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The Effect of Collaborative Learning Approach on Students' Academic Achievement in Turkish Courses in Turkey: A Meta-Analysis Study *

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Abstract

The educational concept of 21th century, during which great social, economic and technological developments are experienced, confers the responsibilities of determining the most relevant teaching approach and implementing this approach voluminously in the classrooms to the educators for the purpose of planning a qualified teaching process and performing the target acquisitions at the end of this process. It can be said that collaborative learning approach is qualified enough to fulfil this need in terms of its contribution to academic achievement and social skills of individuals. The fact that the studies done in different fields and different sample groups in the literature revealed positive effect of collaborative learning approach on academic achievement has created the need of meta-analysis of these researches. Within this frame, it was aimed to determine the effect of collaborative learning approach on academic achievement of students in Turkish courses in Turkey with this study. Within this scope, the related literature was scanned in order to reach the researches included in the study. As a result of this scanning, totally 32 researches examining the effect of collaborative learning approach on the academic achievement in Turkish courses of students studying in Turkey and providing the criteria determined for the study were included in meta-analysis. Effect size values and combined effect sizes of each study were calculated by using Comprehensive Meta-Analysis (CMA) while normal distribution plot of effect sizes was calculated by using MetaWin software in the study carried on. As a consequence of meta-analysis, it was found out that collaborative learning approach has positive effect on academic achievement of the students in Turkish courses in comparison with traditional methods. In the end of the analysis done in terms of random effect models, the average effect value was calculated as 1,034 with 0,110 errors. The lower bound of effect size was determined as 0,818 while the upper bound was 1,251 within 95 % confidence interval.

Keywords

Collaborative learning
Turkish course
Academic achievement
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When the findings attained are interpreted according to Cohen, Manion, and Morrison (2011), it can be stated that collaborative learning approach has large effect in terms of enhancing academic achievement in Turkish courses.

Introduction

The educational concept of 21st century during which great social, economic and technological developments are experienced confers the responsibilities of determining the most relevant teaching approach and implementing this approach voluminously in the classrooms to the educators for the purpose of planning a qualified teaching process and performing the target acquisitions at the end of this process. Investigating the researches done on in-classroom teaching implementations of teachers (Bardak & Karamustafaoğlu, 2016; Çelikkaya & Kuş, 2009; Karamustafaoğlu, Bayar, & Kaya, 2014; Saracaloğlu & Karasakaloğlu, 2011; Taşkaya & Muşta, 2008; Taşkaya & Sürmeli, 2014; Temizöz & Özgün Koca, 2008; Yeşilyurt, 2013) it was determined that the teachers serving in Turkey generally use traditional teaching method. However, a classroom environment in which the students can participate in classroom activities efficaciously, interact with the recently presented practices by impelling their pre-knowledge and experiences, explain their own opinions without hesitation, question and internalise multidimensional perspectives (Doğanay & Sarı, 2012) shoul be created for an effective learning-introduction process. Considering this requirement, it can be said that the learning approaches providing students with the mentioned environments are needed. Considering the fact that collaborative learning approach increases academic achievement, contributes developing social circle, strengthens interpersonal communication (Slavin, 2013), respects diversity by eliminating prejudice (Cabrera et al., 2002), decreases cognitive load on individual's mind (Kirschner, Paas, & Kirschner, 2009) improves critical thinking skill (Gokhale, 1995); it can be said that it is qualified enough to respond this need. Collaborative learning can be defined as a learning approach in which the students help each other's academic development by forming little groups for a mutual goal (Prichard, Bizo, & Stratford, 2006; Slavin, 2011), produce suggestions to problems through doing and experiencing (Maden, 2011) and in which group success is awarded in different ways (Açıkgöz, 2003). All students share different sources they posses, support each other mutually and thereby enhance their learnings to the maximum level in collaborative learning approach (Johnson & Johnson, 2002).

It can be said that the basis of collaborative learning approach can be found in ancient civilizations investigating its origins. Nevertheless, the use of collaborative implementations as a learning approach founded on theoretical basis corresponds to second half of 19th century. The social dependency, cognitive development and behavioural learning approaches emerging in second half of 19th century contributed to the development of theoretical bases of collaborative learning approach and its rich theoretical background (Johnson & Johnson, 2002). The studies carried on have revealed that collaborative learning approach affects students' academic achievement positively at elementary school, middle school, high school and university levels of education (Avşar & Alkış, 2007; Doymuş, Şimşek, & Bayrakçeken, 2004; Huang, Su, Yang, & Liou, 2017; Pattanpichet, 2011; Sharan, 1980; Smith, Hinckley, & Volk, 1991; Stevens & Slavin, 1995; Sung & Hwang, 2013). The positive effect of collaborative learning on students' academic achievement stands out also in the results of the studies (Ezell, Kohler, Jarzynka, & Strain, 1992; Ghaith, 2003; Henry, Castek, O'Byrne, & Zawilinski, 2012; Hitchcock, Dimino, Kurki, Wilkins, & Gersten, 2011; Philippakos & MacArthur, 2016) performed in terms of developing basic language skills.

The fact that there are a lot of experimental researches revealing the effect of collaborative learning approach on academic achievement in different learning domains of Turkish courses with different student groups studying in Turkey has raised the need for meta-analysis of these researches. Because it is seen that the mentioned experimental researches are independent from each other and different results on some certain subjects are inferred from each one. These researches have some limitations such as sample, period, access, number of implementers, etc. The researches are generally

done independently from each other and end up with stating the fact that more researches should be done. It is a well-known truth that inclusive and reliable secondary studies are needed to interpret the knowledge attained by similar studies and to guide new studies (Akgöz, Ercan, & Kan, 2004). Therefore, it has been decided to do meta-analysis study for the purpose of reaching a more accurate judgement about the effect of the methods based collaborative learning approach on academic achievement in Turkish courses in comparison with traditional teaching methods; besides making more clear predictions and generalisations about the future. The aim of this research was determined as revealing the effect of collaborative learning approach on students' academic achievement in comparison with traditional teaching. Accordingly, the problem statement has been determined as "Do the research results about the effect of collaborative learning approach on students' academic achievement in comparison with traditional teaching differ on behalf of collaborative learning approach when the calculated effect sizes are taken into consideration?

The sub-problems are:

1) What is the distribution of the studies included in meta-analysis in terms of moderator variables??
2) Does collaborative approach have a different general effect on academic achievement in comparison with traditional teaching?
3) Is there a significant difference among the effect sizes in terms of the learning domains of Turkish courses in which collaborative learning approach was implemented?
4) Is there a significant difference in terms of educational level among the effect sizes of the studies in which collaborative learning approach was implemented?
5) Is there a significant difference among the effect sizes of the studies in terms of the base techniques of collaborative learning used in experimental studies?
6) Is there a significant difference among the effect sizes of the studies in terms of experimental implementation period?
7) Is there a significant difference among the effect sizes of the studies in terms of the sample size the study implemented on?

Method

The research method used in the study, data collection, inclusion criteria, coding the data, data analysis and interpretation titles are stated in this chapter.

Research Model

Meta-analysis technique was used in the research with the purpose of synthesising the results of independent experimental studies investigating the effect of collaborative learning approach on academic achievement. Meta-analysis can be described as classifying the researches done about a subject, theme or in a study field within the context of certain criteria; coherently comparing quantitative findings of these researches through statistical methods; combining and calculating their effect sizes (Cohen et al., 2011; Dinçer, 2014; Durlak & Lipsey, 1991; Hedges, 2007; Salkind, 2007).

Data Collection

The data of the study were collected in December in 2016. The necessary scanning was done by using the keywords "collaborative learning, Turkish course, academic achievement, reading, writing, listening, speaking" in Web of Science, ERIC, Scopus, EBSCOhost, ULAKBİM TR index, YÖK (National Council of Higher Education) Thesis and Google Scholar in order to reach the researches to be included in the study. At the end of the scanning, 29 articles and 21 post-graduate studies (13 master's theses and 8 doctoral dissertations) examining the effect of collaborative learning approach on Turkish courses academic achievement of students studying in Turkey were accessed.

These criteria were taken into consideration while determining the studies included in:

1) The researches should be published between 2000 and 2016 years.
2) The type of the researches should be master's thesis, doctoral dissertation or article published in peer-reviewed scientific journals in English or Turkish languages.
3) The researches should be in experimental pattern.
4) The researches should be done with preschool, elementary school, middle school, high school and university students in Turkey.
5) The information about validity and reliability of the studies should be given.
6) Collaborative learning approach should be implemented to experimental group and traditional teaching approach should be implemented to control group in the researches.
7) The necessary statistical information (arithmetical average, standard deviation or t-test, "F" test analysis results and pre-test post-test correlations) should be stated in order to calculate the effect sizes.
8) The sample sizes should be given in the studies.

The researches, recorded as a result of the scanning, were revised within the frame of the criteria stated above in order to carry on the study. 3 of the researches examining the effect of collaborative learning approach on Turkish course academic achievement of the students in Turkey were excluded from the study as they are theoretical, 15 were excluded also as they do not include arithmetical average, standard deviation, t-test, F test analysis result, and pre-test post-test total score correlations or the necessary values for calculating these. Additionally, it was determined that there are two studies in three researches and thereby 2 effect size values were calculated for the mentioned researches. They were included in the study in this way. Consequently, totally 32 researches were included in the meta-analysis study in terms of the determined criteria.

Coding the Data

A coding form was created before meta-analysis study in order to handle the researches done about collaborative learning with an overall aspect and to determine the researches to be included in meta-analysis. This information was stated in the coding form;

- Research name, author, publication year and type
- Implementation period of research, learning domain the implementation was done in and collaborative approach technique preferred during the implementation
- Educational level of the students participating in the research
- Whether there are validity and reliability evidences of the measurement tools used in the researches
- Total number of the study group of the research and descriptive statistics (sub-group size, mean and standard deviation of the group) of control-experimental groups.

In order to provide the reliability of the study, coding of the researches included in meta-analysis should be done by at least two domain experts (Cooper, 2017; Wilson, 2009). Therefore, the coding was done separately by two domain experts (Lecturers who have a doctoral degree in Turkish Language Education and give courses in related programs in faculty of education), then the necessary agreement was provided by gathering. Thus, it was aimed to prevent errors deriving from data entry. Coding reliability was calculated by using "Reliability = Number of agreement / (Agreement + Disagreement) x 100" formula (Miles ve Huberman, 1994) and founded as 94 %. If the values obtained from this formula are above 70 %, it is accepted enough for reliability (Yıldırım & Şimşek, 2011, p. 233). Accordingly, it can be said that the coding is reliable.

Data Analysis and Interpretation

Fixed and random effect models are used for analysing and calculating the effect sizes of the data in meta-analysis studies. It is assumed that each of the studies included in analysis has a real effect size based on fixed effect model. Accordingly, the differences among all the observed effects stem from sampling error (Borenstein, Hedges, Higgins, & Rothstein, 2013). In random effect model, it is accepted that the real effect might differentiate from one research to another one (Bakioğlu & Özcan, 2016; Ellis, 2010). Differences might appear in effect sizes because that the densities of implementations done in the researches differ, different methods are included in implementation, research subjects might differentiate in sub-themes, sample sizes are different in all studies and individual variables (Cooper, 2017). The heterogeneity of the effect sizes' distribution should be tested to decide which one of these two models will be selected. As a result of heterogeneity test, fixed effect model is required to be used if the effect sizes do not show heterogeneous distribution; random effect model is required if the they show heterogeneous distribution (Ellis, 2010). Generally, Q test is used for deciding whether the researches included in meta-analysis constitute a heterogeneous structure. Q statistics is used for the purpose of testing zero hypothesis claiming that all the researches included in the study share the mutual effect through chi-square distribution (Borenstein et al., 2013). Accordingly, it is accepted that homogeneity condition is provided if Q statistics calculated per heterogeneity test is lower than the Q value corresponding in X^2 table. Otherwise, heterogeneity condition is accepted as provided (Dinçer, 2014). However, it is stated in the literature that Q test shares other statistical significance tests' limitations (Üstün & Eryılmaz, 2014). Hence, I^2 value which is another criterion for heterogeneity was calculated in the study. I^2 informs the researches about real heterogeneity ratio of total variance in observed effect (Borenstein et al., 2013). The condition of I^2 value lower than 25 % can be interpreted as low, 50% can be interpreted as medium and 75 % as high level of heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003).

The effect size values of each research included in the study and combined effect size were calculated by using Comprehensive Meta-Analysis (CMA) (Biostat Inc, 2005) software in the study. The formats, by which averages of experimental- control groups, standard deviation values, sample sizes of test statistics values (p value, t value etc.) can be inputted through interface presented by CMA program, were chosen in calculation of the effect sizes. It was examined by funnel plots and Rosenthal's fail-safe N statistics whether the research has publication bias or not. "Analog ANOVA" test was used for comparing the effect sizes of different sub-groups of the researches included in the study. The moderators of the study were determined as learning domain, educational level, collaborative learning technique used in the research, experimental implication method and sample size. Hedge's g coefficient was used for calculating the effect sizes. The confidence level was accepted as 95 % in calculation of the effect sizes. Additionally, Meta Win software was utilised to obtain normal distribution plot of the effect sizes. The criteria (Cohen et al., 2011, p. 617) stated below are considered in interpreting the significance of the effect sizes obtained as a result of the study. These criteria can be used for Hedge's g values although they were given for Cohen's d (Dinçer, 2014).

- $0 \leq$ Effect size value $\leq 0{,}20$ (Low Effect),
- $0{,}21 \leq$ Effect size value $\leq 0{,}50$ (Small Effect),
- $0{,}51 \leq$ Effect size value $\leq 1{,}00$ (Medium Effect),
- $1{,}00 >$ Effect size value (Large Effect)

Results

Initially, the descriptive characteristics of the researches included in meta-analysis are explained. The descriptive data about the researches examining the effect of collaborative learning approach on academic achievement in Turkish courses of students studying in Turkey are stated in Table 1.

Table 1. The Descriptive Data About the Researches Examining the Effect of Collaborative Learning Approach on Academic Achievement in Turkish Courses

		Frequency	Percentage
Study Type	Article	20	% 62,5
	Thesis/Dissertation	12	% 37,5
Study Year	2004	1	% 3,1
	2005	2	% 6,3
	2006	2	% 6,3
	2007	1	% 3,1
	2008	1	% 3,1
	2009	1	% 3,1
	2010	5	% 15,6
	2011	6	% 18,8
	2012	5	% 15,6
	2013	2	% 6,3
	2014	2	% 6,3
	2015	2	% 6,3
	2016	2	% 6,3
Educational Level of Sample	Elementary School	7	% 21,9
	Middle School	18	% 56,3
	University	7	%21,9
Learning Domain	Grammar	7	% 21,9
	Listening	1	% 3,1
	Speaking	1	% 3,1
	Reading	11	% 34,4
	Writing	9	% 28,1
	General (Turkish Course)	3	% 9,4
Collaborative Learning Technique	Peer Feedback	2	% 6,3
	Combining	6	% 18,8
	Learning Together	12	% 37,5
	Group Research	1	% 3,1
	Twin Check	1	% 3,1
	Collaborative Reading and Composition	3	% 9,4
	Collaborative Discussion and Questioning	2	% 6,3
	Reading Circle	1	% 3,1
	Teams-Games-Tournaments	2	% 6,3
	Authoring Cycle	1	% 3,1
	Unidentified	1	% 3,1
Sample Size	$30 \leq N \leq 50$	7	% 21,9
	$51 \leq N \leq 70$	16	% 50,0
	$71 \leq N$	9	% 28,1
Implementation Period	$1 \leq H \leq 10$	4	% 12,5
	$11 \leq H \leq 20$	5	% 15,6
	$21 \leq H \leq 30$	9	% 28,1
	$31 \leq H$	4	% 12,5
	Unidentified	10	% 31,3
	Total	**32**	**% 100**

Investigating Table 1. it is seen that totally 32 researches, 20 article (62,5 %) and 12 post-graduate thesis/dissertations (37,5 %), are included in meta-analysis. These researches done on the subject of collaborative learning approach's effect on Turkish course academic achievement densify in 2011 (18,8 %). It is found out that 18 researches (56,3 %) were done at middle school level, 7 each (21,9 %) were done at university and elementary school level when the samples of the respective researches are investigated. Investigating which learning domains the implementations were associated with collaborative learning in the researches included in meta-analysis; it is determined that 3 (9,4 %) researches are related to Turkish course general academic achievement, 11 (34,4 %) are related to reading skill, 9 (28,1 %) are related to writing skill, 7 (21,9 %) are related to grammar, 1 (3,1 %) is related to listening skill and 1 (3,1 %) is related to speaking skill. It is seen that learning together technique is the most frequently used one with 12 researches (37,5 %) when the statistics showing which techniques were based in the experimental implementations were investigated. It is identified that combining technique with 6 studies (18,8 %), collaborative reading and composition with 3 studies (9,4 %) follow learning together technique. The sample sizes of experimental and control groups included in collaborative learning implementations are expressed by grouping. According to the grouping; there are 7 studies (21,9 %) carried with sample of 30-50 persons, 16 studies (50,0 %) with 51-70 persons, 9 studies (28,1 %) having 71 or more person sample size. Investigating the implementation periods of collaborative learning, it is determined that there are 4 researches (12,5 %) implemented for 1-10 hours, 5 (15,6 %) for 11-20, 9 (28,1 %) for 21-30 and 4 for 31 hours or more. It attracts the attention that the implementation period of 10 researches (31,1 %) were not stated in the researches.

Findings about the Effect of Collaborative Learning Approach on Turkish Course Academic Achievement

In order to evaluate the convenience of the effect sizes to be combined, normal distribution plot should be examined firstly. The plot showing normal distribution of the studies' effect sizes is given in Figure 1.

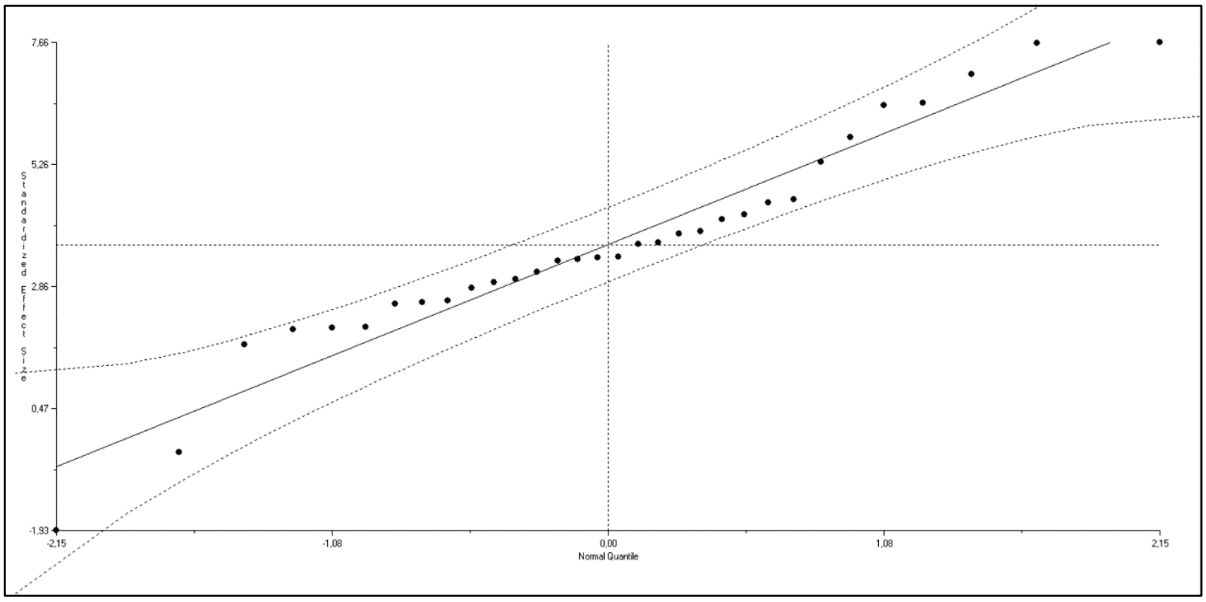

Figure 1. Normal Distribution Plot of The Studies' Effect Sizes

Investigating figure 1, it is seen that the effect sizes of the researches included in meta-analysis are at both sides of the normal distribution line and between the confidence interval indicated with the dotted lines. Within this context, it is seen that the researches included in the study show normal distribution. Rosenberg, Adams, and Gurevitch (2000) pointed out that it is statistically possible to calculate average effect sizes of the studies included in meta-analysis in case that the distribution is normal. Depending on this finding, average effect sizes of the researches included in meta-analysis were calculated and the answer was searched for "How is the effect of collaborative learning approach on

Turkish course academic achievement in comparison with traditional teaching?" sub-problem. It was examined whether there was publication bias in the researches included in meta-analysis before the average effect size was calculated. The funnel plot results related to publication bias probability are given in Figure 2.

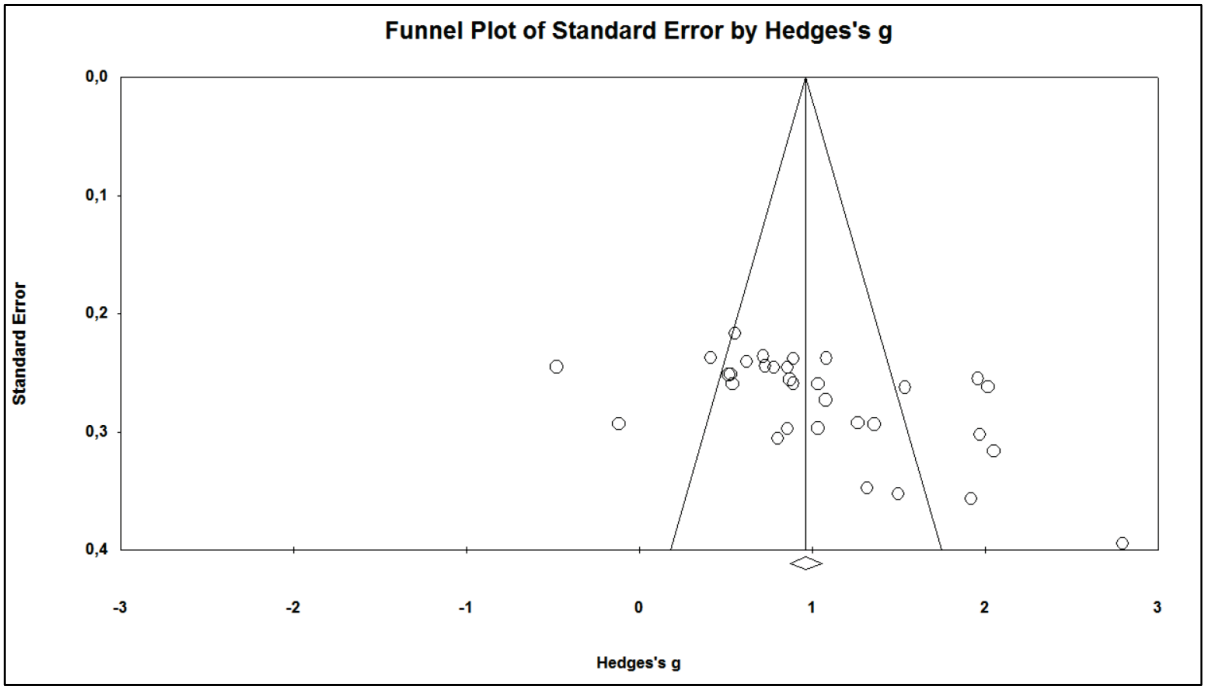

Figure 2. Funnel Plot Related to the Average Effect Sizes of Collaborative Learning Approach

Investigating funnel plot in Figure 2, it is seen that the studies gather at the middle part and there is an almost symmetrical scatter at both sides of the line showing the combined effect size. In addition to funnel plot, it was investigated whether the study has publication bias by Rosenthal's fail-safe N statistics and fail-safe N was found as 3660 as a result of the analysis presented in Table 2. This value gives the number of the studies having effect at zero level for the mutual effect size calculated as 1,408 at the end of meta-analysis to be statistically insignificant. Accordingly, it can be stated that the effect size obtained through meta-analysis is resistant to publication bias. Additionally, Mullen, Muellerleile, and Bryant (2001, p. 1454) stated that the result of meta-analysis can be resistant to future researches on the condition that the value obtained through N/(5k+10) formula is higher than 1. When the related calculations [3360/ (32*5+10) =19,764] were done, it was found out that the result was higher than 1. This value can be interpreted as relatively low publication bias of meta-analysis.

Table 2. Calculating Rosenthal FSN for Meta-Analysis Examining the Effect of Collaborative Learning Approach on Turkish Course Academic Achievement

Bias Condition	
Z value for observed studies	21,05206
P value for observed studies	0,00000
Alpha	0,05
Direction	2
Z value for alpha	1,95996
Number of observed studies	32
FSN	3660

The model for calculating the effect sizes should be determined and the effect sizes should be expressed according to the model after investigating normal distribution plot and publication bias statistics of the researches included in meta-analysis.

Heterogeneous distribution value, average effect size and confidence intervals according to the effect model of the studies are presented in Table 3.

Table 3. Average Effect Sizes and Lower-Upper Bounds of Confidence Interval in Terms of Effect Model

Model	Average Effect Size Value (ES)	95% Confidence Interval for Effect Size		Standard Error (SE)	Homogeneity Value (Q)	Degree of Freedom	I^2	p
		Lower Bound	Upper Bound					
Fixed	0,962	0,869	1,055	0,047	166,099	31	81,336	0,000
Random	1,034	0,818	1,251	0,110				

Seen in Table 3, Q value was found as 166,099 as a result of calculating heterogeneity value of the researches included in the study according to the fixed effect model. Investigating x^2 table, the critical value of 31 degree of freedom at 95 % significance level was determined as 44.985. Considering these findings, it is found out that Q value (166,099) is higher than the critical value of chi-square distribution for 31 degree of freedom (x^2 =44,985 for df=31). In this case, it can be figured out that the researches included in meta-analysis constitute a heterogeneous structure. Additionally, the value of 81,366, obtained through calculating I^2, indicates high level of heterogeneity. Therefore, random effects model was decided to be used in calculating average effect sizes of the researches included in meta-analysis.

The average effect size was calculated as 1,034 with 0,110 errors as a result of the analysis done according to random effects model. The lower bound of the effect size is 0,818 and upper bound is 1,251 in 95 % confidence interval. Interpreting the findings according to Cohen et al. (2011), it can be said that collaborative learning approach has a strong level of effect in terms of increasing Turkish course academic achievement. The positivity of the average effect size (+1,034), indicates that the operational effect is on behalf of the experimental group. Forrest plot showing the distribution of primary studies' effect sizes and created in terms of random effects model is presented in Figure 3.

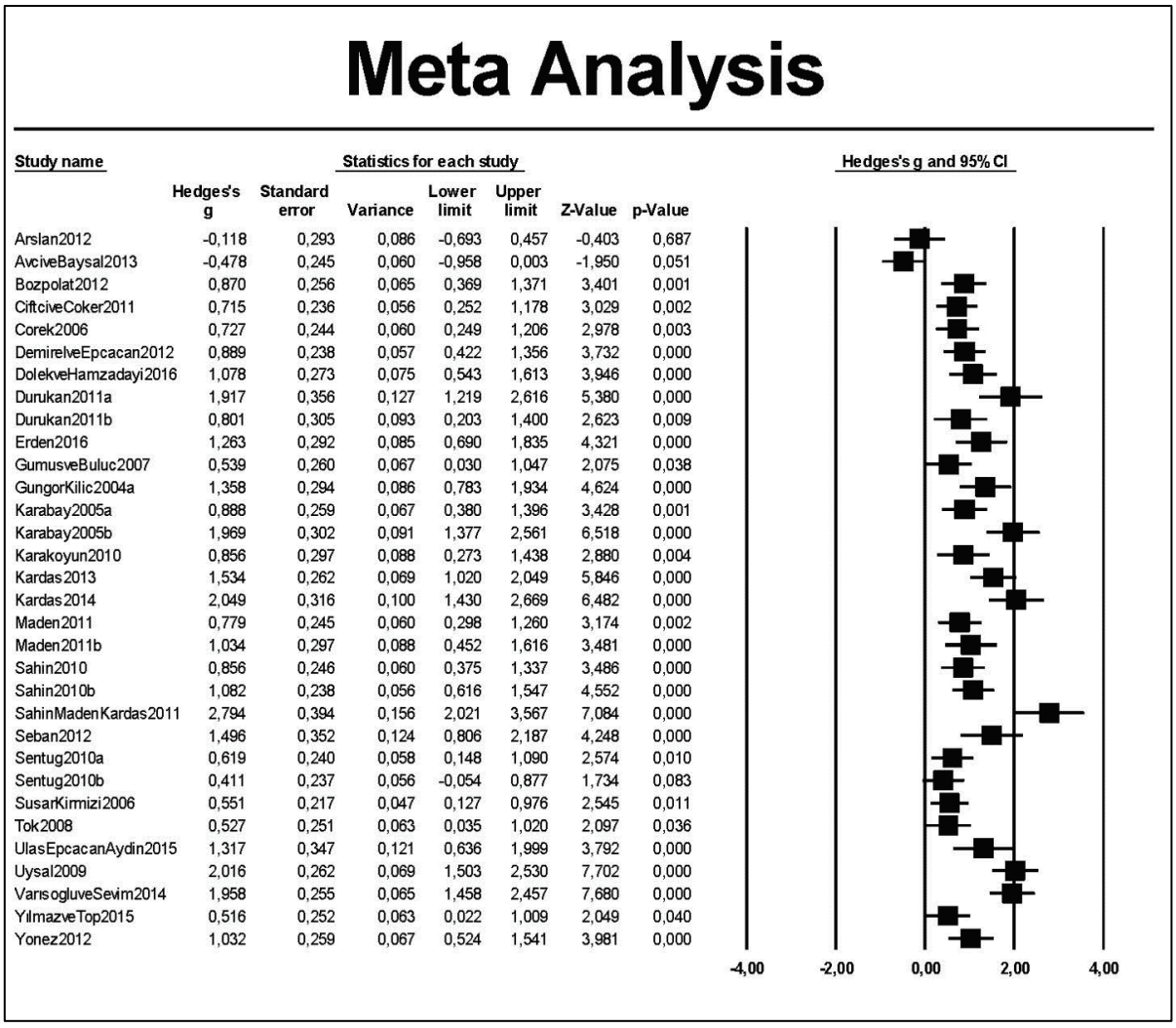

Figure 3. Forest Plot Related to Effect Sizes of the Studies in Terms of Random Effects Model

The black squares seen in figure 3 show the study's effect size and the lines next to the squares indicate the lower and upper bounds of the effect size at 95 % confidence interval. The weight percentage given in the right part of forest plot numerically shows the effect percentage of each study in meta-analysis result. Investigating forest plot, it is identified the research having the largest confidence interval belongs to Yağmur Şahin, Maden, Kardaş, and Şahin (2011) and the smallest belongs to Susar Kırmızı (2006). It is determined that Yağmur Şahin et al.'s (2011) research has the smallest weight percentage while Susar Kırmızı's (2006) has the largest one and the other researches have similar values of weight percentage as a result of the analysis.

Considering the data about the effects sizes of the researches included in the study, it is seen that the smallest effect size is -0,478, the largest effect size is 2,794. Investigating the overall statistical results of the effect sizes, it is figured out that 30 of total 32 researches have positive and 2 have negative effect. 30 researches resulting positively have an effect on behalf of the experimental groups to which collaborative learning approach was implemented; on the other hand, 2 researches resulting negatively have an effect on behalf of the control groups to which traditional teaching methods were implemented.

Findings about the Effect Sizes in Terms of Learning Domains

The statistical analysis results of the sub-problem "Does the effect of collaborative learning approach on Turkish course academic achievement differ in terms of learning domains (grammar, reading, writing, general Turkish course)?" are given in Table 4.

Table 4. Effect Size Differences in Terms of Learning Domains

Variable	Homogeneity Value Between Groups (Q_B)	P	n	Average Effect Size Value (ES)	95 % Confidence Interval for Effect Size		Standard Error (SE)
					Upper Bound	Lower Bound	
Learning Domain	7,953	0,047					
Grammar			7	1,465	0,868	2,061	0,304
Reading			11	0,699	0,341	1,057	0,183
Writing			9	1,140	0,849	1,430	0,148
General (Turkish Course)			3	0,765	0,477	1,052	0,147

According to analysis results, the effect sizes were determined as 1,465 for grammar learning domain, 0,699 for reading learning domain, 1,140 for writing learning domain. The effect size of 3 researches comprising all learning domains of Turkish course is 0,765. According to homogeneity test results done for determining if there is a significant difference among the effect sizes, it is determined that there is a statistically significant difference among the groups created in terms of learning domains (Q_B=7,953, p<.05). According to the finding, it can be said that collaborative learning approach has the maximum effect on grammar skill in terms of Turkish course academic achievement in comparison with traditional teaching. According to the effect size values (Cohen et al., 2011), collaborative learning approach has a large effect in grammar and writing skills related researches; it has medium effect in reading skills and general Turkish course related researches. As there is only one research related to each of listening and speaking skills, these researches are not included in comparison when analysing moderators.

Findings about the Effect Sizes in Terms of Educational Level

The statistical analysis results of the sub-problem "Does the effect of collaborative learning approach on Turkish course academic achievement differ in terms of educational level (elementary, middle school, university)?" are given in Table 5.

Table 5. Effect Size Differences in Terms of Educational Level

Variable	Homogeneity Value Between Groups (Q_B)	P	n	Average Effect Size Value (ES)	95 % Confidence Interval for Effect Size		Standard Error (SE)
					Upper Bound	Lower Bound	
Educational Level	2,613	0,271					
Elementary School			7	0,973	0,514	1,432	0,234
Middle School			18	0,926	0,637	1,215	0,147
University			7	1,380	0,902	1,858	0,244

Investigating the findings whether the effect sizes differ according to educational level in terms of Turkish course academic achievement, the effect sizes were calculated as 0,973 at elementary school level, 0,926 at middle school level, and 1,380 at university level. According to the homogeneity test results done for determining whether there is a significant difference among the effect sizes, it is identified that there is not a statistically significant difference between groups created in terms of educational level (Q_B=2,613, p>.05). In respect to these findings, the academic achievement obtained as a result of collaborative learning implementations does not statistically and significantly differ at different educational levels.

Findings about the Effect Sizes in Terms of Base Collaborative Learning Technique

The statistical analysis results of the sub-problem "Does the effect of collaborative learning approach on Turkish course academic achievement differ in terms of the technique based in experimental implementations (peer feedback, combining, learning together, group research, twin check, collaborative reading and composition, collaborative discussion and questioning, reading circle, teams-games-tournaments, authoring cycle)?" are given in Table 6.

Table 6. Effect Size Differences in Terms of Collaborative Learning Technique

Variable	Homogeneity Value Between Groups (Q_B)	P	n	Average Effect Size Value (ES)	95 % Confidence Interval for Effect Size		Standard Error (SE)
					Upper Bound	Lower Bound	
Learning Technique	2,022	0,364					
Combining			6	0,795	0,441	1,149	0,181
Learning Together			12	1,123	0,782	1,464	0,174
Collaborative Reading and Composition			3	1,163	0,519	1,808	0,329

Investigating the table of the effect size differences in terms of collaborative learning techniques based in experimental implementations, it is identified that collaborative reading and composition (ES=1,163) is the technique having the largest effect size. It is seen that the techniques of learning together with 1,123 effect size, combining with 0,795 effect size follow collaborative reading and composition.

According to homogeneity test results done for determining if there is a significant difference among the effect sizes, it is determined that there is not a statistically significant difference among the groups created in terms of collaborative learning technique based in experimental implementations (Q_B=2,022, p>.05). According to the finding (Cohen et al., 2011), the effect of collaborative learning approach on Turkish course academic achievement is large in the researches based on collaborative reading and composition and learning together while it is medium in the researches based on combining. Group research, twin check, peer feedback, collaborative discussion and questioning, reading cycle, teams-games-tournaments and authoring cycle techniques are not included in moderator analysis as there is not enough number of studies.

Findings about the Effect Sizes in Terms of Experimental Implementation Period

The statistical analysis results of the sub-problem "Does the effect of collaborative learning approach on Turkish course academic achievement differ in terms of experimental implementation period?" are given in Table 7.

Table 7. Effect Size Differences in Terms of Experimental Implementation Period

Variable	Homogeneity Value Between Groups (Q_B)	P	n	Average Effect Size Value (ES)	95 % Confidence Interval for Effect Size		Standard Error (SE)
					Upper Bound	Lower Bound	
Implementation Period	4,051	0,399					
1 ≤ H ≤ 10			4	1,609	0,765	2,452	0,430
11 ≤ H ≤ 20			5	1,175	0,733	1,618	0,226
21 ≤ H≤ 30			9	0,918	0,664	1,172	0,130
31≤H			4	1,198	0,561	1,835	0,325
Unidentified			10	0,796	0,310	1,282	0,248

Investigating the findings whether the effect sizes differ according to experimental implementation period in terms of Turkish course academic achievement; the effect sizes were calculated as 1,609 for the researches experimental implementation was done for 1-10 hours, 1,175 for the researches experimental implementation was done for 11-20 hours, 0,918 for the researches experimental implementation was done for 21-30 hours, 1,198 for the researches experimental implementation was done for 30 or more hours. According to homogeneity test results done for determining if there is a significant difference among the effect sizes, it is determined that there is not a statistically significant difference among the groups created in terms of experimental implementation period (Q_B=4,051, p>.05). In respect to these findings, the academic achievement obtained as a result of different experimental collaborative learning implementation periods does not statistically and significantly differ.

Findings about the Effect Sizes in Terms of Sample Size

The statistical analysis results of the sub-problem "Does the effect of collaborative learning approach on Turkish course academic achievement differ in terms of sample size?" are given in Table 8.

Table 8. Effect Size Differences in Terms of Sample Size

Variable	Homogeneity Value Between Groups (Q_B)	P	n	Average Effect Size Value (ES)	95 % Confidence Interval for Effect Size		Standard Error (SE)
					Upper Bound	Lower Bound	
Sample Size	0,969	0,616					
30 ≤ N ≤ 50			7	1,237	0,667	1,807	0,291
51 ≤ N ≤ 70			16	0,920	0,599	1,240	0,164
71 ≤ N			9	1,054	0,706	1,402	0,178

According to the analysis results; the effect size values was found as 1,237 for the researches including 30-50 participants, 0,920 for the researches including 51-70 participants, 1,054 for the researches including 71 or more participants. According to homogeneity test results done for determining if there is a significant difference among the effect sizes, it is determined that there is not a statistically significant difference among the groups created in terms of sample size (Q_B=0,969 p>.05). In respect to this finding, the academic achievement obtained as a result of collaborative learning implementations with different sample sizes does not statistically and significantly differ.

Discussion, Conclusion and Suggestions

32 effect sizes related to the researches included in meta-analysis were calculated in this study which is examining the effect of collaborative learning approach on Turkish course academic achievement of the students in Turkey. It was seen that 30 of these effect sizes had positive value while 2 had negative. It has been concluded that traditional teaching method is more effective than collaborative learning approach in two studies having negative value. However, these values (ES=-0,118; ES=-0,478) are weak and small according to Cohen et al. (2011). The average effect size value of 32 studies was calculated as 1,034. This value is large according to Cohen et al. (2011). Depending on these findings, it can be said that collaborative learning approach has a strong level of effect on academic achievement in comparison with traditional teaching methods. It is inferred that similar results were attained when the overall effect size is compared with the other studies in the literature.

Johnson, Johnson, and Stanne (2000) did meta-analysis of 164 experimental researches performed basing on eight different collaborative learning technique in the study they examined the

effect of collaborative learning approach on academic achievement. As a result of the analysis, it was revealed that collaborative learning techniques had more positive effects on academic achievement than competitive and individual learning techniques. In a similar research, Bowen (2000) examined the effect of collaborative learning approach on chemistry course academic achievement. In the study in which the effect sizes of total 37 researches, done between 1980 and 1996 years, were caculated, it was determined that collaborative learning approach had a medium effect on Chemistry course academic achievement in comparison with traditional teaching methods (d=0,51). Çapar and Tarım (2015) examined total 26 researches, examining the effect of collaborative learning approach on mathematics course academic achievement and done between 1998 and 2009 years, through meta-analysis. The result that collaborative learning approach has a medium effect on mathematics course academic achievement was reached at the end of the analysis (d=0.59). Tuncer and Dikmen (2017) included six different researches done between 2003-2011 years and concluded that collaborative learning has a medium effect on achievement in their study examining the effect of collaborative learning on achievement (d=0,518). Likewise, Karakuş and Öztürk (2016) examined 30 researches examining the effect of collaborative learning approach on science course academic achievement through meta-analysis method and consequently stated that collaborative learning approach has a medium positive effect (d=0.694) on students' science course academic achievement. Consequently, it can be stated that the findings about the mentioned meta-analysis studies' overall effect sizes are consistent with the results of this study.

In this study examining the effect of collaborative learning approach on Turkish course academic achievement, a moderator analysis was also done in order to determine whether the effect sizes significantly differ in terms of the variables such as "learning domains, educational level, collaborative learning techniques based in experimental implementations, implementation period and sample size".

According to homogeneity test results done for determining if there is a significant difference among the effect sizes of the researches in terms of learning domains, it is determined that there is a statistically significant difference among the groups (Q_B=7,953, p<.05). According to the finding, collaborative learning approach has the maximum effect on grammar skill in terms of Turkish course academic achievement in comparison with traditional teaching (ES=1,465). The minimum effect was obtained from the studies intending to develop reading skill (0,699). According to the effect size values (Cohen et al., 2011) collaborative learning approach has a large effect on grammar (ES=1,465) and writing (ES=1,140) skills related researches; it has medium effect on reading skills (ES=0,699) and general Turkish course (ES=0,765) related researches.

According to the homogeneity test results grounding on educational level, it was concluded that that there is not a statistically significant difference between groups in terms of educational level that collaborative learning approach was implemented (Q_B=2,613, p>.05). Accordingly, it can be inferred that the academic achievement obtained as a result of collaborative learning implementations does not statistically and significantly differ at different educational levels. Comparing the findings with those in the literature, the mentioned findings are not consistent with each other in terms of effect sizes. Cole (2014) determined that there is a statistically significant difference between the groups created in terms of educational level, as a result of the homogeneity test in meta-analysis study examining the effect of peer teaching on literacy course (Q_B=10,863, p<.05). Accordingly, peer teaching implementations have negative effect on the students at middle school (ES=-0.007) level in comparison with the students at elementary (ES=0.539) and high school (ES=0.7) level. Çapar and Tarım (2015) reached similar results in the study examining the effect of collaborative learning approach on mathematics course academic achievement and determined that there is a statistically significant difference between the groups created in terms of educational level (Q_B= 11.76, p<.05). According to the finding, it is concluded that collaborative learning has the maximum effect at university level (ES=1,33), have the minimum effect at middle school level (ES=0,30) in terms of mathematics course academic achievement in comparison with

traditional teaching methods. An educational level for which negative effect size was calculated does not exist in terms of the other groups. Investigating the findings of the study performed, it attracts attention that middle school level has the minimum effect size among educational groups. Although there is a difference between homogeneity test results, it can be said that the developmental differences handicapping socialisation of the middle school students were effective during collaborative learning based implementations.

Effect sizes of three different groups were calculated in terms of collaborative learning techniques based in experimental implementations. It was determined that there is not a statistically significant difference between the groups according to calculated effect sizes in terms of collaborative learning techniques based in implementations (Q_B=2,022, p>05). According to the effect size values (Cohen et al., 2011), the effect of collaborative learning approach on Turkish course academic achievement is large in the researches based on collaborative discussion and questioning and learning together while it is medium in the researches based on combining. Johnson et al. (2000) stated in the meta-analysis study that learning together, teams-games-tournaments, group research, academic conflict, combining, student teams achievement sections and collaborative composition techniques have more effective results on academic achievement in comparison with traditional teaching methods. Considering these findings, it can be said that the results of the study show similarities with the study results of Johnson et al. (2000) in terms of collaborative learning technique used in implementations.

As a consequence of homogeneity test results based on experimental implementation period, it is determined that there is not a statistically significant difference among the effect sizes in terms of experimental implementation period (Q_B=4,051, p>.05). In respect to this finding, the academic achievement obtained as a result of different experimental collaborative learning implementation periods (1-10 hours, 11-20 hours, 21-30 hours, 31 or more hours) does not statistically and significantly differ. Çapa and Tarım (2015) reached similar results in their study. According to the calculated effect size values in terms of experimental implementation period, a statistically significant difference between groups was not found (Q_B = 1.12, p>.05).

As a result of homogeneity test grounding on sample size, it was concluded that the effect sizes of the studies do not show a significant difference in terms sample size (Q_B=0,969, p>.05). According to this finding, it can be said that the academic achievement obtained as a result of experimental collaborative learning implementations with different sample sizes (30-50, 51-70, 71 or more) does not statistically and significantly differ. Tomcho and Foels (2012) also reached the result that group size of the experimental implementations does not have an effect on learning outputs (meta-regression coefficient= -0.02, 95% CI [0.08, 0.04], Z= -0.52, p= .60) in their study examining the effect of group learning activities on learning outputs. From this point of view, it can be expressed that two researches are concluded similarly.

The human being learns everything through listening by the time the academic life starts, then sets speaking, reading and writing skills to work respectively. The competence of the person in using these skills effects personal and social life in addition to academic life. Because the person creates and develops his economic, social and cultural capital through his language. In case the educational activities are developed sufficiently; the person is provided with exploring new technology or using available technology more effectively, welfare level of the society increases, the improvement of the democracy is contributed and criminal rates are decreased (McMahon, 2000). Otherwise, unemployment, bad working conditions, low payment and poverty appear in the mentioned areas (Yıldız, 2008). Therefore, the quality and feasibility of the activities carried within the scope of mother tongue education should be high. One of the most important conditions in order that the quality and feasibility of educational activities can be high is the use of effective learning strategy, method and techniques in classroom environment. From this view, collaborative learning approach stands out with

its quality overlapping with constructivist education philosophy and coming up with effective results in classroom. The results of meta-analysis done in this study have some qualifications supporting this statement. Within this frame, it can be suggested to use this learning approach within the scope of mother tongue teaching activities at all educational levels from elementary to post-graduate. In addition to this suggestion, the suggestions below can be expressed for research and practice considering the results:

- Peer feedback, group research, twin check, collaborative discussion and questioning, reading circle, teams-games-tournaments and authoring cycle techniques are not included in moderator analysis in this study as the number of these studies are not enough. Because of this limitation, different meta-analysis studies can be done by taking other collaborative learning techniques into the scope.

- Reporting effect sizes and implementation periods or stating statistical data needed to calculate effect sizes in experimental/semi-experimental studies that will search the effect of collaborative learning approach on academic achievement will provide more extensive and reliable results for meta-analysis. Additionally, reporting a number of characteristics such as learning domain, learning techniques, sample size, implementation period, implementer and educational level will allow for analysing different variables and examining the effects comparatively. On the other hand, it is suggested to examine the effect of collaborative learning approach on not only academic achievement but also on various dependent variables such as anxiety, attitude, motivation in meta-analysis studies.

- The researches examined within the scope of meta-analysis study mostly focus on grammar, reading and writing learning domains beside combining and learning together techniques. This case poses the result of representation of the other groups with less studies in homogeneity test. Hence, the increase in the number of the other experimental studies that will mention overall academic achievement in Turkish course is important for the further meta-analysis studies to reveal more generalizable results.

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Appendix 1. Studies Included in the Meta-Analysis

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