are doing, so the teacher should look for a spacious room in the school to apply the lessons of cooperative learning if possible.

4- The number of students in the class: If the number of students is large, then dividing them into groups leads to the presence of many groups that may affect the process of controlling the teacher to the class,

following up their work, and providing advice to those who need, so if there is a large number of students, more than one teacher can teach Per class through the classroom teaching method.

5 - The students' sense of self-reliance and commitment to work: The students' feeling that they can carry out tasks or work relying on themselves, and they had a commitment to cooperative work, and their motivation to work was high so that cooperative learning will be successful, and the teacher should constantly motivate them to depend on themselves and strengthen them positively.

### **The importance and benefits of cooperative learning**

Both (Johnson and Johnson, 1998) emphasize that using cooperative learning, if properly used according to its scientific methods, has great returns on the educational process as a whole. The following is a presentation of the most important benefits of cooperative learning as cited by Johnson and Johnson, as follows:

1- The competencies of critical thinking: teaching facts and theories is a secondary goal concerning the goal of teaching critical thinking and the use of higher levels of reasoning strategies in many fields of study related to science and technology.

2- Tendency towards classmates: regardless of the differences in the level of ability, gender, race differences, and different social classes, and that the cooperative education experiences work to raise positive tendencies of the learner towards the rest of the colleagues within the cooperative education group.

3- Attitudes towards academic subjects: Collaborative experiences develop positive learner attitudes towards academic subjects and the learning experience itself compared to competitive and individual experiences.

4- Collaborative skills: Teaching represents something and a future direction because the learning that takes place within the school aims to prepare the individual for a profession and assume the responsibilities of this profession.

5- Mental health: The results of some studies have indicated that cooperative learning is positively linked to several mental health factors, such as emotional maturity, positive social relationships, strong individual self-esteem, and individual confidence in others.

6- Expected social control: The concept of expected social control refers to the ability to understand and define the features of another individual's point of view towards what you are doing or understanding how a certain situation you are doing concerning another individual, and understanding how that person interacts with that situation in terms of Emotional and cognitive.

7- Reality of views on others: When we describe an individual, we usually focus on some features, and our point of view about it is fixed and does not change from one situation to another, but we must try to reach a point of view in this individual that differs according to the situation in which we evaluate this individual.

8- Self-esteem: Johnson and Johnson argue that cooperative learning experiences raise higher self-esteem levels than competitive and individual learning experiences.

9- Relationships with the teacher: The impact of cooperative learning experiences is not limited to developing the relationship between the student and the rest of the classmates within the learning group or class and developing their relationship with the teacher.

In addition to these benefits, cooperative learning also results in benefits in the academic field. These benefits are represented in the pupil reaching higher levels of achievement, higher rates, increased ability to remember, increased educational task time, understanding basic general concepts, and mastering them to develop the ability to apply what they learn. Pupils in new situations lead to improvement of language skills and the ability to express, leading to an increase in the ability to accept different points of view. Through a research carried out by Johnson and Johnson, it has become clear that cooperative learning benefits are not limited to educational attainment. Still, rather there are many benefits that the student derives from cooperative learning, whether in the field of relationships or the mental or emotional field, and its extension later in the individual's social and professional life.

### **Academic achievement**

Academic achievement is defined as the outcome of the information and competencies that the student obtains during a certain stage of the academic stages (Abdel-Hamid, 2010). Academic achievement is also defined as mastering a set of skills and knowledge that a student can possess after being exposed to educational experiences in a particular study subject or group of subjects (Al-Salakhi, 2013). The concept of academic achievement represents the measurement of the student's ability to comprehend the prescribed academic subjects and the extent of his ability to apply them through measurement methods conducted by the school (Al-Hassan, 2008). Specialists in the field of education and psychology are interested in academic achievement because of its great importance in the student's academic life, as it is the result of what happens in the educational institution of various and multiple learning processes for different skills, knowledge, and sciences that indicate his mental and

cognitive activity (Al-Jalali, 2011). Al-Shalhi (2013) considers that academic achievement is one of the academic problems students suffer from either because of the difficulty of the subjects or the inappropriate method of teaching the subject, or the students' lack of understanding and proper understanding of the academic subjects, which makes him lose confidence in himself and his abilities and thus his compatibility with his colleagues and the school environment is affected.

From the definitions mentioned above, it can be said that some researchers view achievement as the knowledge that an individual acquires within the school or in the school field only, as stated in the definition of Abdul Hamid, which emphasizes that achievement is often used to refer to academic or educational attainment, and it is also a product. The knowledge that the student acquires through a school program. From all those mentioned above, it can be said that academic achievement represents the amount of knowledge an individual acquires in the academic field. The total grades measure that academic achievement is the amount of knowledge that the individual obtains in the academic field and is measured by the student's total grades at the end of the school year.

### **Factors and variables affecting academic achievement**

Interest has increased in studies and research that dealt with research on the impact of social, cultural, and other factors on academic achievement, so educational researchers, psychological and sociologists began to research the social, economic and cultural background of students to address the problems that result from them and try to overcome them, and to adapt to the circumstances that arise in the process. Education to raise the level of student achievement in academic subjects (Kamal, 2005).

Many variables affect students' academic performance, as schools are completely dependent on students, who are the most important group in any educational institution. Both Ali and Al-Shehab (2008) indicated that students' academic performance had received much researchers' attention in previous studies. It is a challenge in many aspects and is affected by psychological, social, economic, environmental, and personal factors. But these factors that affect academic achievement differ from one person to another and from one environment to another. The researchers paid attention to many factors and variables that contribute effectively to the quality of learners' performance and affect the quality of students' academic achievement. Among these factors: factors related to the student (mental factors; emotional factors; social factors; economic factors), family factors, school factors, and peer factors (Al-Khashab, 2008).

The following research question can be derived from what was mentioned previously: What is the effect of the cooperative learning method on the student's academic achievement at the primary level?

#### **research assumes:**

1. Cooperative learning positively affects the student's academic achievement at the primary level.
2. Cooperative learning positively affects the student's academic achievement according to the years of experience variable.

#### **Research Methodology:**

In this research, the two researchers used the mixed method:

(1) The quantitative curriculum, as the study sample consisted of (130) teachers in primary schools in northern Israel during the year 2018-2019, of whom (78) were female and (52) teachers, where a questionnaire consisting of (25) items was used, all of them participating In examining the impact of cooperative learning on academic achievement among primary school students from the teachers' point of view as a research tool. The questionnaire was built based on previous studies and presented to educational experts. The questionnaire was passed on to a random sample twice, with a difference of two weeks. Cronbach's Alpha was calculated, and the result was obtained:  $\alpha = 90.9\%$ .

(2) The researchers used the experimental method, where the researchers designed equal groups with pre and post-test. The first group is experimental and learns according to the cooperative learning method, and the control group learns according to the traditional method used in the school. The two researchers subjected the study's independent variable, which is "cooperative learning," to apply its effect on the dependent variable, which is "mathematical achievement," on elementary school students. The study sample was selected from different Arab primary schools from northern Israel during the first semester of the 2019-2018 educational year. The researchers distributed the study sample to two groups, the first is an experimental group, and the other is a control group, as the sample members reached 40 students. The following table (1) illustrates that:



Table (1): Distribution of the study sample

The School	Experimental / control	Student's number
The sixth grades of Arab elementary schools from northern Israel	Experimental	20
	control	20
Ttotal		40

Equivalence of the two study groups:

The researcher made sure of the equivalence of the two groups, the experimental and the control, according to the following variables:

1) Mathematical achievement: through students' achievement in previous examinations according to the following Table (2):

Table (2): Equivalence of mathematical achievement for the experimental and control groups

The Group	Number	Average	variance	T(39)
control	20	71.88	14.93	
Experimental	20	77.21	18.9	2.52

This indicates that the two groups are equal in terms of achievement.

2) The parents' cultural, economic, and social level: the school counselor was used to select the students, as the experimental and control sample was chosen from the same schools and a converging socio-economic and cultural environment.

An action plan and a teacher's guide have been built so that the instructor and assistant are to implement the lessons without problems and mistakes. The guide provides directions and instructions that help the teacher facilitate the educational process and achieve its progress in the right direction.

#### Stability and reliability of the study tool

The sample consisted of (130) male and female teachers in primary schools from the northern Israel region during the year 2018-2019, of whom 52 were male and 78 female teachers, and the following table (3) shows the demographic characteristics of the sample:

Table (3): the demographic distribution of teachers

	Variable	Number	Percentage
<b>The Gender</b>	Male	52	40
	Female	78	60
	<b>Total</b>	<b>130</b>	<b>100.0</b>
<b>Qualification</b>	Teaching certificate	43	33.0
	First degree + teaching certificate	69	53.3
	Postgraduate	18	13.7
	<b>Total</b>	<b>130</b>	<b>100.0</b>
<b>Specialization/ majors</b>	literary	78	60
	scientific	62	20
	Other than that	26	20
	<b>Total</b>	<b>130</b>	<b>100.0</b>
<b>Years of Experience</b>	Less than 5 years	22	16.6
	From 5 to 15 years old	65	50
	Over 15 years old	43	33.3
	<b>Total</b>	<b>130</b>	<b>100.0</b>

#### Study tool:

(1) To examine the effect of the cooperative learning method on academic achievement among elementary school students from the teachers' point of view, the research tool was built in the form of a questionnaire using educational supervisors and previous studies. The cooperative learning method in elementary school students' academic achievement from the teachers' point of view and the necessary modifications of addition and deletion were approved in its final form based on the research requirements.

**The Validity of the study tool:**

Table (4): The results of the Pearson Correlation coefficient between the research paragraphs with their total score

Paragrap h number	Paragraph	Correlation coefficient (r)	Statistical significance
1	Cooperative learning contributes to creating a suitable atmosphere and a lively account share.	0.443**	0.000
2	Cooperative learning provides students with a sense of confidence that they can solve math problems.	0.434**	0.000
3	Cooperative learning prompts students to talk without being restricted by a specific topic.	0.461**	0.000
4	Cooperative learning helps pupils' excitement about the topics surrounding the classroom.	0.592**	0.000
5	Collaborative learning contributes to sparking a solution and an answer without shame.	0.437**	0.000
6	Cooperative learning contributes to the discussion with pupils in planning the solution of arithmetic problems.	0.506**	0.000
7	Cooperative learning provides students with many experiences, situations, and experiences that they can talk about	0.545**	0.000
8	Cooperative learning helps encourage students to find additional solutions to the same arithmetic problem.	0.532**	0.000
9	Cooperative learning enables students to express their sporting identity.	0.545**	0.000
10	Cooperative learning enables students to be trained in solving mathematical problems.	0.547**	0.000
11	Cooperative learning directs students to use arithmetic in life situations.	0.674**	0.000
12	Cooperative learning engages students in algorithmic discussions	0.620**	0.000
13	Collaborative learning enables students to talk about their likes and dislikes about the account	0.563**	0.000
14	Cooperative learning encourages students to learn arithmetic through competitive games	0.629**	0.000
15	Cooperative learning enables students to think creatively in mathematics	0.544**	0.000
16	Cooperative learning enables students to elevate mathematical communication skills	0.630**	0.000
17	Cooperative learning removes mathematical difficulties	0.564**	0.000
18	Collaborative learning gets students interested in numeracy	0.488**	0.000
19	Students are taught arithmetic in a free-thinking atmosphere through cooperative learning	0.609**	0.000
20	Cooperative learning contributes to giving each student the right to express his / her ideas and how to solve them.	0.628**	0.000
21	Cooperative education contributes to enhancing effective participation among students in solving mathematical problems.	0.495**	0.000
22	Cooperative learning contributes to enhancing students' tendencies towards mathematics.	0.660**	0.000
23	Cooperative learning makes students diversify in presenting ideas	0.696**	0.000
24	Cooperative learning makes the student's ideas consistent with each other	0.629**	0.000
25	Cooperative learning contributes to the student in improving the transfer of information from one idea to another	0.560**	0.000

It is clear from the above table that all the research paragraphs have high degrees of correlation with the total degree of them, which indicates that the research paragraphs have a high degree of honesty and that they are valid for what they were designed to measure.

#### Stability of the study tool:

The study tool's reliability was calculated by the method of internal consistency (Cronbach's Alpha), where the value of (alpha) was calculated for the paragraphs in each axis of the study, as shown in the following table.

Table (5): The internal consistency coefficient (Cronbach's Alpha) between the paragraphs of the questionnaire

The field	Stability coefficient value (Cronbach's alpha)	Number of paragraphs
The impact of cooperative learning on students' academic achievement from the teachers' point of view	0.909	25

It is clear to us from the previous table that the alpha value calculated between the study paragraphs amounted to (90.9%). This indicates a large degree of internal consistency between the paragraphs of the research, and accordingly, the study tool has a high degree of stability.

(2) Post-test: The first group is experimental and learns according to cooperative learning, and the control group learns according to the traditional method used in the school. The two researchers subjected the study's independent variable, which is "cooperative learning," to apply its effect on the dependent variable, "mathematical achievement," on elementary school students. The questions were selected from the MITZAV Mathematics Aptitude and Development Exam, according to the observations and perceptions of experts in the field, which is reliable and honest.

#### Research results

Results related to the research question: What is the effect of cooperative learning on student achievement at the primary level?

1) Survey results: To answer the previous question, the arithmetic averages and standard deviations were extracted for the research paragraphs on the role of cooperative learning in student achievement, as shown in the following table (6):

Table (6): The arithmetic means and standard deviations of the study items on the impact of cooperative learning on the student's academic achievement

The scale	Arithmetic Average	standard deviation	Degree/ Grade
The impact of cooperative learning on students' academic achievement from the teachers' point of view	3.91	0.414	High

It is evident from the above table that the total score of the respondent's responses to the study items on the impact of cooperative learning on students' academic achievement from the teachers' viewpoint was high. The arithmetic means of the sample members' responses was (3.91), with a standard deviation (0.414). This indicates a great emphasis on the sample for what was mentioned in the study paragraphs about the role of cooperative learning in influencing the student's academic achievement positively.

Results related to the hypothesis: Cooperative learning positively affects the student's academic achievement at the primary level according to the teachers' years of experience, as shown in Table (6):

Table (6): Arithmetic averages, numbers, and standard deviations, of the response scores of the sample members about the role of cooperative learning on academic achievement according to the years of experience variable

Years of experience	Arithmetic mean	Number	Standard deviation
Less than 5 years	4.005	22	0.320
From 5 to 15 years' old	4.006	65	0.356
Over 15 years' old	3.716	43	0.447
<b>Total</b>	<b>3.905</b>	<b>130</b>	<b>0.414</b>



To verify the validity of the fourth hypothesis, a single analysis of variance (ANOVA) was used to test the differences in the scores of the respondents' response to the role of cooperative learning on academic achievement according to the change in years of experience, as shown in the following table (7):

Table (7): The results of the mono-analysis of variance test for differences in the degrees of the response of the sample members about the impact of cooperative learning on academic achievement according to the teachers' viewpoint according to the years of experience variable

The source of the contrast	Sum of squares	Degrees of freedom	Average of squares	The computed F value	Statistical significance
Between groups	2.357	2	1.178	7.606	0.001
Within groups	18.745	121	0.155		
Total	21.102	123			

It is clear to us from the previous tables that the value of the statistical significance, which amounted to (0.001), is less than the level of relevance ( $= 0.05$ ). This means rejecting the hypothesis: there are statistically significant differences at the level of significance ( $\alpha \leq 0.05$ ) in the effect of cooperative learning on students' academic achievement from the teachers' point of view according to the years of experience variable. It means that the difference in the years of experience of the sample members led to a difference in their views on the impact of cooperative learning on primary school students' academic achievement.

## 2) Post-achievement results:

The results of the research indicated that there are differences between the average scores of achievement in mathematics between students of the experimental group who study using cooperative learning and the control group who look using the traditional method, as shown in the following table (8):

Table (8): the difference between the control and experimental group in terms of achievement

The group	Number	MEAN	St	T(39)
Experimental	20	81.21	12.1	0.38
Control	20	65.5	13.11	

Measurement of the effect size of independent groups by calculating the Eta square ( $\eta^2$ )

Cohen's method:

$$(81.21 - 65.5) / 3.97 = 3.957$$

ETA SQUARE:

$$\eta^2 = 6.35 / (40 + 6.35) = 0.137$$

The results indicate the significant impact of using the cooperative learning method on students' achievement in mathematics.

## Discussion and conclusions

The study aimed to examine the effect of the cooperative learning method on primary school students' academic achievement in northern Israel.

### (1) From the teachers' point of view

It became clear through the analysis process that the respondent's overall score on the study questions on the impact of cooperative learning on academic achievement among elementary school students in northern Israel was high. The arithmetic means of the sampled individuals' reactions was (3.91), with a standard deviation (0.414). And through this result, it appeared that cooperative learning has a significant role in providing the student with the opportunity to develop his athletic abilities, which allows him to understand the subject matter, which leads to the student's ability to it and raise his academic achievement. This finding is consistent with previous studies, which indicated that cooperative learning has a significant impact on student's academic achievement.

### (2) Post-test results

The results of the research, through the application of the post-test, concluded that: there is an effect of cooperative learning in improving academic achievement between the average results of the experimental group students and the intermediate results of the control group in favour of the experimental group, agree with the results of the studies of Alissa (2013), Naylor (2013), Oren (2014) Leikin (1997) in using the cooperative learning method that works to develop students' abilities and thus academic achievement in the field of mathematics.

It can be explained:

1) The diversity of activities and events led to an increase in creativity among students.

- 2) Solving mathematical problems, including the interaction between students and cooperative work, and multiple and gradual steps worked in each stage to expand students' awareness, and integration of students in the grades helped develop their creative thinking, mathematical skills and problem-solving.
- 3) Cooperative learning contributed to increasing students' understanding of the mathematical subject presented, which developed their fluency of solutions, the flexibility of approaches, originality of the resolution, and enhanced their creative thinking and abilities to deal with sports exercises and thus raise their academic achievement.

### Recommendations

1. The necessity of using borderline learning strategies, such as a cooperative learning strategy, effectively teaches multiple educational materials and various academic levels.
2. Training teachers to use modern teaching strategies during the learning process, such as a cooperative learning strategy.
3. Conducting more research on the effectiveness of cooperative learning in developing students' skills and mental abilities.
4. Conduct more research on the effectiveness of cooperative learning in all educational materials and all academic levels.

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