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The Effect of Teaching "Learning Strategies" on Academic Achievement: A Meta-Analysis Study*

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ABSTRACT

Purpose: This study aimed to perform a meta-analysis of results from the experimental studies that examined the effect of learning strategies on students' academic achievement in Turkey between 2000 and 2016.

Method: This study employed a meta-analysis method to combine the results of experimental studies on the effect of teaching learning strategies on students' academic achievement. Twenty-eight studies comprising of theses and peer-reviewed articles involving an experimental analysis of the effect of learning strategies on students' achievement were included in this study.

Results: The random effects model was used in the study and the mean effect size value was found at large effect level (d = 1.21). The eta-squared calculated for Cohen's d of 1.21 was found to be .268. This value obtained using 31 effect sizes from the results of 28 experimental studies conducted with 1,641 students indicated that the learning strategies had 26.8% positive effect on students' academic achievement.

Implications for Research and Practice: Sub-group analyses were also made in the sub-categories (education level, discipline, strategy teaching style, and strategy type) within the scope of the research, and it was determined that the teaching of learning strategies differed only statistically according to the discipline area. Several suggestions based on the research results were presented.

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Introduction

"Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn."

(Toffler, 1974)

Developments in cognitive psychology, science and technology affected educational settings together with the components included, just like they affected various other environments. In this sense, changes in curricula are observed to be in parallel with the developments. The differences between the curricula adopted in the early years of the Republic Period (in Turkey) and those adopted in the final years reflect these developments. With the developments, the point of view towards individuals has changed in educational settings. Individuals are no longer regarded as passive receivers of knowledge, but active participants in its creation. Moreover, knowledge is updated rapidly, becoming too much and too variable to be conveyed to individuals. In this regard, there is a need for training individuals who can adapt to the necessities of time; know themselves; in other words, continuously update their knowledge; take responsibility for their learning; know how to learn; and are involved in life-long learning. At this point, we can see the learning strategies that can facilitate the act of learning. According to this need, common skills (critical thinking, creative thinking, communication skills, inquiry-based skills, problem solving skills, ability to use information technologies, entrepreneurial skills, and Turkish language skills), which are included in the backbone of all programs (communication in the mother tongue, mathematical competence, digital competence, competence related to social citizenship, taking the initiative and entrepreneurship perception, cultural awareness and expression), and learning to learn is also listed among these competencies with the amendment made in 2017 (Ministry of National Education [MoNE], 2017). Within the framework of competencies in Turkey; these competencies include awareness of the individual's learning needs, ability to cope with learning difficulties, insistence on one's own learning, seeking guidance and benefiting from it (MoNE, 2018). Indeed, a good teaching involves teaching students how to learn, remember, think, and motivate themselves as much as whatever they are taught (Weinstein & MacDonald, 1986). At this point, learning strategies that facilitate learning of anticipation are emerging, and the updates that are made suggest that learning strategies need to be emphasized more. Various researchers (Arends, 1997; Demirel, 2003; Sonmez, 2007; Weinstern & Mayer; 1986) reported that learning strategies, i.e., knowing how to learn in a better and easier way (Brandt,1988/1989), constitute the basis of independent learning (Weinstein & MacDonald, 1986) and learning how to learn. Demirel (2003) briefly defined learning strategies as the set of mental tactics used by individuals in a special learning setting to facilitate acquisition of knowledge and skills. To Arends (1997), learning strategies point out to behaviour and thinking processes that include cognitive strategies such as memorizing and recalling, and the cognitive processes directing these cognitive strategies that are used by learners and affect their learning. What is common in these definitions is the fact that individuals take active role in the learning process, and know how to acquire knowledge in a better and easier way, thus going through conscious mental processes.

In this study, subject of learning strategies consists of cognitive strategies according to Pintrich's classification. Self-regulated learning strategies are grouped in four categories: cognitive, metacognitive, resource management, and motivational strategies (Pintrich, 1999). However, there is no agreement reached by researchers on the classification of learning strategies. Although there are no great differences among the classifications, the learning strategies are classified in various ways (Gagne, 1988; Ozer, 2003; Senemoglu, 2001; Weinstein & Mayer, 1986). Some researchers classify learning strategies into five major categories as rehearsal, elaboration, organization, metacognition, and motivation, which are frequently referred to in the literature (Weinstein & Mayer, 1986). Some others adapted the strategies to certain disciplines, and proposed a classification of language learning strategies (O'Malley & Chamot, 1985; Oxford, 1990) or a classification of vocabulary learning strategies (Schmitt, 1997). Hereafter, a sort of classification with regard to learning strategies in one of the most frequently cited reference books will be detailed. The references can be reviewed for further information about the other classifications.

According to the classification of Weinstein and Mayer (1986), rehearsal strategies that have an important place in selecting and acquiring knowledge involve reiterating aloud a material presented to the class as it is, underlining important parts of a text and taking notes, reciting the causes of an incident, and allowing the delivery of information to working memory for more difficult tasks. Elaboration strategies, aiming at integrating previous knowledge with newer ones, ensure the transference of information from the working memory to the long-term memory, and include summarizing, interpreting, expressing the relationship between newer knowledge with the previous ones, creating simulations and taking productive notes. The main purposes of organization strategies used for complex tasks such as defining the main idea and the outline of a text or creating diagrams to reveal important details are the selection of information to be processed in the working memory, and the establishment of relationships between the ideas in this memory. Metacognition strategies control deficiencies in learning through incorporating the determination of the learners' own learning objectives for any learning activity by themselves, the identification of the extent of goal achievement and the change of the strategy if needed, and include students' questioning themselves about comprehension of the material presented to the class and using questions to direct learning at the beginning of a chapter. Affective strategies such as helping to cope with test anxiety, to be careful and relaxed also involve the use of thinking through working in a quiet place to reduce distracting external stimuli or not focusing on failure to avoid the anxiety of failure. The studies in this area focus on the strategies used by the learner to focus attention, keep motivation, performance anxiety and effective time management.

The studies conducted on learning strategies reported that teaching of such strategies affects different variables such as academic achievement (Biyikli &Dogan, 2015; Cross & Lipson, 1984; Caliskan & Sunbul, 2011; Kaydu, 2004; Paris, Ning & Downing, 2011; Yildiz, 2003), metacognitive awareness (Bas, 2012; Yokus, 2009), and metacognitive skills (Caliskan & Sunbul, 2011) positively, indicating that learning strategies can be taught (Dansereau et al., 1979; Demirel, 1993; Demirel, Askin-Tekkol,

Cigdem & Demir, 2016). Accordingly, there are two different approaches adopted in teaching these learning strategies: integrated (subject-based) and independent (general). It is still a question of debate whether learning strategies should be taught in a "subject-based" way or in a "general" way independent of the subject (Caliskan & Sunbul, 2011). Researchers arguing that learning strategies should be integrated into subject matter (Brandt, 1988/1989; Erdem, 2005; Levin, 1986), point out that the teaching of strategies differs based on the content and requirements of the subject matter. They argue that teaching strategies cannot be independent from the subject matter and should be a part of teaching the subject. Those arguing that strategies should be taught independently of the subject (Weinstein & Mayer, 1986) point out potential disruptions that may occur due to the differences in the knowledge and skills of teachers when strategies are integrated into the subject, arguing that strategy teaching should be provided within the scope of a general program. Some researchers combine these two approaches and propose an eclectic approach in which advantages of both approaches are combined (Lenz, 1992; Somuncuoglu & Yildirim, 1998). Indeed, a strategy taught in a course might be helpful in learning another subject matter, and students may explore its advantage by themselves. On the other hand, students may assess the learning strategies taught independently of the subject based on their mental process, and find out how they can use it.

Researchers indicate that the Turkish Ministry of National Education, schools and teachers play an important role in helping individuals learn the learning (Demirel, 1993; Erdem, 2005; Ozer, 2003; Somuncuoglu & Yildirim, 1998). They also make some recommendations and a list of required qualifications of the programs for learning strategies (Lenz, 1992; Paris, 1988; as cited in Ozer, 2004). For example, Weinstein et al. (1989) indicate that critical thinking must definitely be incorporated into the process of teaching learning strategies, emphasizing that being equipped with a comprehensive "repertoire of strategies" is important for learners to reach the maturity of being selective and flexible while using these strategies. In this sense, Somuncuoglu and Yildirim (1998) state that effective teaching of strategies should be addressed in a context of critical thinking/problem solving skills, and its relationship with specific learning activities or problems must be especially emphasized. Some researchers think that learning strategies should be a part of learners' life and adopted throughout the school, in other words, these strategies should be embedded into the school's culture in order to increase the efficiency of learners (Lenz, 1988; Ozer, 2003).

Although most of the studies on learning strategies are descriptive and correlational (Akkus, İspir, Ay, & Saygi, 2011; Bulus, Duru, Balkis, & Duru, 2011; Cesur & Fer, 2011; Ghee, İsmail, & Kabilan, 2010; Ning & Downing, 2011; Saracaloglu & Karasakaloglu, 2011; Tunca & Alkin-Sahin, 2014), there are still experimental studies. Experimental studies are usually focused on examining the effect of learning strategies on academic achievement (Kaydu, 2004; Mayer, 1980; Yildiz, 2003), attitudes (Belet, 2005; Dikbas & Hasirci, 2008), metacognitive awareness (Bas, 2012; Yokus, 2009), retention of learning (Bozkurt, 2007; Meydan, 2010), metacognitive skills (Caliskan & Sunbul, 2011), and most of them pointed out positive improvements in the related variables. The redundancy of research related to learning strategies has led the

researchers to consolidate them recently (for example: Ardasheva, Wang, Adesope, & Valentine, 2017; de Boer, H., Donker, A. S., & van der Werf, 2014; Demirel, Askin-Tekkol, Cigdem, & Demir, 2016; Donker, Boer, Kostons, van Ewijk, & van der Werf, 2013; Ergen & Kanadli, 2017; Hattie & Donoghue, 2016; Keskin, 2014). The two studies have been found to compile the postgraduate theses on learning strategies (Demirel, Askin-Tekkol, Cigdem, & Demir, 2016; Keskin, 2014) in Turkey. The research conducted in Turkey reveal the thematic and methodological state of postgraduate theses in the relevant field while it is observed that a great number of meta-analysis studies have been carried out abroad. There are various studies conducted in Turkey on the effect of teaching learning strategies on students' academic achievement in various courses. The studies on different dimensions of learning strategies need to be combined, synthesized and assessed. In this regard, through a meta-analysis, this study will make a significant contribution to the literature by determining the common directions through the combination of the results of the studies conducted in Turkey. To date, only one meta-analysis study on the effect of self-regulation strategies on academic achievement (Ergen & Kanadli, 2017) has been conducted in Turkey. Ergen and Kanadli's (2017) study included both relational and experimental studies and 11 studies in the context of cognitive strategies. In this context, the present study differs from Ergen and Kanadli's (2017) study, including experimental studies involving teaching of cognitive learning strategies. The limitation of the study stems from the research objective to reveal the effects of teaching learning strategies in the context of Turkey. As a matter of fact, it would be appropriate to limit the scope of the research to Turkey in academic sense as the national culture and approaches to learning strategies would be different from other countries. This study aimed to perform a meta-analysis of results from the experimental and quasi-experimental studies that examined the effect of learning strategies on students' academic achievement in Turkey between 2000 and 2016. In this sense, answers were sought to the following research questions:

1. How effective is teaching of learning strategies on students' academic achievement according to the findings of the experimental studies conducted in Turkey between 2000 and 2016?
2. Do the findings of the experimental studies conducted in Turkey between 2000 and 2016 on the effect of teaching learning strategies on students' academic achievement differ significantly according to different variables (education level, and discipline)?

Trying to seek answers to these two research questions, this study is important in raising awareness among educational policy makers, program developers and teachers about how to teach learning strategies, and in combining and synthesizing the related studies in a systematic way, thus showing the big picture and serving as a guide to the learning processes. Moreover, the research will give instructive clues related to national teaching processes in terms of revealing the general opinion about Turkey.

Method

Increased number of primary studies on specific issues also increased attention to meta-analysis studies which are based on the synthesis of empirical studies that combine different and similar findings of such studies, and are more comprehensive, practical and resistive to the limitations of the studies (Ustun & Eryilmaz, 2014). At this point, "meta-analysis" can be seen as one of the research syntheses that was defined by Borenstein, Hedges, Higgins and Rothstein (2009) as a combination of statistical findings of quantitative studies in a systematic way. On the other hand, Cooper, Hedges and Valentine (2009) indicate that meta-analysis is different from research synthesis and has a special structure. Meta-analysis, by its very nature, provides a combination of a large amount of quantitative findings in a consistent and coherent way by taking account of the effect sizes, and aims to derive meaningful generalizations by analyzing these findings in an organized way (Cohen, Manion & Morrison, 2001). This study employed the meta-analysis method to combine the results of experimental studies on the effect of teaching learning strategies on students' academic achievement. After formulating a research question, six steps can be followed in a typical meta-analysis (Field & Gillett, 2010, p. 666): 1) doing a literature search; 2) deciding the inclusion and exclusion criteria and apply them; 3) calculation of effect sizes for each study to be included; 4) doing the basic meta-analysis; 5) considering some more advanced analyses such as publication bias analysis and exploring moderator variables; and 6) writing up the results. These aforementioned steps were followed in this study.

Publication bias emerges as an important problem in meta-analysis studies. Rothstein, Sutton and Borenstein (2006) indicate that publication bias occurs when only the findings of published studies are included in the meta-analysis or due to the tendency of academic magazines to publish the studies that are significantly different from the others. Therefore, incorporating as many and various studies as possible in the meta-analysis can be used as a precaution against publication bias and would provide the opportunity to obtain more valid and reliable results. Other factors affecting the validity of meta-analyses are; the fact that the measuring instruments used in the primary studies do not have sufficient reliability and validity, the calculation of the effect size is not explained and the study is entered into an independent research process from the area where the work is done (Greco, Zangrillo, Biondi-Zoccai, & Landoni, 2013).

Data Collection

Several online databases including Google Scholar, ULAKBİM and National Thesis Center were screened to find the published articles, full texts of papers and unpublished theses. During the search, the key word template of "ogrenme stratejileri" OR "learning strategy" AND "deneysel OR experimental" AND "basari OR achievement" for Turkish pages in Google Scholar were used and 1,060 studies were found in this way. One hundred seventy-six publications were found in the (Turkey) National Thesis Centre, and 205 publications were found in ULAKBİM database. In total, 1,436 publications in Turkey were reached either published or unpublished,

either in Turkish or English. To this end, we completed the searching process in January 2017, and included the studies conducted in Turkey throughout a period of 17 years between the years of 2000 to 2016.

The criteria used to select the studies were as follows:

1. The study should be conducted in Turkey between the years of 2000-2016;
2. The study should be in either Turkish or English, and in the form of a thesis, an article or a full text paper;
3. The study should examine the effect of learning strategies on students' achievement experimentally or quasi-experimentally;
4. The study should provide sufficient statistical data (N, $\bar{x}$, SD etc.) to allow for the calculation of effect sizes.
5. The measurement tool used in the study should have sufficient psychometric properties (i.e., validity and reliability).

As a result of the classification of the total of 1,436 publications reached by the last search on the 20th of January 2017 according to aforementioned criteria, this study concentrated on the remaining 352 studies. An e-mail was sent to the authors of the studies that met the selection criteria but were not accessible; however, the authors did not respond to e-mails. Twenty-eight studies comprising of theses and peer-reviewed articles involving an experimental analysis of the effect of learning strategies on students' achievement were included in this study. Thirty-one effect sizes were calculated in total, and analyses were conducted with these 31 effect sizes as there was more than one experimental group in three of the studies. Apart from these 28 studies, no other studies were found to provide sufficient data and meet the necessary requirements in the form of a full-text paper or poster presentation.

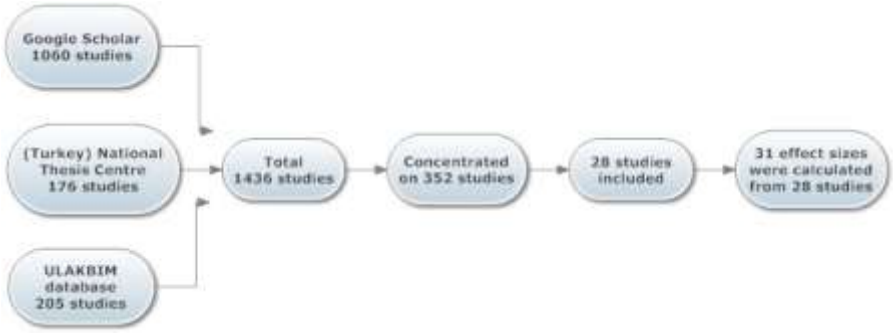

Figure 1. Flow Chart Showing Selection of Studies for Meta-Analysis

A power analysis was conducted using the power analysis equation (Equation 14) for the random effects model presented by Valentine, Pigott, and Rothstein (2010, p.224). Statistical power of this study was found to be .99 using the following values: medium effect size (ES = .5), average sample per group = 25, the total effect size = 31,

and the medium heterogeneity. This shows that the magnitude of 31 effects included in the study gives a high statistical power.

Descriptive Information about the Studies

This study included a meta-analysis of the experimental studies examining the effect of teaching learning strategies on students' academic achievement. Table 1 shows the descriptive information about these studies conducted in Turkey.

Table 1

Descriptive Information about the Studies

Study	*Level of Education*	*Discipline*	*Type*	*N*
Akin, 2013	High school	Music	Article	10
Aydemir, 2007	High school	Foreign Lang.	Thesis	34
Bas, 2012	Secondary school	Foreign Lang.	Article	60
Belet, 2005	Elementary sch.	Turkish	Thesis	43
Biyikli, 2015	Elementary sch.	Science	Article	135
Bolukbas, 2013	University	Foreign Lang.	Article	40
Bozkurt, 2007a	High school	Social Sciences	Thesis	52
Bozkurt, 2007b	High school	Social Sciences	Thesis	54
Caliskan, 2011	Secondary school	Turkish	Article	42
Cerci, 2005	Secondary school	Turkish	Thesis	44
Cetingoz, 2006	University	Social Sciences	Thesis	42
Derman, 2002a	Secondary school	Science	Thesis	103
Derman, 2002b	Secondary school	Science	Thesis	110
Dikbas, 2008	Elementary sch.	Social Sciences	Article	24
Evcim, 2008	University	Foreign Lang.	Thesis	46
Hasra, 2007	High school	Foreign Lang.	Thesis	60
Kaya, 2006	Elementary sch.	Turkish	Thesis	40
Kaydu, 2004	High school	Social Sciences	Thesis	52
Keban, 2010	University	Science	Thesis	39
Kuleli, 2011	University	Foreign Lang.	Thesis	50
Kurum, 2012	University	Foreign Lang.	Thesis	55
Meydan, 2010	Elementary sch.	Social Sciences	Article	68
Serce, 2013	University	Foreign Lang.	Thesis	42
Tasdemir, 2007	University	Science	Article	52
Tok, 2008a	Elementary sch.	Social Sciences	Article	82
Tok, 2008b	Elementary sch.	Social Sciences	Article	81
Tuncer, 2007	Elementary sch.	Social Sciences	Thesis	40
Uraz, 2004	University	Foreign Lang.	Thesis	30
Uysal, 2006	Secondary school	Social Sciences	Thesis	47
Yildiz, 2003	Elementary sch.	Science	Thesis	44
Yokus, 2009	University	Music	Thesis	20

It can be observed that most of the studies were conducted at the university level and in the field of social sciences between 2005 and 2009. Most of them were also found to be in the form of thesis and they were conducted with a total of 1,641 students.

Data Coding

In order to interpret the outcomes of a meta-analysis correctly, it must be ensured that the data are coded correctly (Lipsey & Wilson, 2001). Therefore, all data were coded by two researchers in the field of Educational Sciences and with meta-analysis experience separately. The encoders were fully consistent with each other (r=1.00).

Twenty-eight studies were included in the study. Since there were two experimental groups from different samples in three of these studies, a total of 31 effect sizes (Cohen d) were calculated and the analysis was performed on 31 different effect sizes. In order to control for the methodological features of the 28 studies, a coding sheet (Study Design and Implementation Assessment Device) by Valentine and Cooper (2008) was used to judge the quality of the studies.

In a meta-analysis, in addition to calculating a common effect size, it would be better to collect data for sub-groups to determine situations where effect sizes differ (Lipsey & Wilson, 2001). Therefore, we also reported some statistical information about the studies included as well as the authors' name, publication years, publication form (article, postgraduate thesis, paper), education stage at which the study was carried out (elementary, secondary or high school, and university) and the field of study (foreign language, social sciences, Turkish, and music), the type of strategy used (repetition, sense-making, organizing, monitoring the comprehension, affective, integrated, foreign language learning, and foreign language vocabulary learning).

In the literature, there is still a debate on whether learning strategies should be independent from the subject matter or should be integrated into it (Caliskan & Sunbul, 2011; Somuncuoglu & Yildirim, 1998). The studies included in the meta-analysis were also examined in the terms of this debate, and three additional sub-groups were formed (Somuncuoglu & Yildirim, 1998). These sub-groups were as follows:

1) Studies in which students were first informed of the learning strategies and how to use them, and then the regular teaching process was carried out;

2) Studies in which students were provided with activities instead of any training on learning strategies;

3) Studies in which both approaches given in the first item and were combined with the second (Eclectic: First the learning strategies are explained, and then activities based on these strategies are carried out).

In this study, we also conducted sub-group analyses in addition to calculating a common effect size of the studies to determine the situations in which effect sizes may differ.

Data Analysis

In the data analysis, it should be first decided which effect size value will be used. In correlational studies, correlations are included into the meta-analysis after being converted to the Fisher's z score. In other studies, based on differences, the values are

converted to Cohen's *d*, Hedges' *g* or Glass' Δ effect size values (Borenstein et al., 2009). Among these effect sizes, Cohen's *d* is more suitable for studies with a total sample size above 20 (Lipsey & Wilson, 2001). Only one of the 31 effect sizes included in this study had a sample size below 20. Therefore, the values obtained from the experimental studies were converted to Cohen's *d,* which reflected the difference between the means and analyzed through the Comprehensive Meta-Analysis (CMA v.2; Borenstein, Hedges, Higgins, & Rothstein, 2005) software. The Cohen's *d* formula used in this study was obtained by dividing the mean difference between experimental and control groups by the standard deviation of two groups (Chen & Peace, 2013). The interpretation of the effect sizes was based on the criteria set by Cohen (1988) for standardized mean differences. These rules indicated small, medium and large effect sizes with .2, .5, and .8, respectively.

In terms of the validity of the study, we tried to reveal the effect of teaching learning strategies on students' academic achievement using standardized data obtained from experimental studies as well as examining the publication bias (Rothstein, Sutton, & Borenstein, 2006). Moreover, in order to provide evidence for validity, the process of calculating and reporting the effect size was explained in detail, the measurement instruments used in the primary studies were determined to have sufficient psychometric properties, and the study was carried out by three authors who had doctoral degree in the field of Educational Sciences.

Two researchers separately carried out the article selection process, calculation of effect sizes and interpretation of the analysis results, and then they compared their findings, which ensured the reliability of the study. Full consistency was observed between the findings obtained by two researchers. Besides, the I^2 statistic was used in addition to the *Q* statistic as a measure of homogeneity/heterogeneity during the data analysis. Also, we decided whether to use fixed effects model or random effects model for the effect sizes. Sub-group analyses were performed using Analog to the ANOVA. As indicated by Lipsey and Wilson (2001), Analog to the ANOVA has similarities with ANOVA, but is basically a Chi-Square-based sub-group analysis method performed to determine whether effect sizes are different in sub-groups in a meta-analysis.

Results

This section will be presented under two headings: findings about the common effect size and findings of the sub-group analyses.

Findings about the Common Effect Size

Table 2 shows the effect sizes and the results of the homogeneity/heterogeneity tests of two different models (i.e., fixed effects and random effects) established by combining the results from the studies included in the meta-analysis.

Table 2

Effect Sizes and Homogeneity/Heterogeneity Test Results

Model	*N*	*Mean ES*	*Z*	*SE*	*%95 CI*		*df*	*Q*	*p*	I^2
					Low	**Up**				
Fixed	31	0.933	17.15	0.05	0.83	1.04	30	189.63	.00	84.18
Random	31	1.206	8.532	0.14	0.93	1.48				

In the random effects model, the effect size was computed as 1.21 with a standard error of .14 and 95% confidence interval (a lower limit of 0.93 and an upper limit of 1.48). In the fixed effects model, the effect size was computed as 0.93 with standard error of .05 and 95% confidence interval (a lower limit of 0.83 and an upper limit of 1.04).

The data were tested for homogeneity/heterogeneity (Borenstein et al., 2009). In this sense, the $Q_{(sd=30)}$ statistic was found to be 189.63 ($p < .01$). A Q statistic value exceeding the 30 degrees of freedom and .05 confidence interval (df=30, $\chi^2_{(.05)}$ =43.77) in the chi-square distribution table showed that the data were heterogeneous. Another method for determining homogeneity/heterogeneity is the calculation of the percentage of I^2. I^2 values of 25%, 50% and 75% (and above) indicate low, moderate and high heterogeneity, respectively (Higgins & Thompson, 2002). The I^2 computed from the data was 84.18%, which indicated high heterogeneity.

The authors of the study used the random effects model as they assumed that the differences in learning strategies used in the studies involved in meta-analysis differed beyond the sampling error. Indeed, Field and Gillett (2010) also suggest the use of random effects model for meta-analysis conducted in the social sciences. The mean effect size was calculated as 1.21 based on random effects model. Based on Cohen's (1988) classification, this value indicated that the teaching of learning strategies had a high positive effect on students' achievement. Figure 2 shows the forest plot presenting the distribution of the effect sizes of the studies in the random effects model.

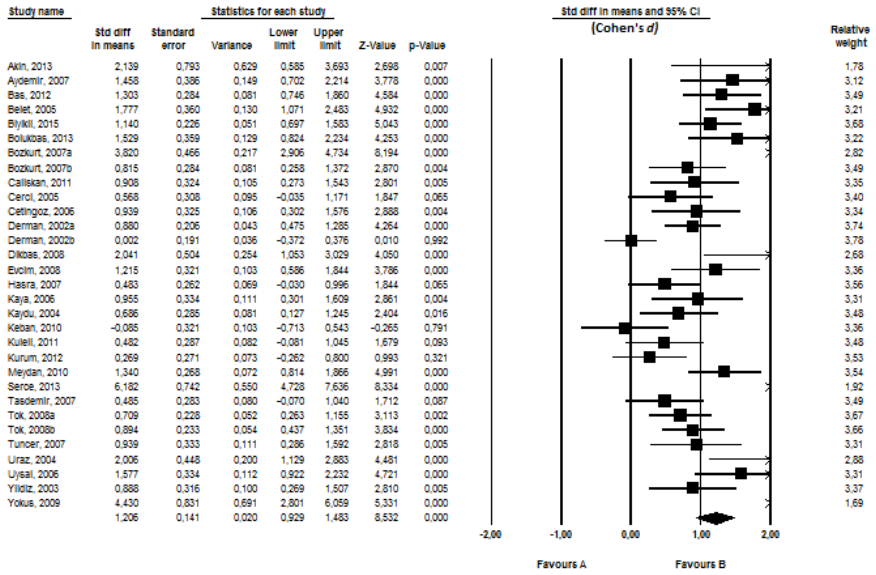

Figure 2. Forest Plot Showing the Distribution of the Effect Sizes of the Studies

The black squares in the forest plot show the effect sizes, while the horizontal lines on both sides of each square show the 95% confidence interval of the effect size. Besides, the relative weight in the forest plot shows the effect of the study on the result of the meta-analysis (Littell, Corcoran & Pillai, 2008; Ried, 2006). According to the forest plot shown in Figure 2, Derman's (2002) study had the largest effect on the mean effect size, while Akin's (2013) study had the smallest effect. Moreover, out of 31 effect sizes, only one was found to be negative (in favour of the control group), while 30 of them were positive (in favour of the experimental group). This indicated that the effect was in the positive direction.

Findings of the Sub-group Analyses

In addition to the analyses for determining the common effect size, groups were also compared to determine the sources of heterogeneity.

- While making the comparison, we first examined whether the level of education (elementary, secondary, high schools, and university) caused any statistically significant difference on academic achievement. Table 3 shows the Analog to the ANOVA results revealing whether the effect of teaching learning strategies on students' achievement differ depending on the level of education in the random effects model.

Table 3

Differences in Effect Sizes Depending on Educational Stages in the Random Effects Model

Variable (School)	*N*	*Mean ES*	*SE*	*% 95 CI* Low	Up	*df*	χ^2	Q_B	*p*
Primary	9	1.099	0.121	0.862	1.337				
Secondary	6	0.846	0.246	0.364	1.328				
High	6	1.484	0.440	0.621	2.346				
University	10	1.529	0.375	0.793	2.265				
Total	**31**	**1.108**	**0.102**	**0.909**	**1.308**	**3**	**7.815**	**3.128**	**.37**

Note: These findings are given as mixed effects output in the CMA software.

Heterogeneity below the critical chi-square value (7.82) for the sub-group of level of Education (Q_B=3.13, p > .05) indicated that there was no statistically significant difference between the groups. In other words, the teaching of learning strategies had similar effects at all education levels.

- As the second sub-group, we examined whether different disciplines caused any significant difference. Table 4 shows the results from the Analog to the ANOVA performed to determine whether the effect of teaching learning strategies on students' achievement differ significantly depending on the discipline in the random effects model.

Table 4

Differences in Effect Sizes Depending on Disciplines in the Random Effects Model

Variable	*N*	*Mean ES*	*SE*	*% 95 CI* Low	Up	*df*	χ^2	Q_B	*p*
Foreign language	9	1.481	0.341	0.814	2.149				
Social sciences	10	1.295	0.223	0.858	1.733				
Science	6	0.558	0.216	0.135	0.982				
Turkish	4	1.030	0.248	0.545	1.515				
Music	2	3.271	1.145	1.026	5.516				
Total	**31**	**1.042**	**0.122**	**0.803**	**1.281**	**4**	**9.488**	**11.75**	**.02**

Note: These findings are given as mixed effects output in the CMA software.

Heterogeneity above the critical chi-square value (9.49) for the sub-group of disciplines (Q_B=11.76, p < .05) indicated that there was a statistically significant difference between the effect sizes of the groups. In other words, the effect of teaching learning strategies on students' achievement differed significantly according to course

type. Hence, the course type was one of the sources of variance. The effect sizes showed that learning strategies mostly affected students' achievement in the field of Music Teaching (3.27) and they had the least effect in the field of Science (0.56). The effect sizes were found to be similar in Social Sciences, Foreign Language and Turkish training.

- As the third sub-group, we examined whether teaching learning strategies independently of the subject or in an integrated or eclectic way caused any significant difference. The first group (strategy teaching only) included studies in which students were provided with only strategy teaching and normal training. The second group (activity only) included studies in which activities based on learning strategies were carried out. Finally, the third group (eclectic) included studies in which both approaches were synthesized. Table 5 shows the results from the Analog to the ANOVA performed to determine whether the effects of these approaches on students' achievement differ in the random effects model.

Table 5

Differences in Effect Sizes Depending on the Ways of Teaching Strategies in the Random Effects Model

Variable	*N*	*Mean ES*	*SE*	*% 95 CI*		*df*	χ^2	Q_B	*p*
				Low	**Up**				
Only strategy	3	1.559	0.429	0.719	2.400				
Only activity	12	1.381	0.291	0.811	1.952				
Eclectic	16	1.072	0.167	0.744	1.400				
Total	**31**	**1.191**	**0.137**	**0.922**	**1.460**	**2**	**5.991**	**1.671**	**.43**

Note: These findings are given as mixed effects output in the CMA software.

Heterogeneity below the critical chi-square value (5.99) for the sub-group of teaching style (Q_B=1.67, p > .05) indicated that there was no statistically significant difference between the groups. In other words, different teaching styles yielded similar results.

- As the fourth sub-group, we examined whether the type of strategy used in the studies (repetition, sense-making, organizing, monitoring the comprehension, affective, integrated, foreign language learning, and foreign language vocabulary learning) caused any significant difference. While the first five of them were the strategies in the literature, the integrated strategy expresses the teaching of at least two of the first five strategies combined. The seventh and the eighth strategies were exclusive to foreign language learning strategies. Table 6 shows the results from the Analog to the ANOVA to test the effects of the type of strategy used.

Table 6

Differences in Effect Sizes Depending on the Type of Strategy in the Random Effects Model

Variable	*N*	*Mean ES*	*SE*	*% 95 CI*		*df*	χ^2	Q_B	*p*
				Low	**Up**				
Repetition	1	1.14	0.23	0.70	1.58				
Sense-making	5	1.57	0.45	0.69	2.45				
Organizing	3	0.55	0.33	-0.09	1.19				
Monitoring the comprehension	1	0.71	0.23	0.26	1.16				
Integrated	15	1.15	0.18	0.80	1.50				
Foreign language learning	3	0.73	0.36	0.03	1.43				
Foreign language vocabulary learning	3	2.84	1.13	0.63	5.04				
Total	**31**	**0.998**	**0.103**	**0.79**	**1.20**	**6**	**12.59**	**9.52**	**.14**

Note: These findings are given as mixed effects output in the CMA software.

Heterogeneity below the critical chi-square value (12.59) for the sub-group of learning strategy type (Q_B=9.528, p > .05) indicated that there was no statistically significant difference between the groups. In other words, the use of any kind or the combination of learning strategy types yielded similar results. In detail, it could be alleged that the vocabulary learning strategies were the most effective strategies; repetition, sense-making and integrated strategies were relatively equal and low when compared to vocabulary learning strategies; and organizing, monitoring the comprehension and foreign language learning strategies were the least effective ones.

Publication Bias

The mean effect size calculations obtained in a study must reflect the reality. Publication bias is the most important threat to showing the reality, i.e., reliability of the study. Therefore, as mentioned by Rothstein, Sutton and Borenstein (2006), the funnel plot shown in Figure 3 was examined using the trim-and-fill method proposed by Duval and Tweedie (2000) in order to scrutinize the suitability of the computed effect size to the purpose.

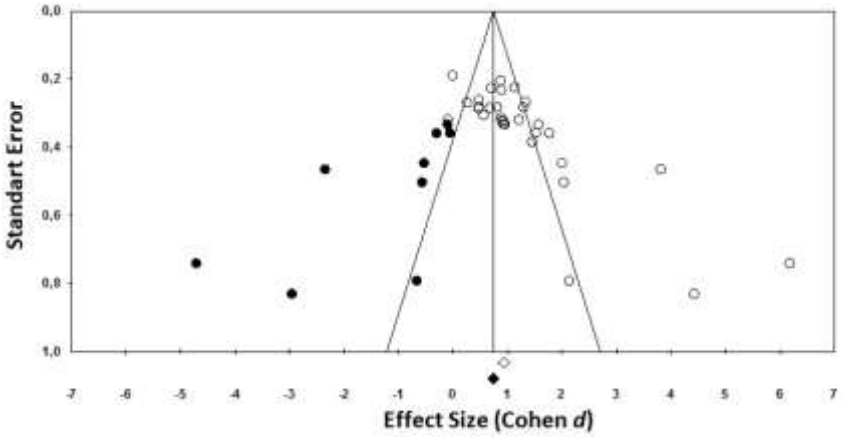

Figure 3. Funnel Plot

A funnel plot was used to examine publication bias (see Figure 3). Empty circles in Figure 3 show the studies included in the study. Filled circles show the imaginary studies that need to be included to eliminate public bias (Duval & Tweedie, 2000). According to the funnel plot, the line at the centre of empty circles should be as symmetrical as possible on both sides in order to eliminate publication bias. It can be said that the funnel plot in Figure 3 appears to be symmetric. Indeed, the funnel plot also showed that addition of only nine studies with favourable results for the control group would be enough to eliminate publication bias totally for this study. Given the 31 effect sizes were computed within the scope of this study, it can be concluded that these nine studies can be neglected. Even if it was not neglected, the standardized effect size was reported to be 0.77 in the event of including nine negatory studies according to Duval and Tweedie's (2000) trim-and-fill method. This effect size was also very close to the large level of impact according to the criteria provided by Cohen (1988). Any review of a funnel plot would be subjective; therefore, Rosenthal's (1979) "fail-safe *N*" (Rothstein, Sutton, & Borenstein, 2006) was also examined. The fail-safe *N* for effect size was found to be 2987 at .05 confidence level. As the value of 2987 was much larger than the value of 165 obtained by the formula 5k + 10 (Fragkos, Tsagris, & Frangos, 2014), it indicated that there was no publication bias in the findings.

Discussion, Conclusion and Recommendations

The purpose of this study was to reveal the effect of learning strategies on academic achievement in Turkey with the use of meta-analysis. Thus, this can be taken as a significant contribution as there has been no similar previous research on learning strategies in Turkey, and it reveals the general state on the controversial issues in the relevant literature. Moreover, it is conducted only through the studies in Turkey with the idea that it will yield more meaningful proposals for national education policies. Therefore, it can be claimed that the research results could be evaluated exclusively to

Turkey. The research is also limited by the analysis of moderator variables that are coded. We first calculated the effect size of the data obtained from the studies based on the random and fixed effects models. Since the two researchers as specialists assumed that the difference in the learning strategies used in the studies differed according to the level of education, discipline, strategy teaching style and strategy type beyond the sampling error, random effects model was preferred. As a result, the effect size was found to be 1.21. The eta-squared calculated for Cohen's *d* of 1.21 was found to be .268. This value obtained from the results of 31 effect sizes obtained from 28 studies conducted with 1,641 students indicated that the learning strategies had 26.8% positive effect on students' academic achievement.

The common effect size of Cohen's *d* found to be 1.21 from the experimental studies conducted, and the standardized effect size was reported to be 0.77 in the event of including negatory nine studies in the relevant field in Turkey indicated that teaching learning strategies had a high positive effect on students' achievement (Cohen, 1988; Ellis, 2009). This finding is in compliance with the meta-analyses carried out in the relevant field (Ardasheva, Wang, Adesope & Valentine, 2017; de Boer, H., Donker, A. S., & van der Werf, 2014; Donker, Boer, Kostons, van Ewijk, & van der Werf, 2013; Ergen & Kanadli, 2017), and individual research results conducted in Turkey revealing that teaching learning strategies improves student achievement when compared to control group (Bas, 2012; Belet, 2005; Biyikli & Dogan, 2015; Bozkurt, 2007; Cetingoz, 2006; Hasra, 2007; Kaydu, 2004; Serce, 2013; Tasdemir & Tay, 2007; Uraz, 2004; Yildiz, 2003; Yokus, 2009), while they contradict with the findings of a few studies (Derman, 2002; Keban, 2010). Indeed, this study presents a general result of all studies chosen based on certain criteria, thus revealing that positive effect of learning strategies is more common, and these strategies can be taught. On the other hand, results of the meta-analysis conducted by Ergen and Kanadli (2017) revealed that self-regulated learning strategies had a "large" effect (d = 0.859) on academic achievement. Their result supports the result of the positive effects of learning strategies on achievement in 33 out of 38 postgraduate theses as a part of Demirel, Askin-Tekkol, Cigdem, and Demir's (2016) study.

Ozer (2003) criticizes the teaching of course content alone in the curricula of all the levels of education in Turkey and concludes that the students' acquiring the learning strategies being largely left to themselves, they learn and use their strategies at random or by hand, the teaching learning strategies is carried out for academic studies. Likewise, Somuncuoglu and Yildirim (1998) suggested the adaptation of an education policy oriented towards learning strategies beyond their study. However, within the scope of the changes in the curricula in 2005, the common skills in the backbone of all the programs, which need to be earned by the individuals, were reflected in the curriculum as key competencies with the amendment made in 2017. Considering learning to learn as one of the focal points of all curricula among these competencies (MoNE, 2017) can be regarded as an extremely significant development. Besides, the expression that competence areas are equally important, interrelated and compatible with each other, mutually exclusive, supportive (MoNE, 2018) demonstrates that the ideas of Weinstein et. al. (1989) and Somuncuoglu and Yildirim (1998) find place in the

curricula. All those are important for learning strategies to spread over, attaching the necessary importance to learning strategies and training individuals who learn to learn in Turkey.

In addition to finding the common effect size, we also compared the groups based on the level of education, discipline, strategy teaching styles, and strategy types in order to determine the source of heterogeneity among the findings. As a result of the analyses, we found that the level of education (elementary, secondary, high schools, and university) did not cause a statistically significant difference in teaching the learning strategies. Similarly, the effect size calculated in Ergen and Kanadli (2017) showed no significant difference according to the type of school level. This indicates that teaching learning strategies is effective at all levels of education, and verifies the views of researchers (Tok, 2008) who think that the teaching of learning strategies is more effective at younger ages in terms of its importance in later learning experiences and for the acquisition of learning to learn at early ages. We also analyzed whether teaching learning strategies in different disciplines caused any significant difference, and found that teaching such strategies mostly affected students' achievement in the field of Music Teaching, while it had the least effect in the field of Science which is one of the positive sciences. Within the scope of the research, the numbers of primary studies based on the disciplines are nine in foreign languages, six in science, 10 in social sciences, four in Turkish and two in Music. It might be claimed that the difference between the numbers of the primary studies may have an impact upon the reliability of the results (Ayaz & Soylemez, 2015); and therefore, the highest achievement level was obtained in music course. On the other hand, the effect sizes were found to be similar in Social Sciences, Foreign Language, and Turkish. It can be deduced that learning strategies are more effective in verbal fields considering that the fields of foreign language, social sciences and Turkish are verbal and physical sciences are numerical. This can be explained by learning strategy activities such as summarizing, underlining, and identifying the main idea support the verbal field more. However, these results contradict with the results of Donker et al. (2013). In their meta-analysis study including 58 research related to self-regulated teaching, Donker et al. (2013) calculated the effect sizes of 0.73 in physical sciences, 0.66 in mathematics, 0.36 in reading comprehension. However, the effect size calculated in Ergen and Kanadli (2017) showed no significant difference according to the course type for self-regulated learning strategies. This result may be due to limiting this study to cognitive learning strategies, and can be explained as the learning strategies cause diverse effects for different lessons in the context of varied countries. On the other hand, the divergence between the results proves the importance of carrying out such kind of research in the context of Turkey.

As mentioned earlier, there is still a debate on whether teaching learning strategies should be independent of the subject or should be integrated into it. To reach a conclusion and find the source of heterogeneity among the findings, we examined whether teaching learning strategies independently of the subject or in an integrated or eclectic way caused any significant difference. We found that different teaching styles did not cause any significant difference in students' achievement. In other

words, different teaching styles yielded similar (influential) results. In a similar vein, the use of any or combination of the learning strategy types (repetition, sense-making, organizing, monitoring the comprehension, affective, integrated [teaching at least two of the first five strategies combined], foreign language learning, and foreign language vocabulary learning) was found to yield similar results beyond the studies. All those suggest that teaching learning strategies can be taught via either their integration into classes or independently of the lessons or the combination of both, and that the use of any kind or the combination of strategy types will result in effective consequences. In detail, it could be alleged that the vocabulary learning strategies were the most effective strategies (2.84), repetition (1.14), sense-making (1.57), and integrated strategies (1.15) were relatively equal and low when compared to vocabulary learning strategies; and organizing (0.55), monitoring the comprehension (0.71), and foreign language learning strategies (0.73) were the least effective ones. Donker et al. (2013) calculated the effect size of repetition strategies as 1.39, that of organizing strategies as 0.81 and that of sense-making strategies as 0.75, and concluded that it was not right to focus solely on what strategy to be used and how to use them in the teaching of learning strategies, and it should be emphasized when and why the strategies (situational knowledge) should be used. On the basis of a meta-analysis on language learning strategies, Ardasheva, Wang, Adesope and Valentine (2017) also reveal that the ideal teaching is carried out through a balance between strategy and knowledge and that it is much more powerful to focus less on strategy rather than a broader strategy repertoire.

Based on the findings obtained from this study, it can be asserted that the teaching of any kind of learning strategy type is effective on achievement on its own or in combination with different strategies whether independently, or integrated, or eclectically at every level of education and in every discipline - especially in verbal based courses - in Turkey. Although the concept of "learning to learn" is regarded among the competencies that constitute the backbone of the curriculum with the last amendment of MoNE, the examination of the curriculum proved that exclusively the concept of "learning strategy" appeared in a few times. This may lead to a lesser awareness in teachers. Therefore, it is recommended to incorporate learning strategy types and application examples as well as the concept of "learning strategy" which is on the basis of learning to learn into curricula at all educational stages and in all disciplines. For the subsequent studies, meta-analysis studies may be conducted in which the effects of teaching learning strategies on different variables (particularly the attitude as being one of the mostly studied ones) are compiled.

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(References with asterisk (*) indicate studies included in the meta-analysis)

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Öğrenme Stratejileri Öğretiminin Akademik Başarı Üzerine Etkisi: Bir Meta-Analiz Çalışması

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Özet

Problem Durumu: Bireyin nasıl daha iyi ve kolay öğreneceğini bilmesinin, bağımsız öğrenmenin kısacası öğrenmeyi öğrenmenin temelini oluşturduğu ifade edilen öğrenme stratejileri, farklı araştırmacılar tarafından tanımlanmıştır. Öğrenme stratejisi öz olarak bilgi ve becerilerin elde edilmesini kolaylaştırmak için özel bir öğrenme durumunda birey tarafından kullanılan zihinsel taktiklerin tümü olarak tanımlanmaktadır. Öğrenme stratejileri ile ilgili çalışmaların büyük çoğunluğu betimsel ve ilişkisel olmakla birlikte deneysel çalışmalar da mevcuttur. Deneysel çalışmalarda genel olarak öğrenme stratejileri öğretiminin akademik başarıya, tutuma, üstbilişsel farkındalığa, kalıcılığa, yürütücü biliş becerisine vs. etkisi incelenmiş ve çalışmaların çoğunda ilgili değişkenlerde olumlu gelişmeler görüldüğü ortaya konmuştur. Türkiye'deki alan yazında öğrenme stratejileri öğretiminin öğrencilerin çeşitli derslerdeki akademik başarılarına etkisini belirlemek amacıyla yapılmış çok sayıda çalışma olmasına rağmen, bu konuda yapılmış bir meta-analiz çalışmasına rastlanmamıştır. Farklı boyutları ile ele alınan öğrenme stratejileri ile ilgili araştırmaların birleştirilmeye, sentezlenmeye ve değerlendirilmeye ihtiyacı vardır. Bu anlamda Türkiye kapsamında yapılan çalışmaların sonuçlarının birleştirilerek genel yargının ortaya konması alan yazına önemli katkılarda bulunacaktır.

Araştırmanın Amacı: Türkiye'deki alan yazında öğrenme stratejileri öğretiminin öğrencilerin çeşitli derslerdeki akademik başarılarına etkisini belirlemek amacıyla yapılmış çok sayıda çalışma olmasına rağmen, (bilişsel) öğrenme stratejilerinin etkisini deneysel olarak inceleyen araştırmaları ele alan kapsamlı bir meta analiz çalışmasına ulaşılamamıştır. Bu bağlamda bu araştırma, Türkiye'de öğrenme stratejileri öğretiminin öğrencilerin akademik başarılarına etkisini inceleyen 2000-2016 yılları arası deneysel çalışma sonuçlarını meta-analiz yolu ile bir araya getirmek amacıyla yürütülmüştür.

Araştırmanın Yöntemi: Bu araştırmada, öğrenme stratejileri öğretiminin öğrenci başarısı üzerindeki etkisini inceleyen deneysel ve yarı-deneysel araştırmaların sonuçlarını bir araya getirmek amacıyla meta-analiz yöntemi kullanılmıştır. Yapılan taramaya göre ulaşılan toplam 1436 yayın yukarıdaki kriterlere göre tasnif edildiğinde elde kalan 352 çalışma üzerinde yoğunlaşılmıştır. YÖK Ulusal Tez Merkezi'nde özetlerinden araştırma ölçütlerine uygun olduğu belirlenen ancak erişime açık olmayan tez yazarlarına e-posta gönderilmiş ancak cevap alınamamıştır. Buna göre, belirlenen

ölçütler çerçevesinde öğrenme stratejilerinin öğrenci başarısı üzerindeki etkisini deneysel olarak inceleyen lisansüstü tezler ile bilimsel makalelerden oluşan toplam 28 çalışma araştırmaya dâhil edilmiştir. Bu 28 çalışma haricinde yeterli veri sunan ve gerekli şartları sağlayan tam metin bildiri veya poster sunumu türünde çalışmaya rastlanılmamıştır.

Araştırmanın geçerliği bağlamında öğrenme stratejileri öğretiminin öğrenci başarısı üzerindeki etkisi deneysel araştırmalardan elde edilen standartlaştırılmış verilerle ortaya koyulmaya çalışıldığı açıklanmış ve yayın yanlılığı incelenmiştir. Ayrıca geçerliği sağlayabilmek adına, etki büyüklüğü hesaplama ve raporlama süreçleri ayrıntılı olarak açıklanmış, birincil çalışmalarda kullanılan ölçme araçlarının yeterli psikometrik özellikleri taşıdıkları belirlenmiş ve çalışma Eğitim Bilimleri alanında doktoralı üç akademisyen tarafından yürütülmüştür.

Araştırmanın Bulguları: Araştırmada, belirlenen kriterler çerçevesinde meta-analize dâhil edilen araştırmalardaki verilerin rastgele ve sabit etkiler modellerine göre etki büyüklüğü değerleri hesaplanmıştır. Alan uzmanı olan iki araştırmacı, çalışmalarda kullanılan öğrenme stratejilerindeki farklılığın örneklem hatasının ötesinde eğitim kademesi, disiplin, strateji öğretim tarzı ve strateji türü bağlamında farklılaştığını varsaydıkları için rastgele etkiler modeline karar vermiş ve etki büyüklüğü değeri 1.21 olarak belirlenmiştir. Araştırma kapsamında eğitim kademesi, disiplin, strateji öğretim tarzı ve strateji türüne yönelik alt grup analizleri de yapılmış ve öğrenme stratejileri öğretiminin yalnızca disiplin alanına göre istatistiksel olarak anlamlı şekilde farklılaştığı belirlenmiştir. Belirlenen etkinin geçerliğine ilişkin yayın yanlılığı olmadığı yapılan analizler ile ortaya konulmuş olup elde edilen etki değerinin geçerli olduğu sonucuna ulaşılmıştır.

Araştırmanın Sonuçları ve Önerileri: Rastgele etkiler modeline göre hesaplanan 1.21 Cohen *d* değerinin eta-kare karşılığı .268'dir. Bu değer; 1641 öğreneni kapsayan 28 çalışmadan elde edilen 31 etki büyüklüğüne göre öğrenme stratejilerinin öğrenen başarısı üzerinde % 26.8'lik olumlu bir katma değere sahip olduğunu göstermektedir. Eldeki araştırmada ortak etki değerini belirleme analizlerine ek olarak, bulgulardaki heterojenliğin nereden kaynaklandığını belirlemek amacıyla eğitim düzeyi, disiplin, strateji öğretim tarzı ve strateji türüne göre grup karşılaştırmaları da yapılmıştır. Yapılan analizler neticesinde eğitim kademesinin (ilkokul, ortaokul, lise, üniversite) öğrenme stratejileri öğretiminde anlamlı bir değişim meydana getirmediği sonucuna ulaşılmıştır. Bu sonuç öğrenme stratejileri öğretiminin eğitimin her kademesinde etkili olduğunu göstermekte; öğrenme stratejilerinin küçük yaşlarda öğretilmesinin daha etkili olduğu görüşünde olan araştırmacıların görüşlerini sonraki eğitim yaşantılarında ve öğrenmeyi öğrenmenin küçük yaşlarda kazanılmasında önemli olduğu noktalarında doğrulamaktadır. Öğrenme stratejileri öğretiminin farklı disiplinlerde anlamlı bir değişime neden olup olmadığına ilişkin analizler ise öğrenme stratejileri öğretiminin öğrenci başarısını en fazla müzik eğitimi en az pozitif bilimlerden olan Fen bilimleri alanında olumlu yönde etkilediğini göstermiştir. Araştırma kapsamında disiplin alanlarına yönelik birincil araştırma sayısı Yabancı dilde 9, Fen bilimlerinde 6, Sosyal bilimlerde 10, Türkçe'de 4 ve Müzik'te 2 olarak görülmektedir. Birincil çalışma sayıları arasındaki farkın sonuçları etkileyebileceği, bu

nedenle müzik dersindeki başarının en yüksek çıktığı düşünülebilir. Diğer yandan sözel alan olarak sınıflanabilecek Sosyal bilimler, Yabancı dil, Türkçe alanlarında etki büyüklüklerinin de birbirine yakın olduğu sonucuna ulaşılmıştır. Yabancı dil, Sosyal bilimler ve Türkçe alanlarının sözel, Fen bilimleri alanlarının sayısal olduğu düşünüldüğünde öğrenme stratejilerinin sözel alanlarda daha etkili olduğu çıkarımında bulunulabilir. Öğrenme stratejisi öğretiminin alan bağımsız, bütünleştirilmiş veya eklektik olarak gerçekleştirilmesinin öğrenci başarısında anlamlı bir değişim meydana getirmediği sonucuna ulaşılmıştır. Bir başka deyişle farklı tarzlarda öğrenme stratejisi kazandırma yaklaşımları benzer sonuçlar doğurmaktadır. Benzer şekilde çalışmalarda kullanılan öğrenme stratejisi türünün de benzer sonuçlar doğurduğu tespit edilmiştir. Tüm bunlar öğrenme stratejileri öğretiminin gerek derslere entegre edilerek, gerek derslerden bağımsız gerekse her ikisinin bütünleştirildiği şekilde öğretilebileceğini ve herhangi bir strateji türünün veya karmasının kullanılmasının tümünün etkili sonuçlar doğurduğunu göstermektedir.

Anahtar Kelimeler: öğrenme stratejileri, akademik başarı, meta-analiz.