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Research Article

The Effect of Cooperative Learning in Education: A Meta-Analysis Study

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Abstract

The present study examines through meta-analysis method academic theses of experimental model and with pre/post-test control groups related to cooperative learning conducted in the period 2018-2020 and accepted by universities in Turkey. The meta-analysis covers 5 doctoral dissertations and 26 post-graduate theses that are commensurate with the problematic of the study and have sufficient statistical data. Operational effectiveness meta-analysis was used in the study. The analysis covered the effects of cooperative learning method on students' scores in cognitive (achievement), affective (attitude) and psychomotor skills. Meta-analysis conducted shows that the effect size of cooperative learning related to students' cognitive domain scores is 1.213, 0.504 in affective domain, and 0.714 in psychomotor domain. These values obtained from meta-analysis suggest that the effect size is large when cognitive domain is concerned and medium in the case of affective domain. According to findings, the significance level of the effect of cooperative learning in class teaching is large when cognitive domain scores are concerned and medium in the case of affective domain. The effect is not significant in the case of psychomotor domain.

Key Words

Affective domain • Cognitive domain • Cooperative learning • Effect value • Psychomotor domain

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All types of learning are based on the interaction of individuals (Jenkins 1981, cited by Özer, 2005). According to Vygotsky (1978) an individual's learning requires a social environment. Individual's presence in social interaction with both experienced peers and adults in learning process is an important factor in learning (Baş & Beyhan, 2016). Student-student interaction in education is too important to be omitted or just left to chances (Yılmaz, 2001). There are three different ways for students to interact with each other at school: (1) they can compete with any who tries to do better than other students in the class, (2) students can work individually in line with certain criteria, (3) students can cooperate by undertaking the responsibility of both their own and others' learning. While traditional teaching strongly encourages students to go individually by competing with each other, studies on how students learn best suggest that this is not the case (Johnson & Johnson, 1986). Hence cooperative learning is a way of learning that deserves attention in efforts to ensure effectiveness and achievement in learning (Özer, 2005).

Cooperative Learning

Developed by John Dewey, Vygotsky and Slavin, cooperative learning (Sönmez, 2019) is one of the most common and yielding areas of theory, research and practice in education (Johnson, Johnson, & Stanne, 2000). Slavin (1980) describes cooperative learning as classroom techniques where students work on learning activities in small groups and gain reward or recognition according to the performance of groups. According to Johnson and Johnson (2009) cooperative learning is using of small groups for teaching purposes where groups work together to maximise the learning of themselves and each other. For Jacobs, Lee, and Ng (1997, p.1) cooperative learning is *"organised and managed groupwork in which students work cooperatively in small groups to achieve academic as well as affective and social goals."*

Not all groups coming together can be called as cooperative. For a group in learning to be cooperative, educationists must know the different modes of use of cooperative learning and fundamental elements to be carefully structured in each cooperative activity (Johnson & Johnson, 2009). For example while conventional learning groups have homogeneous structure, cooperative groups are mixed with respect to talent, gender, race, personal and social characteristics. While there is a leader directing the group in conventional learning leadership is shared within the group in cooperative learning (Özer, 2005). In the conventional learning group, although students have not rejected working together as in the fake learning group they still believe that their assessment will be made on individual basis (Boyraz, 2019). In other words, while individual responsibility of students is the essence in conventional groups it is group responsibility in cooperative groups. Further, while social skills are not attached much importance in conventional learning groups, there is direct teaching of social skills like sharing, communication, leadership and honesty in cooperative learning groups (Özer, 2005).

In traditional learning groups assignments are designed so as to assess and award students not as group members but individuals. In traditional learning groups industrious and responsible students perform better when they work alone. In cooperative learning groups, on the other hand, students work together with their group mates to achieve common objectives and help each other's learning. In this learning group all students exhibit higher academic performance than in the case they work individually (Johnson & Johnson, 2009).

Since cooperative learning provides students opportunities to work in cooperation instead of competing with their peers, it is clear that they will psychologically feel better. In cooperative groups it will be easier for students to build friendships. As relations develop and get better there will also be improvements in productivity, morale,

sense of responsibility and determinedness to tackle difficult duties (Johnson & Johnson, 2009). Students get better scores in cooperative learning compared to competitive or individual learning (Shimazoe & Aldrich, 2010). In cooperative learning students learn to respect and be tolerant to opinions of others (Senemoğlu, 2015). Also, cooperative learning enables each student to take an active part in learning. Active students do not display disturbing behaviour or tend to move out of their assignment (Johnson & Johnson, 2009).

Despite its proven benefits, teachers using this method in their classes frequently meet the resistance of their students. For example, starter students complain about their lagging-behind group mates while poor performers' complaint is that they are ignored by others in their group (Felder & Brent, 2007). In their study, Macit and Aslaner (2019) say that teachers may have negative approaches to this method for its disadvantages including time constraints, students at too different levels, method's unfitting nature for some topics and problems emerging during group formation.

Widely used cooperative learning techniques include problem sets, laboratories and projects, jigsaw, peer editing and peer-led team learning (Felder & Brent, 2007). Differences in techniques stem from the structure of activities carried out during courses, physical characteristics of the classroom, and the nature of the course and topic (Hedeen, 2003). According to Johnson and Johnson (2009) the performance of any small group varies with respect to how well it is composed no matter which technique is used. Teachers must be careful in planning and class organization in the context of cooperative learning. For the full implementation of this approach assignments and awards must be carefully selected and structured (Yıldız, 1999).

There are five major elements that are required n cooperation based learning groups:

- Positive Interdependence: It means the achievement of individuals in the group depends or each other's achievement (Johnson & Johnson, 2009). The presence of a hard working student in the group contributes to the performance of others (Senemoğlu, 2015). The question *"What must we do?"* is frequently utilized in cooperative learning groups (Yıldız, 1999). Here, students are aware that when their group mates attain their targets so will they (Arslan & Yanpar, 2006).
- Individual Accountability: It involves the assessment of the performance of each student individually. The objective of cooperation-based learning groups is to make each group member a stranger individual (Johnson & Johnson, 2009).
- Face-to-Face Promotive Interaction: As face-to-face interaction among group members grow up, there are also improvements in accountability to peers, peers' ability to influence each other's reasoning and outcomes, social modelling, social support and inter-personal awards (Johnson & Johnson, 2009). Vygotsky (1978) maintains that oral communication between students contributes significantly to student skills in self-expression and internalization of some ideas that are difficult to learn. Further, some cognitive activities and inter-personal dynamics emerge only when students are included so as to support each other. Examples include explaining orally how problems are to be solved, discussing the nature of concepts learned and teaching what has been learned to classmates (Johnson & Johnson, 2009). Small groups from two to four persons must be preferred for an effective interaction (Uslu, 2019).
- Social Skills: The student undertakes the responsibility to teach his/her friends what he/she has learned. The student's social side too will develop since he/she will be communicating with friends (Akgül, 2020).

- Group Processing: The process is evaluated when group members discuss to what extent objectives have been met and maintain their effective working relations. When interpersonal problems emerge within groups, students must evaluate the process together, identify problems and seek ways of solution (Johnson & Johnson, 2009).

Examining some recent studies on cooperative learning that can be found in domestic literature we find that this method has its significant impact on student achievement. Ergün (2019), for example, finds that computer-supported cooperative learning is effective on student achievement. Similarly Avci (2018) finds cooperative learning as significantly effective on students' achievement in sciences course compared to other teaching methods. A meta-analysis work by İleri (2019) concluded that cooperative learning approach has it large effect on boosting academic performance in sciences according to findings obtained from 103 studies. In a study to test the effect of cooperative learning on students' performance in geography course Koçyiğit (2018) found that performance scores of experimental group students are significantly higher than control group students who learned by conventional methods. The study also found that cooperative learning affected students' attitude positively. In another study Çalışkan (2018) found that cooperative learning method significantly improved the achievement of 9th grade students in mathematics. It was also observed that experimental group students showed improvements in both their class participation and problems solving skills.

Objective of the Study

One can find in the relevant literature many advanced studies on cooperative learning method. However, knowing that cooperative learning can significantly improve student performance when it is correctly applied (i.e. relative to competitive and individual learning) does not mean that it can have its effects in all situations and equally (Johnson, Johnson, & Stanne, 2010). Thus, meta-analysis is important in giving an overall picture concerning an identified issue.

The basic objective of the present study is to examine the outcomes of experimental theses on cooperative learning technique prepared in the country by using meta-analysis and to see the comparative effects of cooperative learning and other existing teaching methods on student's cognitive achievement/gain, attitude and retention scores. It was sought, through this meta-analysis, to bring together studies on collective learning made within the last three years and to reach a general conclusion.

Problem Statement

Does collaborative learning method significantly affect students' cognitive, affective and psychomotor domain scores?

Sub-Problems

1- Does the collaborative learning method significantly affect students' cognitive domain scores?

2- Does collaborative learning method significantly affect students' affective domain scores?

3- Does the collaborative learning method significantly affect students' psychomotor domain scores?

Method

The method known as meta-analysis is used in this study. First defined by Glass (1976), the term meta-analysis is defined by Dinçer (2014) as follows: "grouping similar studies on a specific issue, theme or research under some identified criteria and interpreting associated quantitative findings by combining them." In other words, outcomes obtained from different studies are combined to reach an overall conclusion (Dinçer, 2014). Stages in meta-analysis are as follows: Identification of the state of the problem; setting research criteria; deciding on how to select studies; deciding on the effect size to be used; selecting appropriate statistical analyses; identifying variables falling into the domain of the study if any; and finally reporting (Şen & Akbaş, 2016).

Data Collection Process

Theses covered by the study for analysis consist of studies with experimental design and pre/post-test control groups investigating the impact of cooperative learning in education. The surveying of postgraduate theses asserted in Turkey was conducted on the internet site of YÖK National Thesis Centre in Turkish language (https://tez.yok.gov.tr/UlusalTezMerkezi/). The time interval of theses covered for meta-analysis extends from the present and two years back from now. Of theses reached, 31 were included in the study.

Data Analysis

The Treatment Effectiveness method of meta-analysis was used in the statistical analysis of data. This method envisages the division of the difference between experimental and control group averages by total standard deviation. This method is used to compare effect sizes by transforming independent variable data used in more than one study into a common measurement unit (Demiray, 2013). Effect size is a standard measurement value used in determining the force and direction of relationship in a given study (Başol, 2009). In this study "Hedge's g" was used in calculating effect size and results obtained were interpreted according to Cohen's d. Cohen (1992) which considers the interval 0.20 – 0.50 as "small", 0.50 – 0.80 as "medium" and 0.80 and over as "large". The level of significance in this study is 95%.

After calculating effect sizes for all studies their homogeneity is tested. When it is found that intra-group, inter-group and total heterogeneity values obtained when fixed effects model is applied in meta-analysis are higher than critical values, effect sizes were re-calculated by using the random effects model.

Findings

Below are some comments on findings obtained from the analysis of data.

Findings Related to the First Sub-Problem

The first sub-problem of the research is to look for an answer to the question, "Does the collaborative learning method significantly affect the cognitive domain scores of the students?" Homogenous distribution values, average effect sizes and confidence intervals of 51 outcomes in total related to the effect of collaborative learning method on cognitive domain in 28 academic theses covered by meta-analysis are given below in Table 1.

Table 1

Homogeneous and Heterogeneous Distribution Values, Average Effect Sizes and Confidence Intervals of Studies Covered by Meta-Analysis on Cognitive Domain Scores of Students in Cooperative Learning Method with Respect to Effect Models

Model Type	*Average effect size (ES)*	*Degree of freedom (df)*	*Homogeneity value (Q)*	*Chi square table value*	*Standard error (SE)*	I^2	*95% Confidence interval for effect size*	
							Lower limit	*Upper limit*
Fixed Effects Model	1.049	50	436.723	67.5048	0.043	88.551	0.965	1.132
Random Effects Model	1.213	50	407.723	67.5048	0.127		0.965	1.462

According to Table 1, the effect of cooperative learning used in teaching environment on student success can be said to be positive with the effect size value of 1.049 in the fixed effects model. Homogeneity test yields statistical value Q as 436.723. In chi-square table, the critical value is considered as about 67.5048 at significance level of 95% and with degree of freedom of 50. Since 436.723, the statistical value Q calculated in this study is greater than 67.5048 as critical value, it can be said that the distribution of effect sizes has a **heterogeneous** nature. Having 88.551 as calculated I^2 may be accepted as showing that effect size at heterogeneous level is high.

Since the distribution in the study has heterogeneous character, it was sought to avoid illusions deriving from this heterogeneous character of the sample by conducting analyses in line with random effects model (Çelebi &Yıldız, 2002). On this basis, the effectiveness of teaching with or without using cooperative learning approach is assessed according to random effects model. Meta-analysis of 51 data according to random effects model gives the effect size as ES= 1.213 with standard error of 0.127 in 95% confidence interval with upper and lower limits as 1.462 and 0.965, respectively. It can be said that effect size value is in the category "large" according to Cohen's (1992) classification, which suggests that the use of cooperative learning in class practices have its positive effect on academic performance. These suggest that average success scores in groups engaged in cooperative learning are significantly higher than other groups without cooperative learning learning. It can be argued that cooperative learning method significantly affects achievements at this level. Findings related to effect size of studies are given in Table 2 and Figure 1.

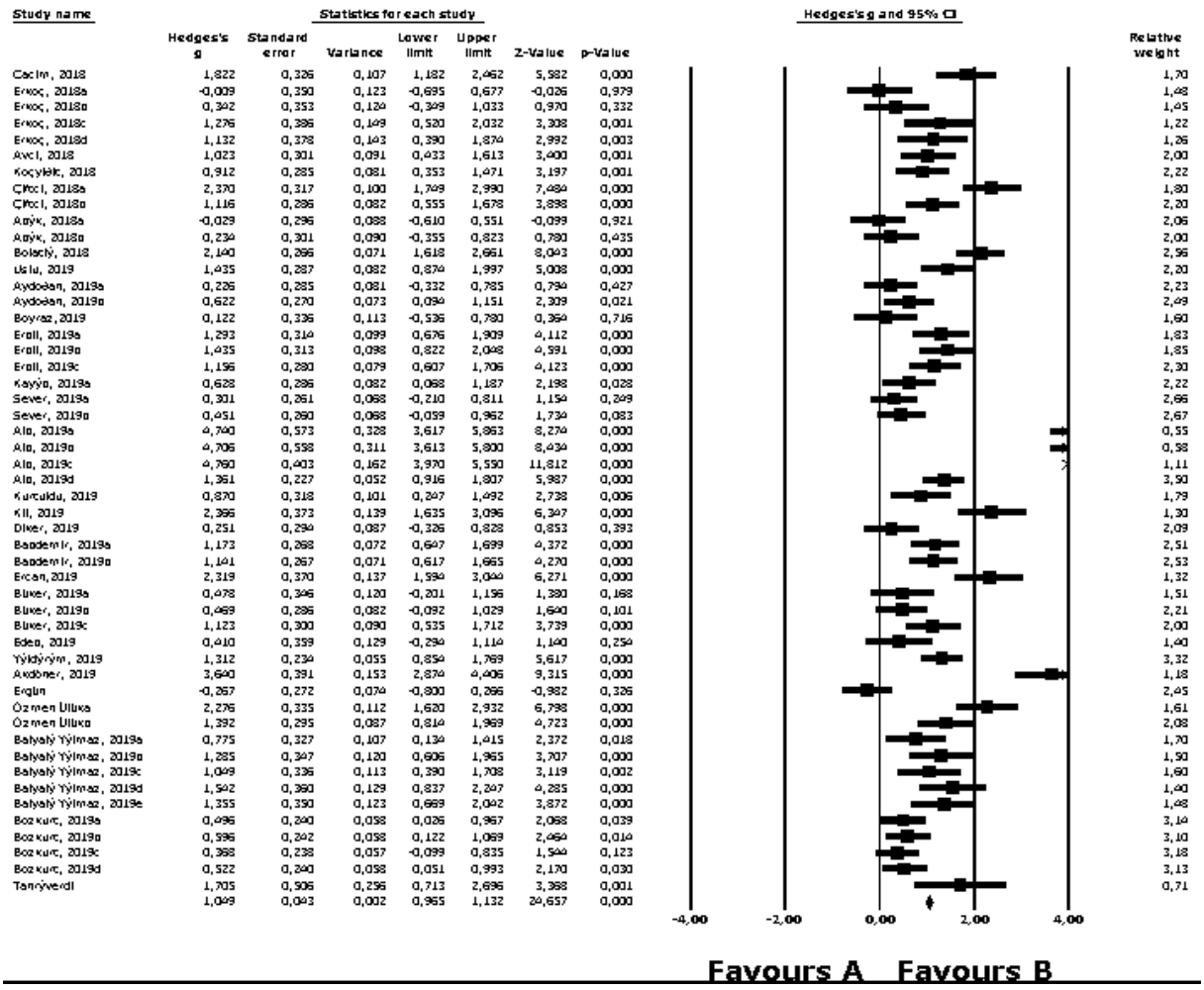
Table 2

Distribution of Effect Sizes in Studies Covered by Meta-Analysis on Cognitive Domain Scores of Students in Cooperative Learning Method According to the Classification Made by Cohen

Effect Size Level	*Frequency*	*Percentage*
Small	15	29.411
Medium	5	9.803
Large	31	60.784
Total	51	100

When table 2 is examined, it is seen that according to Cohen (1992), 31 studies have a large effect size, 5 studies have a medium effect size and 15 studies have a small effect size.

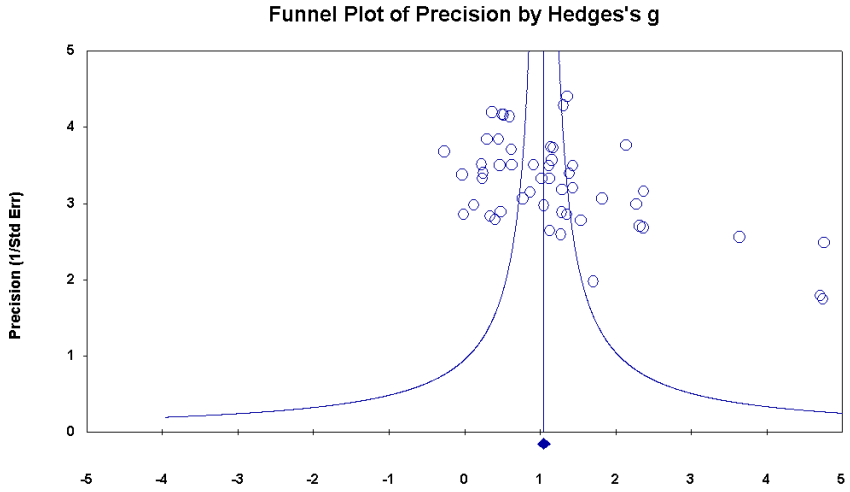
Figure 1. Effect Size Values Related to Cognitive Domain



In Figure 1 lines on both sides of squares show the lower and upper limits of effect sizes in 95% confidence interval while the rhomb shows the overall effect size of studies. Taking a look we see -0.009 as the smallest and 4.760 as the widest effect size.

It can be said that weight percentage given on the right of effect size values represents numerically the effect share of each study on meta-analysis outcome. Homogeneity/heterogeneity of studies covered by analysis and any bias can be shown with a funnel chart. Figure 2 gives the distribution of effect sizes of studies according to Hedges's as funnel chart (Funnel plot of precision).

Figure 2. Distribution of Effect Sizes of Studies According to Hedges's g (Funnel Chart)



The funnel in the graphic is delimited by a ± slope. According to this graphic some studies remain out of the slope curve which makes it possible to say that the group is heterogeneous. It may not yield sound results if assessment is made solely by taking a look at the funnel graphic. More reliable outcome can be obtained if Q or p values are also considered (Dinçer, 2014).

Findings Related to the Second Sub-problem

The second sub-problem of the research is, to look for an answer to the question, "Does the collaborative learning method significantly affect the affective domain scores of the students?" Homogenous distribution values, average effect sizes and confidence intervals of 33 outcomes in total covered by meta-analysis are given in Table 3 below according to statistical models related to students' attitude scores.

Table 3

Homogeneous and Heterogeneous Distribution Values, Average Effect Sizes and Confidence Intervals of Studies on Affective Domain Scores of Students Included in Meta-Analysis according to Effect Models

Model Type	*Average effect size (ES)*	*Degree of freedom (df)*	*Homogeneity value (Q)*	*Chi square table value*	*Standard error (SE)*	I^2	*95% Confidence interval for effect size*	
							Lower limit	*Upper limit*
Fixed Effects Model	0.493	32	99.125	43.7729	0.047	67.717	0.402	0.585
Random Effects Model	0.504	32	99.125	43.7729	0.083		0.341	0.666

According to Table 3, the effect of cooperative learning used in teaching environment on students' affective domain scores can be said to be positive with the effect size value of 0.493 in the fixed effects model.

Homogeneity test yields statistical value Q as 99.125. In chi-square table, the critical value is considered as about 43.7729 at significance level of 95% and with degree of freedom of 32. Since 99.125, the statistical value Q calculated in this study is greater than 43.7729 as critical value, it can be said that the distribution of effect sizes has a **heterogeneous** nature. Having 67.717 as calculated I^2 may be accepted as showing that effect size at heterogeneous level is high.

Since the distribution in the study has heterogeneous character, it was sought to avoid illusions deriving from this heterogeneous character of the sample by conducting analyses in line with **random effects model** (Çelebi Yıldız, 2002). On this basis, the effectiveness of teaching with or without cooperative learning method is compared according to random effects model. According to random effects model, meta-analysis of data from 33 studies gives the effect size as ES= 0.504 with standard error of 0.083 in 95% confidence interval with upper and lower limits as 0.666 and 0.341, respectively. It can be said that effect size value is in medium interval according to Cohen's (1992) classification which means that use of cooperative learning in class teaching has its positive effect at medium level significance on affective domain scores. In other words, cooperative learning affects achievements in terms of affective domain scores at medium level of significance. Findings related to effect size of studies are given in Table 4 and Figure 3.

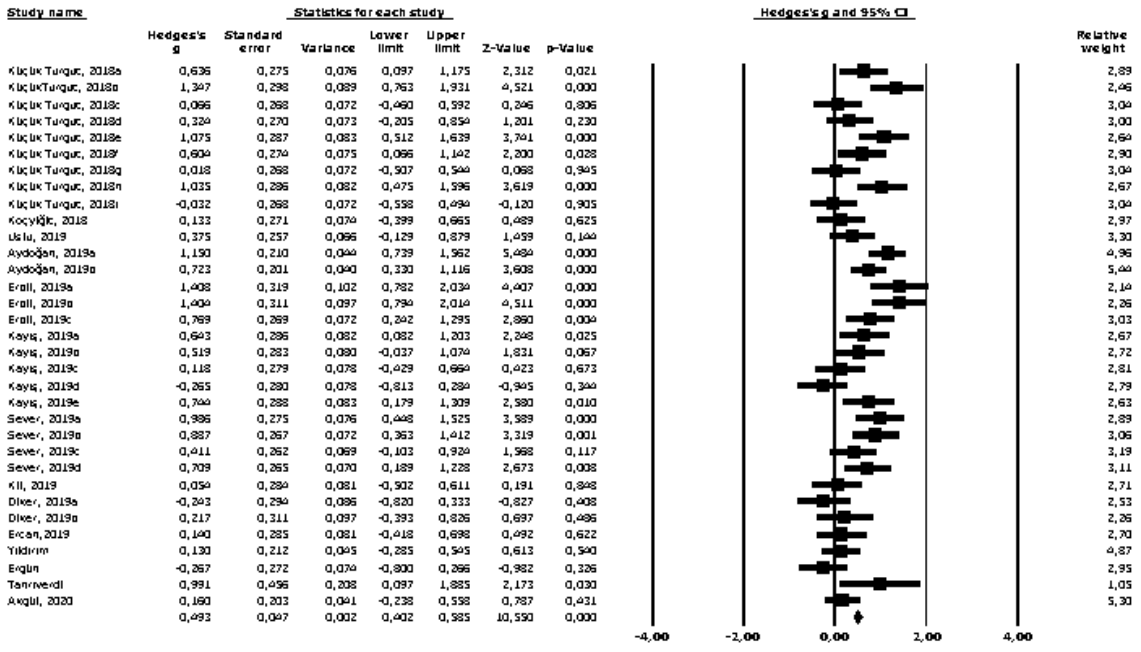
Table 4

Distribution of Effect Sizes in Studies Covered by Meta-Analysis on Affective Domain Scores of Students in Cooperative Learning Method According to the Classification Made by Cohen

Effect size level	*Frequency*	*Percentage*
Small	16	48.484
Medium	8	24.242
Large	9	27.272
Total	33	100

When table 4 is examined, it is seen that according to Cohen (1992), 9 studies have a large effect size, 8 studies have a medium effect size and 16 studies have a small effect size.

Figure 3. Effect Size Values Related to Affective Domain



In Figure 3 lines on both sides of squares show the lower and upper limits of effect sizes in 95% confidence interval while the rhomb shows the overall effect size of studies. Taking a look we see 0.018 as the smallest and 1.408 as the widest effect size.

Figure 4 gives the distribution of effect sizes of studies according to Hedges's as funnel chart (Funnel plot of precision).

Figure 4. Distribution of Effect Sizes of Studies According to Hedges's g (Funnel Chart)

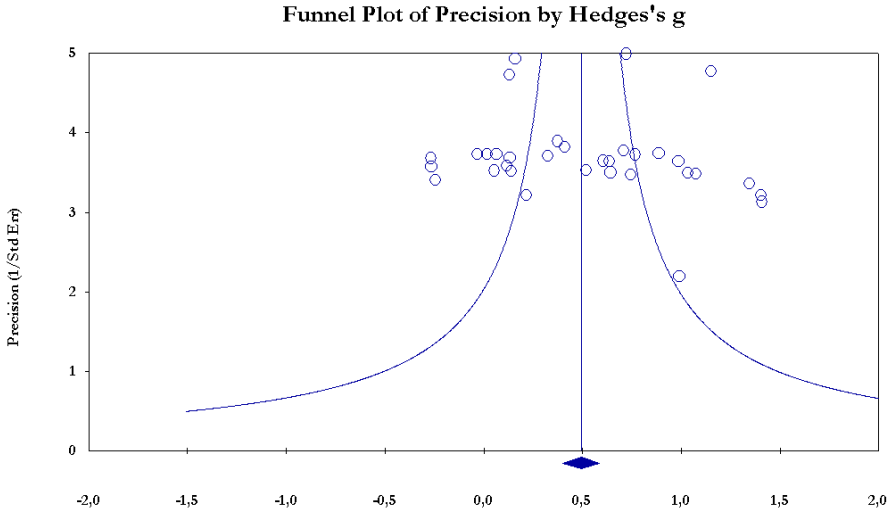


Figure 4 gives the funnel chart showing the distribution of effect size in studies. The funnel in the graphic is delimited by a ± slope. According to this graphic some studies remain out of the slope curve which makes it possible to say that the group is heterogeneous. It may not yield sound results if assessment is made solely by taking a look at the funnel graphic. More reliable outcome can be obtained if Q or p values are also considered (Dinçer, 2014, p. 81).

Findings Related to the Third Sub-Problem

The third sub-problem of the research is to look for an answer to the question, "Does the collaborative learning method significantly affect the psychomotor domain scores of the students?" Homogenous distribution values, average effect sizes and confidence intervals of 4 outcomes in total related to the effect of collaborative learning method on psychomotor domain in 28 academic theses covered by meta-analysis are given below in Table 5.

Table 5

Homogeneous and Heterogeneous Distribution Values, Average Effect Sizes and Confidence Intervals of Studies on Psychomotor Domain Scores of Students Included in Meta-Analysis according to Effect Models

Model Type	*Average effect size (ES)*	*Degree of freedom (df)*	*Homogeneity value (Q)*	*Chi square table value*	*Standard error (SE)*	I^2	*95% Confidence interval for effect size*	
							Lower limit	*Upper limit*
Fixed Effects Model	0.714	3	5.702	7.81473	0.189	47.383	0.345	1.084
Random Effects Model	0.678	3	5.702	7.81473	0.272		0.145	1.212

According to Table 5, the effect of cooperative learning used in teaching environment on students' psychomotor domain scores can be said to be positive with the effect size value of 0.714 in the fixed effects model. Homogeneity test yields statistical value Q as 5.702. In chi-square table, the critical value is considered as about 7.81473 at significance level of 95% and with degree of freedom of 3. Since 5.702, the statistical value Q calculated in this study is greater than 7.81473 as critical value, it can be said that the distribution of effect sizes has a homogenous nature. According to fixed effects model, meta-analysis of data from 4 studies gives the effect size as ES= 0.714 with standard error of 0.714 in 95% confidence interval with upper and lower limits as 1.084 and 0. 345, respectively. With these results it can be said that psychomotor domain scores of groups where cooperative learning is applied is not significantly higher than scores of groups where cooperative learning is not applied. Cooperative learning has no significant effect on students' psychomotor domain scores. Findings related to effect size of studies are given in Table 6 and Figure 5.

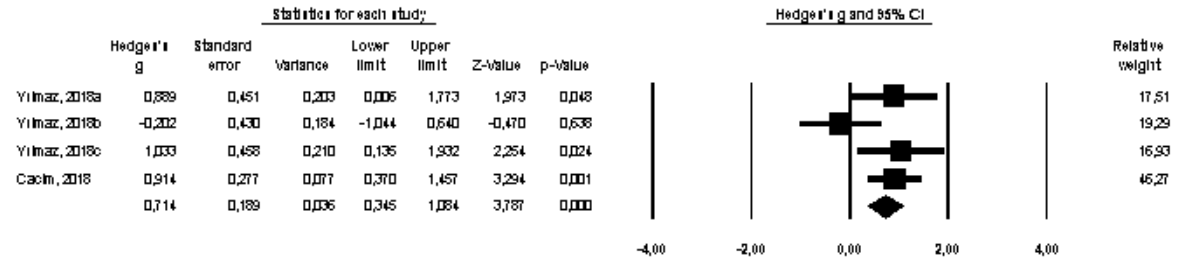
Table 6

Distribution of Effect Sizes in Studies Covered by Meta-Analysis on Psychomotor Domain Scores of Students in Cooperative Learning Method According to the Classification Made by Cohen

Effect Size Model	*Frequency*	*Percentage*
Small	1	25
Medium	-	-
Large	3	75
Total	4	100

When table 6 is examined, it is seen that according to Cohen (1992), 3 studies have a large effect size and 1 study have a small effect size.

Figure 5. Effect Size Values Related to Psychomotor Domain Scores



In Figure 5 lines on both sides of squares show the lower and upper limits of effect sizes in 95% confidence interval while the rhomb shows the overall effect size of studies. Taking a look we see -0.202 as the smallest and 1.033 as the widest effect size.

Figure 6 gives the distribution of effect sizes of studies according to Hedges's as funnel chart (Funnel plot of precision).

Figure 6. Distribution of Effect Sizes of Studies According to Hedges's g (Funnel Chart)

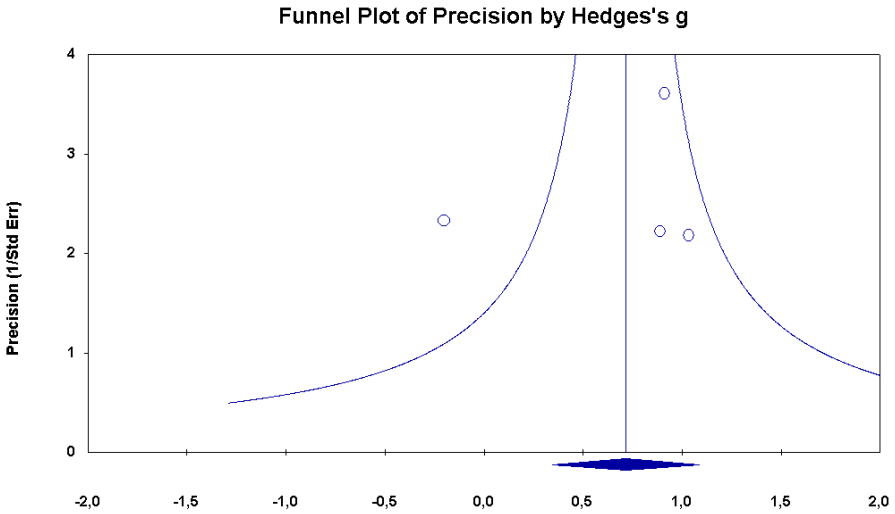


Figure 6 gives the funnel chart showing the distribution of effect size in studies. The funnel in the graphic is delimited by a ± slope. According to this graphic some studies remain out of the slope curve which makes it possible to say that the group is heterogeneous. It may not yield sound results if assessment is made solely by taking a look at the funnel graphic. More reliable outcome can be obtained if Q or p values are also considered (Dinçer, 2014).

Discussion

According to data from 5 doctoral and 25 post-graduate theses conducted in Turkey cooperative learning has its positive effect on scores in cognitive, affective and psychomotor domain skills. The level of effect calculated according to Cohen's (1992) classification is in the interval "large" with respect to cognitive domain scores. Many studies that can be found in literature show that cooperative learning has its significant effects on cognitive, affective and psychomotor domains. Many studies suggest that cooperative learning brings along higher performance relative to competitive or individual learning (Johnson et al., 2000). For example, meta-analysis by Johnson et. al. (2000) concluded that learning methods based on different forms of cooperative learning yielded higher performance relative to competitive and individual learning methods. Another meta-analysis work found that cooperative learning approach had its large effect in improving academic achievement in sciences (İleri, 2019). Bolatlı (2018) finds that cooperative learning environment significantly affects students' interest in the course and their active participation. As a result of this learning environment there were positive changes in teacher-student and student-student communication. Running parallel to these, Kurtuldu (2019) concluded that cooperative learning is more effective in improving the academic achievement of students relative to what teachers apply in teaching as their own methods. Aydoğan (2019) found that high-level cognitive learning of experimental group students in simulation-supported cooperative learning is higher than the control group. Outcomes of all these studies show that it is important to ensure teachers' awareness about the benefits of cooperative learning and have teacher-centred teaching methods replaced by student-centred teaching methods (Zakaria, Chin, & Daud, 2010).

The present study found that the effect on affective domain is at medium level according to the levels of effect classified by Cohen (1992). Arslan and Yanpar (2006) found that cooperative learning is effective in

improving student achievement and there are positive changes in students' attitude that can be attributed to this method. In another study Kayış (2019) concludes that cooperative learning based teaching affects students' social skills at significant level. The study finds that social skills scores of experimental group students are significantly higher than control group students. The study by Ergün (2019) finds that student's level of academic achievement is affected by computer-supported cooperative learning method. Meanwhile, it is also found that this method has no significant effect on students' attitude scores. Similarly, Akgül (2020) finds that cooperative learning has no effect on affective domain scores. On the other hand, Zakaria, Chin and Daud (2010) say cooperative learning methods improve students' performance in mathematics and their attitude towards this course. Different outcomes found in the context of attitude scores can be attributed to the possibility that attitude is too abstract and subjective to spot changes taking place in a short period of time (Zakaria et al., 2010).

The present study found that there was no effect on psychomotor domain scores according to the levels of effect classified by Cohen (1992). İn a study examining the effect of cooperative learning on psychomotor domain, Cacim (2018) found that cooperative learning has its significant effect on students' psychomotor domain scores compared to conventional learning. The researcher explains this outcome by various factors including more enjoyable handling of courses in the experimental group, limited intervention by the teacher, student's freedom to act with his/her own speed and being in a pleasant completion with classmates. Contrary to this finding, Yılmaz (2018) concludes that cooperative learning has no significant effect on students' psychomotor skills.

On the basis of outcomes obtained the following suggestions can be made for researchers and practitioners:

- There may be further meta-analyses covering studies on cooperative learning conducted abroad.
- Work may be started for a new learning-teaching theory on the basis of outcomes from meta-analysis.
- The present study was on the effect of cooperative learning on students' cognitive, affective and psychomotor scores. Apart from these, there may be meta-analysis work covering other variables such as retention, branch, education level, etc.
- The present study is limited to three years. There may be meta-analysis of studies on cooperative learning selecting a wider time interval.
- The majority of studies on cooperative learning approach focus on secondary and high school levels. Researchers may extend these studies to primary schools as well.
- Teachers may use cooperative learning which is more effective than existing teaching programmes in terms of achievement and attitude more widely in their classes.
- There may be further studies to examine the effect of cooperative learning on psychomotor domain.

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