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Abstract

The purpose of this research was to examine the effect of teaching of learning strategies on academic achievement of students. The research sought an answer to the problem statement of "What kind of effect does teaching of learning strategies has on academic achievement of students?" The meta-analysis model was adopted to examine the effectiveness of teaching of learning strategies on academic achievement. The sources of the research were consisted of both published and unpublished empirical studies (N = 18) in Turkey, by taking some inclusion criteria into account. The results of the research indicated that the overall weighted effect size was moderate (0.892). Also, the effect size values obtained were compared with some methodological and substantive moderators in the research. According to moderator analyses, it was found that there was no significant difference between effect sizes of the studies in terms of sample size, publication type, course type, implementation duration, instructional level, school setting, and socioeconomic status.

Introduction

Traditionally, schools have always kept students under an information bombardment (Kincheloe, 2011). Under this bombardment, students are confronted with incredible variety of information in schools almost every day (Clemmitt, 2010). Hence, they are expected to learn a wide variety of information presented to them by the school (Schmeck, 1988). For this reason, students need to spend a lot of time and energy to get this wide variety of information (Weinstein, Ridley, Dahl, & Weber, 1989). Although students are expected to learn much information at school every day (Weinstein, Tomberlin, Julie, & Kim, 2004), explanations of how to learn the information presented to them are often overlooked (Weinstein and Mayer, 1986). In other words, despite the fact that students are expected to learn the given information, it seems that they are rarely informed about how to get the information transferred to them (Merton, 1988). As a matter of fact, while some students are observed to succeed by studying for a short period of time, whereas others are seen not to succeed despite they study harder (McCharthy & Schmeck, 1988). Indeed, some students studying in the same classroom are observed to learn the information at the end of the course, whereas the others are seen to fail in learning the information presented to them (Pressley, Goodchild, Fleet, & Zajchowski, 1989). From this point of view, it can be suggested that good teaching includes teaching students how to learn, how to remember, how to think, and how to motivate themselves (Weinsten & Mayer, 1983). So, a good teaching depends largely on making students aware of their own way of learning, and thus leading it in the learning process (Riding & Rayner, 1998). While students are being taught basic concepts and principles in schools, teaching them to get learning to learn is also very important (Nisbet & Shucksmith, 1986). In order to make students get learning to learn competence, learning strategies should be utilised in the classroom (Weinstein, Husman, & Dierking, 2000). Thus, for an effective learning and teaching, teaching strategies from primary school to university education should be included in the teaching-learning process (Garner, 1990). In recent years, more emphasis has been placed on teaching of learning strategies for improving the academic achievement of students (Alexander, Graham, & Harris, 1998). In this respect, since the most important reason for individual differences amongst the students is to choose and use the appropriate learning strategies (Vermunt, 1996), it seems necessary to teach these strategies to students in schools (Weinstein & Mayer, 1986). The recognition of learning strategies as one of the important factors affecting academic achievement has increased the demand for how to teach them in teaching-learning process (Weinstein et al., 2004; Weinstein, Acee, & Jung, 2010). Parallel to this interface, the teaching of learning strategies has begun to be included in schooling (Hattie and Donoghue, 2016). In this context, while a number of empirical studies were carried out in relation to teaching of learning strategies (e.g., Carns & Carns, 1991; Meltzer, Katzir-Cohen, & Miller, 2001; Selçuk, Şahin, & Açıkgöz, 2011; Yıldız, 2003), the research bringing together the results of these studies through meta-analysis was seen to be very limited (e.g., Dignath &

Büttner, 2008; Donker, do Boer, Kostons, Dignath van Ewijk, & van der Werf, 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996). For example, Hattie, Biggs, and Purdie (1996), by conducting the first meta-analysis on the issue, examined the effect of learning skills on academic performance. In one of these meta-analyses, Donker et al. (2014) examined the effect of learning strategy instruction on academic performance, with respect to some certain moderators such as type of learning strategies, type of course, and ability levels. Similarly, Ergen and Kanadlı (2017) examined the effect of self-regulated learning strategies on academic achievement in regard of some limited number of moderators such as course type, strategy types, and instructional level. Also, Dignath and Büttner (2008) tried to examine the components of self-regulated learning amongst students. When all the meta-analyses conducted on the issue were taken into consideration, it was concluded that most of these studies were carried out in western contexts (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Hattie, Biggs, & Purdie, 1996), included a limited number of moderators (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996), focused on different types strategy teaching (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996), and mostly took academic performance, rather than academic achievement into account (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Hattie, Biggs, & Purdie, 1996). However, the current research tried to examine the teaching of learning strategies exclusively, as well as to compare the effect of these strategies with a broad spectrum of moderators. This research also focused on studies especially in Turkey, a country displaying both western and non-western cultural characteristics, to compare the results of it with other meta-analyses in the scope. In conclusion, it seems that there is a need to see the effectiveness of teaching of learning strategies on academic achievement through a meta-analytic review. Until now, although there have been a number of empirical studies conducted in terms of teaching of learning strategies and there is considerable support for strategy use in the related literature (e.g., Kiewra, 2002; Protheroe & Clarke, 2008), teachers seem to be reluctant to welcome these strategies into their classrooms (Selçuk, Şahin, & Açıkgöz, 2011). While teachers are seen to include teaching of learning strategies in a limited manner (Bayındır, 2006), the teaching of these strategies is not much involved in the curriculum (Özer, 2002). Though there may be many reasons for this situation, one of the reasons for this may be that there is no research combining the findings of these studies and drawing a general conclusion whether teaching of learning strategies are effective or not. Also, most teachers may be suspicious about the effectiveness of these strategies on academic achievement, whether to use them in the classroom (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). Therefore, a meta-analytic review, combining the effect sizes of different empirical studies on academic achievement, may put out a satisfactory result for teachers. In this regard, a meta-analysis research seems timely, not only to see the effect of these strategies on academic achievement of students, but also to identify the possible moderators (substantive and methodological), affecting the academic achievement be examined in depth carefully. So, the purpose of this research is to perform a meta-analysis to examine the effect of teaching of learning strategies on academic achievement of students.

Learning Strategies

Learning strategies, as cognitive strategy (Lenz, 1992), can be defined as "behaviors and thoughts in which a learner engages and which are intended to influence the learners encoding process" (Weinstein & Mayer, 1986, p. 316). According to Arends (1997), learning strategies are behaviours and thinking processes used by learners, including cognitive strategies such as memory setting and retrieval, and executive cognitive processes. In other words, learning strategies are situations and ideas to influence the coding process of learners (Weinstein & McDonald, 1986). These strategies are purposeful behaviours that affect how the learner processes the information (Mayer, 1989). Learning strategies are generally each of the techniques that facilitate the self-learning of the individual (Weinstein & Mayer, 1986). Thus, the purpose of any particular learning strategy may be to affect motivational or affective state of the learner or the way in which learner selects, acquires, organises, or integrates new knowledge (Weinstein 1988). While there are many learning strategies that learners can use in the learning process (e.g., Nisbet & Shucksmith, 1986; O'Malley, Chamot, Manzanares, Russo, & Kupper, 1985; Pressley & Harris, 1990; Weinstein & Mayer, 1986), these strategies may involve some some simple study skills such as underlying the main idea in a text or complex thinking processes such as establishing analogies (Mayer, 1988). The literature provides a number of strategies categorised in many ways (e.g., Dansereau, McDonald, Collins, Garland, Holley, Diekhoff, & Evans, 1979; Derry & Murphy, 1986; Gagne & Drisscoll, 1988; Kirby, 1984; Levin, 1986; Nisbet & Shucksmith, 1986; O'Malley et al., 1985; Oxford, 1990; Pressley & Harris, 1990; Weinstein & Mayer, 1986; West, Farmer, & Wolff, 1991). However, it can be stated that the classification suggested by Weinstein and Mayer (1986) takes more attention. According to this categorisation, it is seen that Weinstein and Mayer (1986) grouped learning strategies under five major categories. These categories are as follows: rehearsal strategies, elaboration strategies, organisational strategies, comprehension monitoring strategies, and affective strategies. The strategies range from simple study skills such

as underlying a main idea, to complex processes such as using analysis to relate prior knowledge to new information (Weinstein et al., 1989). In brief, amongst these strategies, rehearsal strategies use repetitive exposure to what the student is trying to learn (Weinstein, Acee, & Jung, 2011). An example of this strategy would be repeating, in correct serial order, the names of the colours in the spectrum (Weinstein & Mayer, 1986). Elaboration strategies include complex tasks, such as paraphrasing, summarising, or describing how new information relates to existing knowledge (Weinstein 1988). For instance, the use of mental imagery to help remember the action sequence described in a play and the use of a sentence to relate a country and its major industrial product are both elaborations (Weinstein & Mayer, 1986). Organisational strategies are a category of elaboration strategies that focus on recognising and elaborating new material in some type of graphic form (Weinstein, Acee, & Jung, 2010). Examples of methods in this category include grouping the battles of World War II by geographical location, organising animals by their taxonomic category, and listing vocabulary in terms of their parts of speech (Weinstein 1988). Comprehension monitoring strategies include establishing learning goals, assessing the degree to which these goals are being met and, if necessary, modifying the structures being used to facilitate goal attainment (Weinstein & Mayer, 1986). Lastly, affective strategies help to create and maintain suitable internal and external climates for learning (Weinstein & Mayer, 1983). Examples of affective strategies include using relaxation and positive self-talk to reduce performance anxiety, and establishing priorities and setting a time schedule as a way to reduce procrastination (Weinstein & Mayer, 1986).

Teaching of Learning Strategies

Since students are not taught, that is, they do not have knowledge about, they cannot use learning strategies (Pressley & Harris, 1990). For this reason, students should be taught learning strategies in schools, so that they can learn, remember, and motivate themselves effectively (Weinstein & Mayer, 1986). The teaching of these strategies allows students to become strategic, effective, and lifelong learners (Weinstein & Hume, 1998). A review of the related literature gives some teaching approaches in regard of learning strategies in the classroom (e.g., Lenz, 1992; Paris & Paris, 2001; Pressley, Harris, & Marks, 1992; Rhoder, 2002; Weinstein & Mayer, 1986). Amongst these approaches, Weinstein and Mayer (1986) suggest three approaches in teaching of learning strategies. The first approach, embedded teaching, concentrates on incorporating learning strategies training into existing educational materials. Another approach, metacurriculum, uses existing interventions to teach learning strategies. The use of a metacurriculum to teach learning strategies involves teaching them along with regular content materials. The last approach, adjunct approach, involves creating some form of supplementary teaching (Weinstein & Mayer, 1986). A similar approach to teaching of learning strategies is seen to come from Rhoder (2002). As Rhoder (2002) suggests, there are three approaches in teaching of learning strategies at school. These approaches are stand alone, embedded, and immersion. In the stand alone approach, learning strategies are presented separately from the curriculum itself. In the embedded approach, teaching of learning strategies is embedded explicitly within the content of the curriculum. The stand alone and embedded approaches focus on explicit and direct teaching of learning strategies in the classroom. Lastly, in the immersion approach, learning strategies are taught implicitly, rather than explicitly. In this approach, students are immersed in understanding new information without focusing on the process they are using (Rhoder, 2002). On the other hand, Paris and Paris (2001) suggest two approaches for teaching of learning strategies. These approaches are implicit and explicit teaching of learning strategies. Implicit teaching of learning strategies involves behaviours and applications of teachers that are supposed to enhance the use of a learning strategy in students. In contrast, in explicit teaching of learning strategies, teachers directly teach or present the use of strategies and gives information on how they can apply the strategies in certain learning situations (Paris & Paris, 2001).

A review of literature in terms of teaching of learning strategies, in general, suggests two approaches; direct teaching and reciprocal teaching (Senemoğlu, 2004). In direct teaching, learning strategies are taught directly to students with specifically designed programmes or activities (Özer, 2004). In this approach, learning strategies are presented to students, and then the applications of these strategies are demonstrated to students (Lenz, 1992). On the other hand, in reciprocal teaching, learning strategies are taught to students by integrating with the curriculum (Özer, 2004). It is generally recommended that direct teaching should follow the main steps initially described by Levin (1992). In a typical sequence, the teacher determines the strategies which he or she will teach to the students. Then, the teacher makes the students gain some prior knowledge in regard of the selected learning strategy. After making the students gain some prior knowledge in regard of the selected learning strategy, the teacher prepares a plan for the teaching of the selected learning strategy. Then, based on the plan the teacher presents the use and the applications of the selected learning strategy to the students in the classroom. After that, the teacher makes the students apply the learning strategy by themselves. In this step, the teacher creates opportunities for students to apply the selected strategy in the first hand. Lastly, the teacher

follows the applications of the students in regard of the selected learning strategy, and then he or she gives feedback to the students on the application of the strategy (Lenz, 1992; Levin, 1992). In reciprocal teaching, the teacher asks questions to students by thinking voiced, makes explanations and predictions, and teaches the strategies by applying them in practice. After the teacher shows the applications of learning strategies by modelling, the students take the role of their teacher and be models for their peers using these strategies. While students are applying learning strategies by thinking voiced, they should be supported by taking feedback from their peers and teachers, as well as reinforced to learn and use these strategies in the classroom (Senemoğlu, 2004).

Effect of Teaching of Learning Strategies on Academic Achievement

While teaching of learning strategies has been applied in different school settings (e.g., Carns & Carns, 1991; Fooks, Mora, & Tracks, 1994; Nunn, 1995; Selçuk, Şahin, & Açıkgöz, 2011; Tuckman, 2003; Yıldız, 2003), courses (e.g., Baş, 2012; Ritchie & Volkl, 2000; Tay, 2007; Tuckman, 2003; Yıldız, 2003), and countries with different cultural backgrounds (e.g., Carns & Carns, 1991; Meltzer, Katzir-Cohen, & Miller, 2001; Selçuk, Şahin, & Açıkgöz, 2011; Tuckman, 2003), they are acknowledged to be a method that improve academic achievement of students. Although there is a number of empirical research focusing on the effect of teaching of learning strategies on academic achievement of students (e.g., Carns & Carns, 1991; Çalışkan S., 2011; Fooks, Mora, & Tracks, 1994; Meltzer, Katzir-Cohen, & Miller, 2001; Nunn, 1995; Ritchie & Volkl, 2000; Selçuk, Şahin, & Açıkgöz, 2011; Yıldız, 2003), the number of research examining the effectiveness of strategy teaching on academic achievement through a meta-analysis is very limited (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996). In a review carried out by Hattie, Biggs, and Purdie (1996), which is the first meta-analysis on the issue, it was found that the overall effect size was 0.57, indicating a moderate effect size value. In the research carried out by Donker et al. (2014), examining the effect of learning strategy instruction, the overall effect size was found out to be 0.66, indicating a moderate effect size value. In a similar review, Ergen and Kanadlı (2017) examined the effect of self-regulated learning strategies on academic achievement of students, finding a large (0.859) overall effect size value. Also, in a review conducted by Dignath and Büttner (2008), the overall effect sizes were found out to be 0.61 for primary schools and 0.54 for secondary schools, revealing moderate effect size values. When all the meta-analytic reviews in the scope were taken into consideration, it was concluded that the studies, examining strategy teaching, were mostly found to have a moderate effect size value. Besides, it was concluded that these meta-analytic reviews also considered a limited number of moderators to see the possible effects of strategy teaching on academic achievement/performance, especially focusing on studies in western context.

Method

Research Design

The current research adopted meta-analysis model (Glass, McGraw, & Smith, 1981; Lipsey & Wilson, 2001), to examine the effectiveness of teaching of learning strategies on academic achievement of students. Meta-analysis is a statistical technique for combining quantitative data from independent studies to draw a single conclusion (Hunter & Schmidt, 2004). According to Höffler and Leutner (2007), meta-analytic research requires a number of steps: (*i*) locating all possible studies, (*ii*) coding the studies for salient features and calculating effect sizes, and (*iii*) carrying out statistical analyses of the effect sizes and interpreting the data acquired.

Data Sources

In order to identify the relevant studies considering the effect of teaching of learning strategies, a systematic literature review was conducted over two months, using educational databases (i.e., Web of Science [Science and Social Science Citation Index], Education Resources Information Centre [ERIC], National Dissertations Centre of the Turkish Higher Education Council, Scopus, ULAKBIM, EBSCO, Science Direct, PsychInfo), as well as web-based repositories (i.e., Google Scholar). In search of the research considering the effect of teaching of learning strategies, different combinations of key words such as “learning strategies”, “effect of learning strategies”, “teaching of learning strategies”, “effect of teaching of learning strategies”, “learning strategy instruction”, and “effect of learning strategy instruction” were used. As a result of this extensive literature search, over 100 non-duplicate potential studies were reached in the research.

Criteria for Inclusion

A number of inclusion criteria for the current meta-analysis was taken into consideration in the research: (*i*) the studies evaluated teaching of learning strategies, used to improve academic achievement, (*ii*) the studies conducted on K-12 and university education, (*iii*) the experimental studies that conducted pre- and post-tests with control groups, (*iv*) the studies that compared the effect of teaching of learning strategies and traditional teaching methods, (*v*) the studies took place in Turkey, but the report published in English or in Turkish, (*vi*) the studies conducted in a period of twenty years, from 1998 to the present (2018), and (*vii*) the studies included a minimum implementation duration of 3 weeks.

Coding Procedure

In order to examine the effects and the methodological and substantive features of the studies included, the studies included in the research were coded. Therefore, a formal coding form for the current meta-analysis was developed and some moderators were included in this form. The moderators included sample size, publication type, course type, duration of implementation, instructional level, school setting, and socio-economic status. The moderators of the research were categorised as methodological moderators: (*i*) sample size ($N \leq 30$ = small, $N < 30$ = large), (*ii*) publication type (master's thesis/doctoral dissertation, journal article), and substantive moderators as: (*i*) course type (science, social science), (*ii*) duration of implementation (short = 3-8 weeks, long = 9 + weeks), (*iii*) instructional level (elementary school, university), (i*v*) school setting (urban, suburban), and (*v*) socioeconomic status (low, mixed, high).

On the other hand, a coding procedure is suggested in meta-analysis research (Card, 2012). So, in order to ensure the reliability of studies included in the research, coding should be conducted by at least two independent experts (Miles & Huberman, 1994). Therefore, the studies included in the current meta-analysis were coded independently by two researchers. To find their inter-rater agreement, the Kappa statistic was performed in the research (Cohen, 1960). As a result of the Kappa statistic performed, the reliability rate of the data of the studies included in the current meta-analysis was found to be high, $\kappa = .981$, $p < .001$, 95% CI. Thus, the results indicated that a perfect inter-rater agreement was reached in the research (Landis & Koch, 1977).

Statistical Analyses

In the research, procedure effectiveness technique of the meta-analysis method was adopted in for the analyses of the data (Borenstein, Hedges, Higgins, & Rothstein, 2009). This main purpose of this method is to calculate the differences of arithmetic means of the experimental and control groups in empirical research, formulated as $d = (X_e - X_c) / SD$ (Hunter and Schmidt, 2004). In the procedure effectiveness technique, standardised effect sizes, as Cohen's *d* or Hedges's *g*, are used (Hartung, Knapp, and Sinha, 2008). The calculation of the effect size in meta-analysis research is very important to obtain accurate findings with standard deviations and to interpret these findings (Lipsey & Wilson, 2001). In this research, for the calculations of the effect size, Hedge's *g* was used, and the significance level for the statistical analyses was adopted as 95% (Borenstein et al., 2009; Hedges & Olkin, 1985). Furthermore, a coefficient classification is taken into consideration in the interpretation of effect size values as a result of meta-analysis. In the current research, while interpreting the obtained effect sizes, the effect size classification suggested by Cohen (1992) was used. According to the classification suggested by Cohen (1992), small for effect size values between 0.20 and 0.50, medium for effect size values between 0.50-0.80, and large for effect size values between 0.80 or higher.

In the research, chi-square heterogeneity test of Cochran's *Q* was used to see whether there was heterogenity amongst the studies included in the meta-analysis (Borenstein et al., 2009). A *p*-value lower than the accepted significance level as result of the heterogeneity test demonstrates that the findings should be considered to be heterogeneous in line with the hypothesis put forward, indicating that studies are gathered from more than one distribution (Lipsey & Wilson, 2001). The significant chi-square value shows that the research findings are homogeneous; revealing that the effect size values can be used for all studies (Shelby & Vaske, 2008). In meta-analytic research, there are two types of statistical research models while combining the research findings as the fixed and the random effects models (Borenstein et al., 2009). In this research, both fixed-effects and random-effects models were used to interpret the obtained findings (Lipsey & Wilson, 2001). In the fixed effects model, variance is considered to be a result of interrelated data (Shelby & Vaske, 2008). Concerning the fixed effects model, there is one effect size showing the same effect size for all studies (Hunter & Schmidt, 2004). Conversely, the random effects model is considered to be appropriate when studies included are heterogeneous,

and the fixed effects model is not appropriate as well (Lipsey & Wilson, 2001). When the data collected are not homogeneous and the fixed effects model is not appropriate, this model is adopted in meta-analysis (Hedges, 1983). Thus, while deciding on the statistical model to be adopted in the meta-analysis, whether the effect sizes demonstrate a homogeneous distribution or not should be tested (Ellis, 2010).

Results

In this part of the research, the meta-analysis findings of the studies in relation with the effect of teaching of learning strategies on students' academic achievement were given. Firstly, general characteristics of the studies included in the research were given briefly, and then the overall findings in regard of the effect sizes of the entire studies and the substantive and methodological moderators were presented.

General Characteristics

When the general characteristics of the studies included in the research were examined, it was seen that 55.55% (n = 10) were journal articles, 44.45% (n = 8) them were master's theses and doctoral dissertations. Of these studies included in the research, 72.22% (n = 13) of them were conducted at elementary school level, 27.77% (n = 5) of them were conducted at university level. Also, 44.45% (n = 8) of the studies were conducted in science courses and 55.55% (n = 10) of them were carried out in social science courses (see Table 1).

Table 1. Characteristics of the studies in the meta-analysis

Author(s)/Year	Publication Type	Duration of Implementation	Course	Grade Level	Instructional Level	Sample Size
Bıyıklı and Doğan, 2015-a	Journal Article	6 week	Science	5	Elementary School	54
Bıyıklı and Doğan, 2015-b	Journal Article	6 week	Science	5	Elementary School	54
Bıyıklı and Doğan, 2015-c	Journal Article	6 week	Science	5	Elementary School	54
Bıyıklı and Doğan, 2015-d	Journal Article	6 week	Science	5	Elementary School	54
Sünbül, 1998	Thesis/Dissertation	4 week	Educational Psychology	-	University	71
Taşdemir and Tay, 2007	Journal Article	4 week	Science Teaching	-	University	52
Dikbaş, 2008-a	Thesis/Dissertation	10 weeks	Social Studies	5	Elementary School	82
Dikbaş, 2008-b	Thesis/Dissertation	10 weeks	Social Studies	5	Elementary School	57
Çalışkan, M., 2010	Thesis/Dissertation	15 weeks	Turkish	6	Elementary School	42
Baş, 2012	Journal Article	12 weeks	English	8	Elementary School	60
Tunçer and Güven, 2007	Journal Article	4 weeks	Social Studies	5	Elementary School	40
Selçuk, Şahin, and Açıkgöz, 2011	Journal Article	8 weeks	Physics	-	University	75
Çalışkan, S., 2011	Journal Article	6 weeks	Physics	-	University	36
Yıldız, 2003	Thesis/Dissertation	3 weeks	Science	5	Elementary School	44
Tay, 2007	Journal Article	3,5 weeks	Life Sciences and Social Studies Teaching / Development and Learning	-	University	60
Uysal, 2006	Thesis/Dissertation	3 weeks	Social Studies	7	Elementary School	47
Meydan, 2004	Thesis/Dissertation	4 weeks	Social Studies	4	Elementary School	68
Çerçi, 2005	Thesis/Dissertation	9 weeks	Turkish	8	Elementary School	44

Of the studies included in the current meta-analysis research, all the studies had positive effect size values (see Figure 1). Thus, it may be suggested that all the studies involved in the research had positive effect sizes, revealing an estimated positive effect size. An estimated positive effect size indicates that the performance is in favour of the experimental group, whereas an estimated negative effect size means that the performance is in favour of the control group (Wolf, 1986). So, based on the preliminary findings of the research, it may be implied that teaching of learning strategies was effective in improving academic achievement of students. Also, it was found that while the largest effect size belongs to the study conducted by Selçuk, Şahin, and Açıkgöz (2011), whereas the smallest one was found to belongs to the study carried out by Bıyıklı and Doğan (2015-a). Based on the classification suggested by Cohen (1992), it was understood that nine studies had a large, six studies had a moderate, and three studies had a small effect size in the research.

Overall Findings and Publication Bias

A total of 18 studies included in the analysis with a total sample size of 994 students participating from elementary school (n = 662, 66.60%) and university level (n = 332, 33.40%). As a result of the comparisons of a total of 18 studies included in the research, the overall weighted effect size was d = 0.892 (95% CI = 0.672 – 1.112). The Q-value indicated that the distribution of the effect sizes in this collection of studies was heterogeneous, Q (15) = 47.726, p < .001. The variance of the effect sizes of the studies was larger than could be explained by simple sampling error, so that a random effects model was performed in the research (see Table 2).

Table 2. Results related to overall effect sizes of the studies

							95% CI	
Model	k	ES	SE	Variance	Z	Q	Lower	Upper
Fixed Effects	18	0.880	0.067	0.004	13.216	47.726	0.750	1.011
Random Effects	18	0.892	0.112	0.013	7.952		0.672	1.112

Note. k = number of effect sizes; ES = effect size; SE = standard error; CI = confidence of interval for the average value of ES.

As a result of the values obtained in the analysis, it was revealed that teaching of learning strategies was more successful on raising academic achievement of students than the other methods of teaching in the classroom. Also, the obtained effect size value in the research was considered moderate (see Cohen, 1992). Besides, the result of Z-value indicated that the effect size was statistically significant, Z = 7.952, p < .000. Furthermore, the forest plot showing the distribution of the effect sizes for the studies included in the meta-analysis based on the random effects model was presented (see Figure 1).

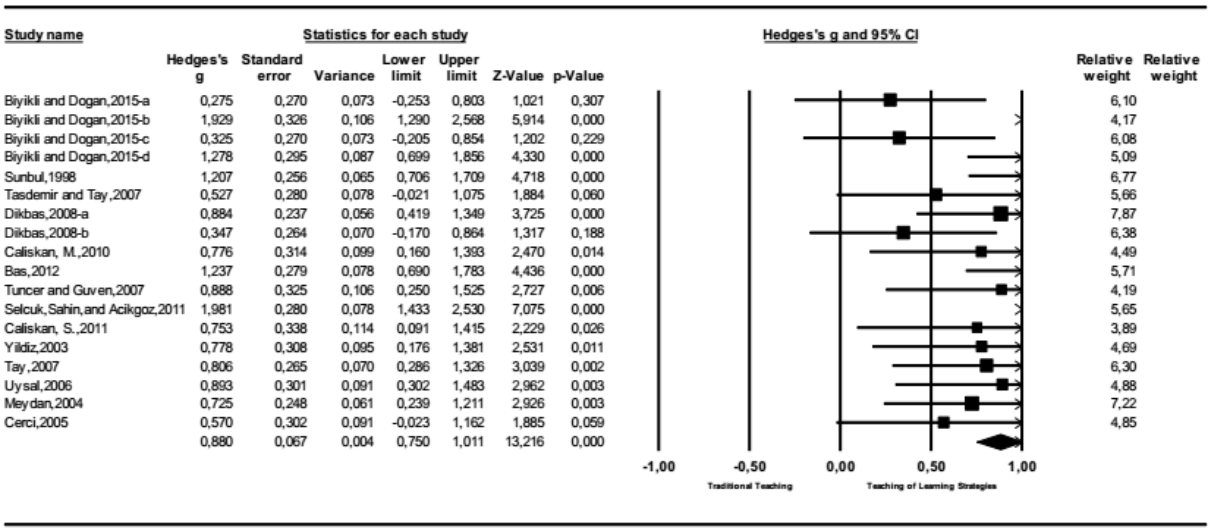

Figure 1. Forest plot showing the distribution of effect sizes

According to Figure 1 given, it was seen that all the studies included in the current meta-analysis had positive effect sizes. Therefore, it may be revealed that the results of all the studies indicated that teaching of learning strategies had a positive effect on students' academic achievement.

On the other hand, in order to examine the possibility of publication bias, the trim and fill method (Duval & Tweedie, 2000a) was performed to identify and correct funnel plot asymmetry. This method is used to estimate the number of missing studies due to removal of the most extreme results on one side of the funnel plot in the meta-analysis (Duval & Tweedie, 2000b). So, the funnel plot will be asymmetrical when there is any publication bias in the studies. In contrast, if there is no publication bias in the studies, the funnel plot will be distributed symmetrical (Cooper, 2016). Extreme effect sizes of interventions on the right hand of a funnel are trimmed to obtain a symmetric funnel plot in the trim and fill method (Duval & Tweedie, 2000a). In the research, the funnel plot seemed almost symmetrical (see Figure 2). The figure showed that the studies were quite neatly distributed. According to the trim and fill method performed, there were no studies missing, indicating that there was no publication bias in the meta-analysis.

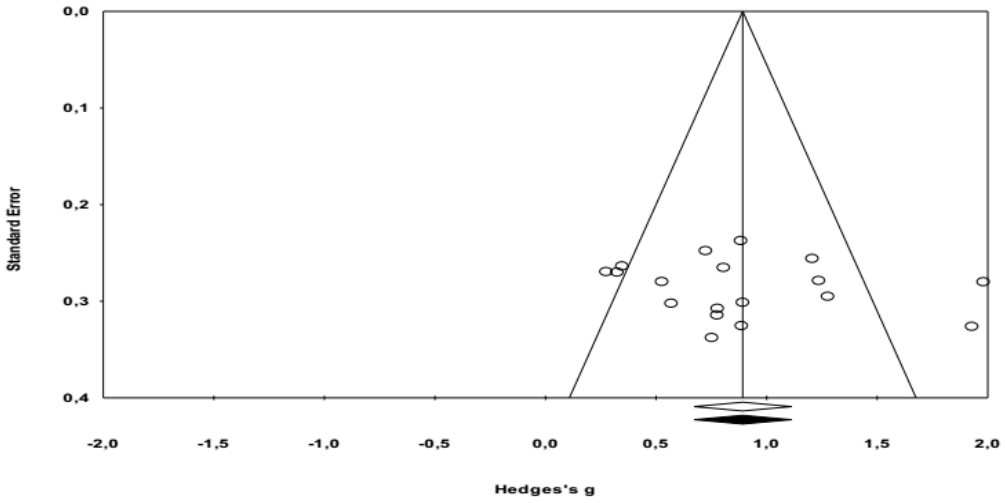

Figure 2. A funnel plot assessing possible publication bias

Also, there are some ways of assessing publication bias through performing statistical techniques, rather than non-statistical techniques such as trim and fill method (e.g., Rothstein, Sutton, & Borenstein, 2005; Lipsey & Wilson, 2001). Hence, in order to determine the publication bias through statistical techniques, classical fail-safe *N* analysis to reduce the average effect size to insignificant levels to increase the *p*-value for the meta-analysis to above 0.05 (Rosenthal, 1979), as well as Orwin's fail-safe *N* test to determine the values of criterion for a trivial log odd's ratio and mean log odds ratio in missing studies were performed (Orwin, 1983). In the current research, the classical fail-safe *N* analysis showed that a total of 810.00000 studies with null results would be required to bring the overall effect size to trivial level at 0.01. Besides, Orwin's fail-safe *N* test, which estimates the number of missing null studies that would be required to bring the average effect size to trivial level at 0.01, indicated that the number of missing null studies to bring the existing overall average effect sizes to 0.01 was found to be 141. Furthermore, rank correlation statistic suggested by Begg and Mazumdar (1994) was also performed in the research. In this method, Tau coefficient is expected to be closer to 1.00, as well as the *p*-value for the meta-analysis to be above 0.05 (Hunter & Schmidt, 2004). In the current research, the Tau coefficient was found to be 0.13 with a *p*-value above 0.05 ($p = 0.42$), indicating that there was no publication bias in the current meta-analysis.

Findings in Regard of Moderator Analyses

Findings in Regard of Methodological Moderators

The methodological moderators of the studies included in the current research were determined as sample size and publication type. In subgroup analyses, two or more groups are compared to examine the difference between the effect sizes. In the research, chi-square heterogeneity test Cochran's *Q*, which is the most common approach to evaluate the heterogeneity of the data acquired to determine the model to be used, was performed (Hedges & Olkin, 1985). According to the results of the heterogeneity test, a *p*-value lower than the accepted significance level demonstrates that the research results should be considered to be heterogeneous in line with the hypothesis put forward (Lipsey & Wilson, 2001). In contrast, a *p*-value upper than the accepted significance level demonstrates that the research results should be considered homogeneous (Hunter & Schmidt, 2004). Table 3 presented the methodological moderators of all the studies included in the research.

Table 3. Effect size differences in regard of methodological moderators

Subgroup	Q_B	p	k	ES	95% CI		SE
					Lower	Upper	
Sample Size	0.726	0.394					
Small			14	0.824	0.602	1.046	0.113
Large			4	1.107	0.496	1.718	0.312
Publication Type	0.963	0.326					
Thesis/Dissertation			8	0.781	0.591	0.971	0.097
Journal Article			10	0.993	0.616	1.370	0.192

Note. k = number of effect sizes; ES = effect size; SE = standard error; CI = confidence of interval for the average value of ES.

The subgroup analyses performed in regard of methodological moderators indicated that there was not a significant statistical difference in terms of sample size (Q_B (1) = 0.726, *ns*) and publication type (Q_B (1) = 0.963, *ns*). Thus, it may be suggested that the effect of teaching of learning strategies on students' academic achievement was not significant in terms of sample size and publication type, defined as methodological moderators in the research.

Findings in Regard of Substantive Moderators

The substantive moderators of the studies included in the current research were determined as course type, grade level, duration of implementation, instructional level, school setting, and socioeconomic status. According to the results of the heterogeneity test, a *p*-value lower than the accepted significance level demonstrates that the research results should be considered to be heterogeneous in line with the hypothesis put forward (Lipsey & Wilson, 2001). However, a *p*-value upper than the accepted significance level demonstrates that the research results should be considered to be homogeneous (Hunter & Schmidt, 2004). Table 4 presented the substantive moderators of all the studies included in the research.

Table 4. Effect size differences in regard of substantive moderators

Subgroup	Q_B	p	k	ES	95% CI		SE
					Lower	Upper	
Course Type	0.285	0.593					
Science			8	0.974	0.497	1.451	0.243
Social Science			10	0.836	0.666	1.006	0.087
Implementation Duration	0.713	0.399					
Short			13	0.944	0.657	1.230	0.146
Long			5	0.766	0.467	1.064	0.152
Instructional Level	0.709	0.400					
Elementary School			13	0.823	0.586	1.059	0.121
University			5	1.061	0.559	1.563	0.256
School Setting	0.495	0.482					
Urban			13	0.935	0.647	1.223	0.147
Suburban			5	0.786	0.487	1.086	0.153
Socioeconomic Status	0.704	0.703					
Low			5	0.786	0.487	1.086	0.153
Mixed			7	0.988	0.624	1.351	0.185
High			6	0.878	0.388	1.368	0.250

Note. k = number of effect sizes; ES = effect size; SE = standard error; CI = confidence of interval for the average value of ES.

The subgroup analyses performed regarding the substantive moderators indicated that the studies included in the meta-analysis were homogeneous, thus there was not a significant difference in terms of course type (Q_B (1) = 0.285, *ns*), duration of implementation (Q_B (1) = 0.713, *ns*), instructional level (Q_B (1) = 0.709, *ns*), school setting (Q_B (1) = 0.495, *ns*), and socioeconomic status (Q_B (2) = 0.704, *ns*). Therefore, it may be suggested that the effect of teaching of learning strategies on students' academic achievement was not significant in terms of course type, duration of implementation, instructional level, school setting, and socioeconomic status, defined as substantive moderators in the research.

Discussion

The purpose of the current research was to examine the effect of teaching of learning strategies on academic achievement of students. Although many studies have examined the effect of teaching of learning strategies on academic achievement of students (e.g., Carns & Carns, 1991; Çalışkan S., 2011; Fooks, Mora, & Tracks, 1994; Meltzer, Katzir-Cohen, & Miller, 2001; Nunn, 1995; Ritchie & Volkl, 2000; Selçuk, Şahin, & Açıkgöz, 2011; Yıldız, 2003), the number of research examining the overall effect of these studies is seen to be limited (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996). However, these studies were not seen to examine the effect of teaching of learning strategies, whereas they were understood to focus on the effect of study skills and self-regulated learning strategies (e.g., Dignath & Büttner, 2008; Donker et al., 2014; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996). However, the current meta-analytic research focused on teaching of learning strategies, rather than self-regulated learning or study skills, from primary education to university level of education by considering studies from Turkey, a country exhibiting western as well as non-western cultural characteristics.

The findings of the current meta-analysis indicated that teaching of learning strategies produced a positive but moderate effect on academic achievement. In the research, all the studies included in the meta-analysis were found to have positive effect sizes (see Figure 1). Thus, a positive effect size of these studies indicates an advantage for the experimental group, which adopted teaching of learning strategies over the control group using the traditional teaching method. The average effect size of the studies included in the meta-analysis was found to be 0.892 (SE = 0.112). According to Cohen (1992), effect size values between 0.51 and 1.00 are considered moderate. Therefore, it can be indicated that teaching of learning strategies are effective in the improvement of academic achievement of students. In other words, the findings of this research demonstrate that academic achievement of students can be improved by teaching of learning strategies in the classroom. The results of the research literature are also consistent with the findings of the current meta-analysis examining the effect of teaching of learning strategies (e.g., Donker et al., 2014). In the research conducted by Donker et al. (2014), the average mean effect size of the included studies was found to be 0.66 (SE = 0.05), indicating a moderate effect size value. In a similar research conducted by Hattie, Biggs, and Purdie (1996), overall effect size on student performance was found as 0.57 (SE = 0.04), indicating a moderate effect size value. Also, Dignath and Büttner (2008) carried out a meta-analytic research, finding overall effect size values on academic performance as 0.61 (SE = 0.05) for primary schools and as 0.54 (SE = 0.11) for secondary schools, reporting moderate effect size values. Besides, in a recent review, Ergen and Kanadlı (2017) found the overall effect size on academic achievement as 0.85 (SE = 0.114), indicating a large effect size value. Furthermore, other research studies also reported that there was a significant positive correlation between learning strategies of students and their academic achievement in school courses (e.g., Ghiasvand, 2010; Wolters, 1999), as well as in central system examinations (e.g., Çınar, 2017). In this sense, it is evident that students using learning strategies are more successful than students not using these strategies (e.g., Loranger, 1994; Paris & Myers, 1981; Ritchie & Volkl, 2000; Şimşek & Balaban, 2010).

On the other hand, some moderator analyses were also conducted in the research. According to one of these analyses, it was found that there was not a significant difference between effect sizes in terms of sample size. In other words, there was not a significant difference between academic achievement of students in regard of large and small sample sizes. Therefore, it can be indicated that academic achievement of students is not affected by sample size in the classroom. Since the use of learning strategies is based upon individual application of students, rather than a whole class application (Weinstein & Mayer, 1986), sample size does not create any significant difference in terms of students' academic achievement. So, it can be revealed based on the finding that learning strategies can be taught not only in classrooms with small populations, but can also be taught in crowded classrooms. This finding is considered important especially for countries having crowded classroom populations such as Turkey. Since traditional teaching method is seen to be ineffective in such classrooms, learning strategies can be taught to students to help overcome learning difficulties and problems faced during teaching-learning process. Thus, the problems and difficulties coming from the nature of the crowded classrooms can be resolved by teaching of learning strategies to students. Students, by using these strategies effectively in the classroom or at home, may be more successful than being taught in a traditional classroom setting. According to Pressley and Harris (1990), students cannot use learning strategies because of not having enough information about these strategies. One of the reasons of individual differences amongst students lies behind selecting and using the appropriate learning strategy in the classroom (Vermunt, 1996). Hence, learning strategies should be taught to students, in order to make them learn, remember, and motive themselves effectively (Weinstein & Mayer, 1986), since successful students use learning strategies more effectively than their unsuccessful peers (Loranger, 1994; Paris & Myers, 1981; Şimşek & Balaban, 2010). By taking the

positive outcome of learning strategies on academic achievement even in crowded classrooms into account, teaching of these strategies can be of help overcome learning problems in educational systems.

According to another finding, it was found that there was not a significant difference between effect sizes regarding the publication type. In the research, all the studies included in the meta-analysis, regardless of theses/dissertations or journal articles, found a positive advantage of teaching of learning strategies. However, some meta-analytic studies may be seen to report contrasting results between published journal articles and unpublished theses/dissertations in favour of journal articles. According to Balta, Michinov, Balyimez, and Ayaz (2017, this difference can be explained by the publication strategies of the researchers, since they submit their studies when they have significant results. Unlike journal articles, theses/dissertations are not submitted for publication, resulting in presenting significant and/or insignificant findings. As for Rust (1990), one of the problems in meta-analytic research is that studies having significant results are worth publishing in journals, whereas studies presenting insignificant results are not the case. In this context, the current meta-analysis reported a contrasting finding in regard of the publication type unlike other studies, suggesting both theses/dissertations and journal articles have similar effect size values. Therefore, it is revealed that publication type does not create a significant difference on the academic achievement of students. This finding is also considered important that reports no publication bias, since both publication types reporting similar results.

Regarding the course type, it was found that there was not a significant difference between effect size values. When all the studies in the current meta-analysis were taken into consideration, the effect sizes of these studies were found all positive, indicating that academic achievement was improved regardless of course types whether adopting science courses or social science courses in the classroom. In a recent research, Ergen and Kanadlı (2017) also found that academic achievement did not show any significant difference according to course type, which is in line with the finding of the current research. This finding may be explained by the fact that teaching of learning strategies can be implemented in the classroom, regardless of which course type is taken into consideration. Moreover, the positive effect of experimental studies suggests that teaching of learning strategies can be implemented in various courses, without reporting any insignificant result in a certain type of course. However, there are also results which do not support the current finding of this research in the related literature (e.g., Dignath & Büttner, 2008; Donker et al., 2014). In these meta-analyses, while Donker et al. (2014) found that writing had the highest effect size value, Dignath and Büttner (2008) found that mathematics had the highest effect size on academic performance. Unlike these studies (Dignath & Büttner, 2008; Donker et al., 2014), due to the very limited number of studies included in the meta-analysis in regard of science, mathematics, and physics courses (see Table 1), these studies in terms of science, physics, and mathematics were addressed as one course, rather than separate course types. For a reliable result in a meta-analytic review, at least five studies should be taken into consideration (Rosenberg, Adams, & Gurevitch, 2000). Hence, the combination of three different courses in one course type may have restricted the see the real effect sizes of these individual courses in the research. Conducting more studies in regard of these individual courses may help better compare the effect sizes with social science courses. It must also be noted that the same approach of analysis of courses was applied on social science course types, due to the same restrictions (see Table 1). Besides, the approach in analysing the studies included in the meta-analysis concerning the course type may have affected the outcome of the effect size values obtained. However, according to Donker et al. (2014), the findings of the studies in different meta-analyses cannot be compared to on a one to one basis, due to the approaches adopted in analysing the studies.

With respect to the duration of implementation, it was revealed that there was not a significant difference between effect sizes on academic achievement. This finding suggests that the length of intervention, whether short or long, does not show a significant difference on academic achievement of students. This finding further indicates that longer interventions, as not expected, are not significant, since after eight weeks of implementation academic achievement of students do not reach an important improvement level. This can be explained by the fact that when learning strategies are taught to students in the classroom within a reasonable time, there is no need to pursue the teaching of these strategies for a long period of time. A short period of teaching duration of learning strategies is seen enough to make students gain and use these strategies in the classroom, based on the related finding obtained in the research. Consistent with the related finding of this research, Daniel (2000) found that short period of interventions demonstrated superior learning outcomes than the traditional semester, indicating that longer period of interventions do not have a significant impact on the learning outcomes of students. Similarly, in a more recent research, Austin and Gustafson (2006) found that short period of courses have a significant effect on student performance than longer period of courses at school. Hence, the results of these studies are said to support the related finding of the current research, suggesting that shorter interventions of teaching of learning strategies can be effective, rather than implementing these strategies longer in the classroom. It should not be thought that longer intervention of teaching of learning strategies is not

effective, however, despite it is found to create no significant improvement on academic achievement, it may help students better perform learning strategies in the teaching-learning process.

According to another finding in the research, it was found that there was not a significant difference between effect sizes in terms of instructional level. The obtained finding suggests that academic achievement of students do not differ in regard of instructional level, whether they study at an elementary school or at a university. This finding also suggests that both elementary school and university students profit well from teaching of learning strategies and that instructional level is not related to the outcomes of their achievement. A similar finding was seen to be obtained by Ergen and Kanadlı (2017), which was reported that instructional level showed no significant difference on academic achievement. Besides, in the research conducted by Donker et al. (2014), it was seen that there was not a significant difference in terms of instructional level, which is in line with the related finding of this research. Therefore, it can be revealed that learning strategies can be taught to all age groups starting from primary school to university level of education. However, while there was no significant difference between effect sizes in regard of instructional level in the current research, the research literature was seen to report contrasting results (e.g., Dignath & Büttner, 2008). Despite the study, conducted by Dignath and Büttner (2008), took exclusively primary and secondary education into account, it showed a significant difference between the effect size values of the studies included in the meta-analysis. Furthermore, Dignath and Büttner (2008), by considering students' ages, reported that skills teaching was more effective in primary school than in secondary school, contrasting with the related finding of the current research. Unlike this study, the current research reported that teaching of learning strategies are effective in both elementary school and university level of education, suggesting that these strategies can well be taught to all students. It must also be noted that since there was no experimental study examining the effect of teaching of learning strategies in terms of high school and primary school level in the literature, the data for these instructional levels were not be able to be involved in the current meta-analysis. So, unfortunately, the analysis regarding the instructional level was performed by only taking elementary school and university level into account. In order to make a reliable and healthy discussion on the effect of teaching of learning strategies on academic achievement concerning the instructional level, more research is needed especially conducted in high school and primary school levels. It is thought that an experimental implementation of teaching of learning strategies in primary school and high school levels can make a difference, because these two instructional levels have their own specific characteristics. In particular, most students attend university entrance examinations in high school level, so that teaching of learning strategies can result in different findings. Besides, due to the ages and cognitive characteristics of primary school students, teaching of these strategies may result in interesting findings. In this research, most studies included in the meta-analysis were seen to be conducted especially in elementary schools (grades 5 to 8), rather than in primary schools and high schools (see Table 1). Researchers may especially choose these grade levels/instructional levels, because of difficulties and problems of primary schools and high schools face in the Turkish context. Therefore, more research on this issue may resolve this problem and display a broad picture of the effect of teaching of learning strategies on academic achievement, by considering especially primary schools and high schools.

Concerning the school setting, it was found that there was not a significant difference between effect sizes on academic achievement. This finding suggests that the effect of teaching of learning strategies on academic achievement do not differ regarding the school setting, whether urban or suburban schools. Frankly, in the data collection process of this research, it was tended to make an analysis especially in comparison of urban and rural school settings, but this was then revised to compare urban and suburban schools, due to the number of studies in rural school settings. Although an analysis was not possible in comparison of urban and rural school settings in the research, the related finding is considered to make a significant contribution to the current meta-analysis. While no meta-analytic research in terms of strategy teaching has examined the effect of such a moderator so far (see Donker et al., 2014; Dignath & Büttner, 2008; Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996), this research, by considering school setting as a moderator, is believed to open a new path for the teaching of learning strategies not only in urban school settings, but also in suburban school settings. The research, as not expected, reported that the effect of teaching of learning strategies on academic achievement was similar in relatively different school settings, indicating that both urban and suburban school students benefit well from teaching of these strategies in the same way. Thus, it can be suggested that learning strategies can be taught to all students in different school settings, whether in urban or in suburban schools. This finding is not only important by taking such a moderator in such a research for the first time, it is also important to report that teaching of learning strategies can well be taught to all students in handicapped school settings. Also, this finding is considered to support the last finding of this research, reporting there is no significant difference between effect sizes in terms of socioeconomic status (SES). As expected, students, either in suburban school settings or with low SES backgrounds, are unfortunately in handicapped conditions in schooling, so that they are considered to improve their achievement less than students studying in urban school settings or with high SES

backgrounds (Brown, Anfara, & Roney, 2004; Lee & Burkam, 2002). However, the current research, by addressing school setting, indicated that students both in urban and suburban school settings can benefit equally from teaching of learning strategies in the classroom. Therefore, it can be suggested that students especially in suburban school settings, as well as in urban school settings, may have a chance to improve their academic achievement by teaching them learn how to learn. Otherwise, they may not able to have a chance to improve their academic achievement in traditional and handicapped school settings. So, learning strategies, by this way, is believed to create paths for students to direct their own learning, minimising the problems and restrictions of their school setting.

Lastly, it was found that there was not a significant difference between effect sizes in terms of SES. This finding is considered as one of the most crucial findings obtained in the research, since earlier research has left SES unaddressed (see Ergen & Kanadlı, 2017; Hattie, Biggs, & Purdie, 1996), excluding the study conducted by Donker et al. (2014). Although the number of studies included in the meta-analysis is limited to draw a general conclusion in regard of SES, the related finding suggests that learning strategies can be taught to all students coming from different (low, mixed, high) parental SES backgrounds. The finding also indicates that students can all be successful by teaching of learning strategies regardless of their SES backgrounds. For example, in a study conducted by Donker et al. (2014), it was seen that strategy use was effective in all groups, children from low SES, children with learning disabilities and special needs, and gifted children and children from high SES backgrounds. Therefore, this result can be said to be in line with the related finding of the current research. While it should be taken into consideration that SES is a descriptive variable, not an exploratory one (Pintrich & Schunk, 2002), the research literature reports that there is a positive significant correlation between SES and academic achievement (Sirin, 2005), indicating successful students have families with high SES backgrounds. However, by contrasting the results in the related literature, the finding of this research suggests that all students, regardless of their SES backgrounds, can be successful at school. All students, whether coming from low or high SES backgrounds, can be trained to use learning strategies in the classroom (Devlin, Kift, Nelson, Smith, & McKay, 2012). So, the finding opens a new path for the future of teaching of learning strategies, since it can change education reform movements in countries such as Turkey in terms of the improvement of academic achievement of students with low SES backgrounds. While low SES has been considered a handicapped characteristic (Cowardin, 1986), it is a critical factor in school failure of students (Finn & Rock, 1997). These students are concluded that they cannot benefit more from traditional teaching, resulting in low academic achievement (Chall, 2000; Wenglinsky, 2002). However, this research showed that students either from low or high SES both benefit from teaching of learning strategies, so that they can be more successful by using learning strategies effectively. Hence, an effective teaching of learning strategies should be implemented in classrooms, in order to make students with low SES improve their academic achievement. By this way, unlike students with high SES backgrounds, students with low SES can benefit more from teaching of learning strategies and improve their achievement, by learning how to learn in the classroom. In traditional classrooms, individual differences are not taken into consideration, and every student is directed to the same type of teaching, the lecture method (Lujan & DiCarlo, 2006), so that students with low SES do not have a chance to learn how to learn (Stiggins, 2002). These students also have no computers, reference books, and other learning materials at home to learn more, as well as their parents cannot provide them with formal training outside of school (Lareau, 2003). Whereas, students with high SES backgrounds have more computers, reference books, and other learning materials in the home and their parents provide more formal training outside of school (Lee & Burkam, 2002). Also, parents of low SES students are not enough involved in their children's schooling and other activities (Brown, Anfara, & Roney, 2004), as well as they are more likely to emphasis conformity and obedience (Macionis, 2006). However, parents of students with high SES tend to be more involved in their children's schooling (Diamond & Gomez, 2004), and they encourage autonomy, individual responsibility, and self-control (Greenfield, Trumbull, Keller, Rothstein-Fisch, Suzuki, & Quiroz, 2006). So, it is seen that there are more advantages for students with having high SES in schooling, rather than students having the low one. Therefore, students with low SES, not having enough resources and extra training out of school, are in need of learning how to learn, so that learning strategies should be taught to these students in the classrooms. Although it is known that certain home conditions make it more difficult for students to succeed in school (Rothstein, 2004), teachers can do much to overcome these problems (Darling-Hammond & Bransford, 2005), by teaching learning strategies to students having low SES backgrounds.

Conclusion

In this research, the effect of teaching of learning strategies on academic achievement of students was examined through meta-analysis. In the current meta-analysis, firstly, some general characteristics of the studies included were given briefly, and then the overall effect size values were presented. After the presentation of the overall

effect sizes, these values in terms of the effect sizes were compared with some moderators such as sample size, publication type, course type, implementation duration, instructional level, school setting, and socioeconomic status. Of the total 18 studies included in the meta-analysis, the overall weighted effect size was found to be 0.892, indicating a moderate effect size value. Also, the effect size values were compared in terms of some methodological and substantive moderators in the research. According to the analyses, it was revealed that the effect of teaching of learning strategies did not differ in regard of all moderators, namely sample size, publication type, course type, implementation duration, instructional level, school setting, and socioeconomic status. Therefore, it was concluded that there were no statistical significant differences between effect sizes in terms of all the moderators, which were taken into consideration in the current meta-analysis.

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