The Effect of Homework on Student Achievement: A Meta-Analysis Study

Esen Turan Ozpolat[1], Berna Karakoc[2], Ibrahim Yildirim[3] and Kevser Eryilmaz[4]
[1] Adıyaman University, Education Faculty
[2] Kilis 7 Aralık University, School of Physical Education and Sports
[3] Gaziantep University, Gaziantep Education Faculty
[4] Ministry of Education

Abstract

The aim of the present study was to combine the findings of experimental studies conducted between 2000 and 2019 on the effect of homework on students' academic achievements using the meta-analysis method. Ten papers that were reported by Google Scholar and Higher Education Institution (YÖK) National Thesis Center databases between 2000 and 2019 were included in the study based on certain criteria. The study also included subgroup analyses, as well as the determination of the general effect of homework on academic achievement. The findings of the present study revealed that the Hedges' g value was significant; it was calculated as 0.970, which indicated the general effect of homework on student achievement. Furthermore, the analysis demonstrated that the effect of homework on student achievement differed significantly based on school level and various sub-dimensions reported previously.

Key words: *achievement; homework; meta-analysis.*

Introduction

Another issue that is as important as the technological infrastructure, physical structure, and teacher qualifications is the academic achievement of students and the improvement of these achievements at schools. For this purpose, homework, which is considered an integral part of learning by teachers and schools and makes significant contributions to student learning, is also considered an out-of-classroom activity and an extension or repetition of classroom studies. Homework is described as the assignments that should be conducted outside school hours, ensure permanent learning, be employed to support student learning, and be assigned by schoolteachers.

It is a teaching method adopted and applied all over the world to enforce the topic content and encourage the students to conduct research, and it is also a part of curricula and considered important for academic achievement (Kaplan, 2006; Turan-Özpolat, Karakoç, & Kara, 2017; Yuladır & Doğan, 2009).

Homework is an important part of the daily routine of school-age children and ensures their active participation in the learning process. For a long time, teachers have frequently used the homework method to provide students with additional learning time, to enforce their studies and organization skills, to help them acquire studying habits, to improve their academic achievement, and to inform parents about the progress of their children (Cooper, 2015; Jayanthi, Bursuck, Epstein, & Polloway, 1997; Minke, 2017). Homework improves the study habits and independent learning, self-discipline, learning attitudes, and problem-solving skills of the students, assists them in consolidating the knowledge instructed in the classroom, and allows continuity between the classes (Cooper, 1989; Painter, 2003). It could be used to prepare for the next class, provide opportunities in cases where there is not enough time in the classroom to conduct comprehensive activities, involve the parents in the learning process, allow the students, teachers, and parents to monitor progress and fill the gap between the school and home (Painter, 1999; North & Pillay, 2002). Rosário et al. (2015) categorized homework assignments as application, preparation, and additional assignments based on benefits, feasibility, and practicality. These kinds of assignments are assigned by teachers to ensure student participation and encourage meaningful learning.

Application assignment: It focuses on the tasks instructed in the classroom to increase speed, improve newly acquired skills, review prior work, study for exams, and maintain specific skills over time (Rosário et al., 2015). Teachers use application and preparation assignments more often since these are both practical and take less time.

Preparation assignment: This focuses on preparing students for the next class (Rosário et al., 2015). According to Vatterott (2009), such assignments are naturally associated with pre-learning. Homework is designed to encourage students to think about the previous topic discussed in class and prepare them for future topics.

Additional/Supplementary homework: It focuses on encouraging the transition from previous learning to new tasks (Rosário et al., 2015). These types of assignments require a higher level of abstract thinking. Teachers use this type of homework to encourage students to collaborate with their peers and to improve creative learning. Real-life, hands-on skills are used to complete additional assignments. This leads to a richer learning experience for the students.

According to Vatterott (2010), the best homework assignment should possess the following five distinctive properties: goal, productivity, ownership, competence, and attractiveness; broaden students' knowledge, and develop basic skills. Homework assignments should have a clear academic objective to implement the knowledge or skills learned in the class and to check students' comprehension. Assignments should also completely reflect student learning, support student ownership of the

assignment by providing options, and allow students to successfully complete the assignment without assistance (Vatterott, 2009). According to Cooper, Robinson, and Patall (2006), homework assignments have various purposes. These are discussed in the following paragraphs.

Pre-learning: Homework aims to encourage students to think about the topic discussed in the previous class and to prepare for the topics that will be covered later. This includes in-depth studies such as reading a chapter or outlining the topic before the instruction (Rosário et al., 2015; Vatterott, 2009). Homework assigned for pre-learning could be used to discover the prior knowledge of the students (Vatterott, 2009).

Comprehension control: According to Vatterott (2009), comprehension control is the most neglected objective of homework but the most valuable method for teachers to be aware of student learning levels. Solving similar questions with the methods instructed by the teacher and the explanation of these methods by the student are very beneficial for comprehension control.

Practice (Application): Homework assignments, such as memorizing the multiplication table or writing words, are considered traditional. The ability to memorize is essential for students to practice; however, teachers should ensure that their students comprehend the topic or understand their skills in the classroom. If teachers neglect their students' comprehension, the purpose of homework assignments might be missed, and it will only lead to the disappointment of the student and parents. Instead of memorizing overnight, comprehension should be spread over several days (Vatterott, 2009).

Process: According to Vatterott (2009), process assignments are used when teachers ask students to reflect on the concepts instructed in class. This is when teachers ask students to think about new questions and apply their skills and knowledge learned in the classroom. The processing of the assignments is a long-term project or task that is often adopted at the end of a unit or a learning goal.

Although it was suggested that the benefits of homework include enforcing student learning, helping students acquire studying habits, improving their academic achievements, and informing parents about their children's progress, certain other views on homework argue the opposite (Henderson, 1996; Van Voorhis, 2004). According to Cooper et al. (2006), excessive homework assignments lead to several negative effects, such as loss of student interest in academic material, physical and emotional fatigue, lower participation in non-curricular activities (at school and outside of the school), lack of free time, and parental intervention (pressure to complete homework and perform well). Students could neglect homework assignments by complaining that the assignments were boring or meaningless, and activities such as studying for exams, workbook exercises, finishing incomplete classroom studies, etc., affect them negatively (Cooper, 1989; Cooper et al., 2006). According to Kralovec and Buell (2001), poorly managed assignments could lead to an increase in the difference between high- and low-level achievements. These problems usually arise due to certain behaviors such as completing homework assignments in the classroom, cooperation, cheating,

or just fulfilling necessary assignments (Cooper & Valentine, 2001; North & Pillay, 2002; Painter, 2003; Kohn, 2006). Cooper (2001), on the other hand, reported that students who did more homework had better achievement scores. It was argued that this would be possible when the students are aware of this fact, homework is assigned based on the student level, and they are moderately guided.

Homework is significant material for students to reinforce learning. Whether assigned for home or school, homework is the most important indicator of studying habits and the quality of the students' work. There will inevitably be differences between the work, attitudes, and habits of a student who does homework in a timely and meticulous manner and a student who procrastinates or ignores homework (Küçükahmet, 1997, p. 179). Students who understand the true value and benefits of homework and take responsibility become aware of their priorities, learn how to solve different problems, manage their time, work independently and assume their responsibilities, and understand the importance of planning in all educational processes (Cooper, 1989; Sullivan & Sequeira, 1996). Especially due to scientific developments in education and the constructive education approach in recent years, the importance of homework as well as its negative effects have been emphasized, and the contribution of assignments to various skills, lifelong learning, and school achievements of the students has been clearly highlighted (Tuncer & Altunay, 2009; Güneş, 2014; Roschelle, Feng, Murphy, & Mason, 2016). Several studies have demonstrated that homework leads to active learning, and the implementation of learned knowledge and skills in daily life increases the permanence of learning and academic achievement. In general, studies demonstrated that there was a positive correlation between homework and student achievement and emphasized that students who do their homework regularly were more successful at school when compared to others (Hill, Spencer, Alston, & Fitzgerald, 1986; Cooper, 1989; Foyle, 1990; Tertemiz, 1991; Epstein & Van Voorhis, 2001; Hong, 2001; Gür, 2002; Baker & LeTendre, 2005; Ilgar, 2005; Bennett & Kalish, 2007; Eren & Henderson, 2008; Kitsantas & Zimmerman, 2009; Hayward, 2010; Yıldız & Büyükkasap 2011; Doğan & Bozgeyikli, 2015; Núñez, Suárez, Rosário, Vallejo, Valle & Epstein, 2015; Roschelle et al., 2016; Kaya & Kaya, 2018; Koçak & Göçer, 2020). Thus, the present study aimed to combine the results reported by previous empirical studies on "the effect of homework on the academic achievements of students" with meta-analysis and a holistic approach. For this purpose, the following research problems were identified:

1. What is the effect level of homework on the academic achievement of students based on the results reported by experimental studies conducted in Turkey between 2000 and 2019?

2. Does the mean effect size of homework on students' academic achievements differ based on grade level and publication type?

Based on the abovementioned research problems, the present study aimed to aggregate the findings reported by various studies on homework; it was also considered important since it would contribute to the literature and reveal the trends in homework by presenting the current status.

Methodology

The meta-analysis method was employed in the study. The number of scientific articles, and therefore those published in educational sciences, has increased exponentially, and the knowledge reflected in these studies has also expanded. This also revealed the need for a holistic revision and interpretation of the knowledge accumulated in the literature (Bakioğlu & Göktaş, 2018). Meta-analysis is a type of literature review employed to summarize the findings of the studies conducted on a particular topic statistically and systematically (Başol Göçmen, 2004). Meta-analysis can also be called an analysis of the analyses (Kaya, 2016). Furthermore, although meta-analysis is an analysis method, it aims to achieve a synthesis at the end. Thus, it provides deeper knowledge on the related topic by combining previous study findings. Kavale (2001) emphasized that no study is perfect in revealing a generalizable truth and stated that the study findings could be summarized with a holistic, systematic, and objective method with meta-analysis. Thus, the present study aimed to determine the effect of homework on the academic achievement of students, and for that purpose, empirical studies conducted on homework between 2000 and 2019 were reviewed.

Data collection

In the study, Google Scholar and National Thesis Center databases were scanned to reach all papers published in Turkey in Turkish or English. The search was completed in December 2019, and the studies conducted in the 20-year period between 2000 and 2019 in Turkey were included in this analysis. The inclusion criteria are detailed below:

1 The studies conducted in Turkey between 2000 and 2019;
2 All published and unpublished theses, articles published in peer-reviewed scientific journals, and proceedings published in various scientific conferences in Turkish or English;
3 Studies that investigated the effect of homework on student achievement with empirical or empirical with control group methods;
4 Inclusion of adequate numerical data that would allow the calculation of effect size in the study.
5 In Google Scholar, "homework AND achievement" keywords were used, and the search resulted in 1170 papers.
6 Also, "homework AND success OR achievement" keywords were used in Google Scholar, and the search revealed 687 Turkish papers.
7 In the National Thesis Center, "ev ödevi OR homework" keywords were used, and the search revealed 10 papers.

In the search conducted, 1867 papers were reviewed, including repetitions of certain studies. The in-depth review revealed nine studies that complied with the inclusion criteria. Since one of these nine studies was conducted with two experimental groups, a total of 10 effect sizes were calculated, and the analyses were conducted on this data set. The descriptive data on the empirical studies conducted on homework in Turkey between 2000 and 2019 are presented in Table 1.

Table 1
Descriptive data on the studies

No	Author, Year	School Level	Publication	Study Group (N)
1	Atli, 2012	Primary School	Thesis	42
2	Baran, 2016	Middle School	Proceeding	32
3	Eker, 2012	Primary School	Article	65
4	Eraz, 2014	Primary School	Thesis	70
5	Gok, 2013	University	Article	185
6	Kapikiran a, 1999	Primary School	Article	27
7	Kapikiran b, 1999	Primary School	Article	28
8	Kaplan, 2006	Middle School	Thesis	72
9	Ozben, 2006	Middle School	Thesis	46
10	Tertemiz, 1991	Primary School	Article	86

As seen in Table 1, the empirical studies included in the research were conducted mostly with primary school students, and the total number of students was 653.

Data coding

All data were coded separately by two researchers in the field of educational sciences, and it was observed that agreement was achieved between the codes. The study included 4 theses, 5 articles, and 1 proceeding, for a total of 10 studies.

In addition to the calculation of the common effect size, it may be possible to collect data for the subgroups through meta-analysis. Thus, by comparing the mean effects of various subgroups in the studies, an analysis of the variance between the effect sizes determined for individual studies could be conducted (Borenstein, Hedges, Higgins, & Rothstein, 2009). Thus, certain statistical information about the papers, such as the name of the author, the year of publication, the school level (primary school, middle school, or university), and the type of publication (thesis, article, or paper) were also presented in the present study.

Data analysis

The mean effect size was calculated with Hedges' g in the present study. The effect size levels were classified as follows: .2 = small; .5 = moderate; .8 high effect size (Cohen, 1992). In general, Microsoft Excel software was used to calculate the effect sizes, and Comprehensive Meta-Analysis (CMA) software was used for all other analyses in the current study.

Results and interpretation

This section discusses the findings on the general effect size, accompanied by the findings associated with the research problems and sub-group analysis.

The mean effect size

Effect sizes and homogeneity test results in two models (fixed and random effects) obtained by combining the study findings in the meta-analysis are presented in Table 2.

Table 2
Effect sizes and homogeneity test results

Model	N	Mean Effect Size	Z	Standard error	% 95 Confidence Interval		Sd	Q	P	I²
					Lower Limit	Upper Limit				
Fixed Effects Model	10	0.640	7.798	.082	0.479	0.800	9	83.141	.000	89.175
Random Effects Model	10	0.970	3.682	.263	0.453	1.486				

Based on the data reported by the studies that were included in the meta-analysis, the effect size was 0.640 with the fixed effects model and 0.970 with the random effects model. The data were tested for homogeneity (Borenstein et al., 2009). Thus, it was determined that $Q_{(sd = 9)}$ was 83.141 (p < .01). Since the Q value exceeded the value for 9 degrees of freedom and .05 confidence level in the chi-square table (sd = 9, $\chi 2_{(.05)}$) = 16.92), the data were heterogeneous. Based on the classification proposed by Cohen (1992), the effect size in the random effects model was high. The forest plot that reflected the distribution of the effect sizes based on the random effects is given in Figure 1.
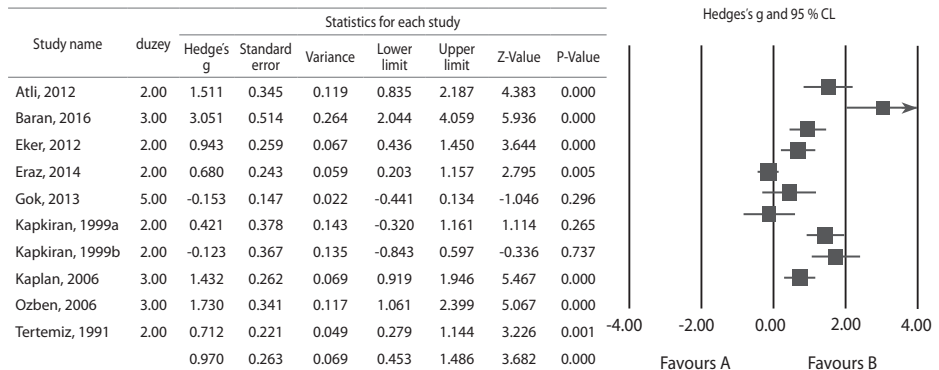
Study name	duzey	Hedge's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	P-Value
Atli, 2012	2.00	1.511	0.345	0.119	0.835	2.187	4.383	0.000
Baran, 2016	3.00	3.051	0.514	0.264	2.044	4.059	5.936	0.000
Eker, 2012	2.00	0.943	0.259	0.067	0.436	1.450	3.644	0.000
Eraz, 2014	2.00	0.680	0.243	0.059	0.203	1.157	2.795	0.005
Gok, 2013	5.00	-0.153	0.147	0.022	-0.441	0.134	-1.046	0.296
Kapkiran, 1999a	2.00	0.421	0.378	0.143	-0.320	1.161	1.114	0.265
Kapkiran, 1999b	2.00	-0.123	0.367	0.135	-0.843	0.597	-0.336	0.737
Kaplan, 2006	3.00	1.432	0.262	0.069	0.919	1.946	5.467	0.000
Ozben, 2006	3.00	1.730	0.341	0.117	1.061	2.399	5.067	0.000
Tertemiz, 1991	2.00	0.712	0.221	0.049	0.279	1.144	3.226	0.001
		0.970	0.263	0.069	0.453	1.486	3.682	0.000

Figure 1. Random effects model forest plot

A forest plot is an important indicator in both examinations of the meta-analysis findings and homogeneity. In the figure, the squares indicate the effect size in the associated study, and the lines next to the squares indicate the limits of the effect size at a 95 % confidence interval. The diamond-like shape below the graph indicates the effect size in all studies (Ayaz & Söylemez, 2015). The longer the horizontal line, the higher the confidence interval. The effect of the study on meta-analysis findings is reflected by the weight percentage (%). Thus, a higher percentage indicates that the effect of the study on the total meta-analysis finding was also high (Gözüyeşil & Dikici, 2012). The finding that only two out of the 10 effect dimensions were negative in the study (favoring the control group) and eight were positive (favoring the experimental group) indicated that the effect was positive.

Publication bias

Publication bias is one of the important problems in meta-analyses, and it is a problem associated with the preference for positive and statistically significant studies rather than negative and statistically insignificant studies in publication (Sarı & Orhan, 2019). Thus, the funnel plot presented in Figure 2 was used to investigate whether there was a publication bias in the studies.
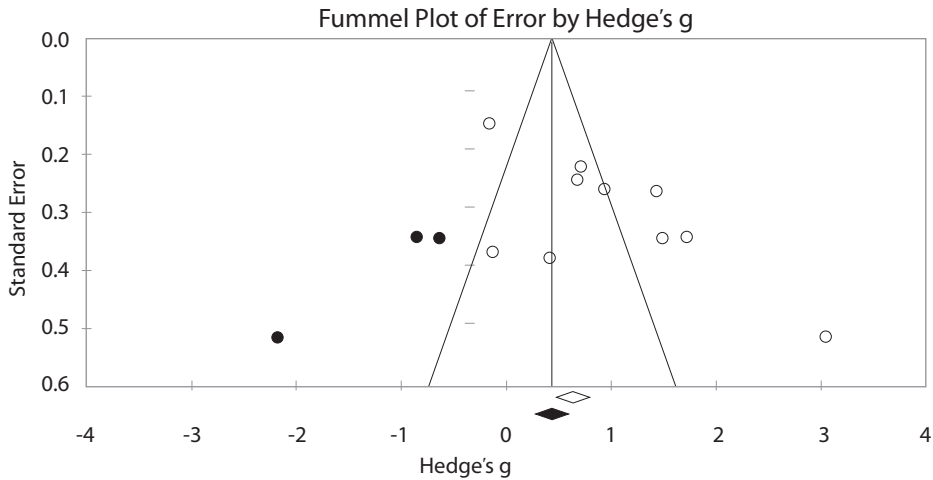

Figure 2. Funnel plot

The trim-and-fill method was employed to obtain the funnel shape in Figure 2. This method is a nonparametric data expansion technique (Duval & Tweedie, 2000) that could be used to estimate the number of missing studies in meta-analysis. The reason for this problem is the suppression of the most extreme findings on one end of the funnel plot (A Meta-Analysis Package for R, 2019). The black dots on the left side of the graph indicate that for the study to be symmetrical, it is necessary to add a number of studies equal to the number of points on the left side (Kaya & Öçal, 2018). In the present study, the three points on the left side of the graph, which were obtained with the trim and fill method, indicated that three studies should be added to the left side of the graph to obtain a symmetrical study. Thus, it could be suggested that there was no publication bias. Furthermore, Rosenthal's (1979) "fail-safe N" (Rothstein, Sutton, & Borenstein, 2005) coefficient was also investigated in the study. Thus, it was determined that the effect size "fail-safe N" was 229 at a .05 confidence level. It could be suggested that there was no publication bias based on the study findings since this value obtained with the 5k + 10 formula (Fragkos, Tsagris, & Frangos, 2014) was greater than 60.

Subgroup analyses

Subgroup analyses were conducted based on the data homogeneity, and the source of the homogeneity was determined. The subgroup analysis findings are presented in Table 3 based on school and publication type variables.

Table 3

Subgroup analyses in random effects model

Variable		N	Effect Size	Standard Error	% 95 Confidence Interval		Sd	.05 Confidence Interval X^2	Q_B	P
					Lower limit	Upper limit				
School level	Primary	6	0.713	0.184	0.353	1.073				
	Middle	3	1.968	0.412	1.160	2.776				
	University	1	-0.153	0.147	-0.441	0.134				
	Total	10	0.312	0.110	0.095	0.528	2	5.99	30.964	0.00
Publication type	Thesis	4	1.303	0.247	0.819	1.788				
	Article	5	0.362	0.254	-0.137	0.860				
	Proceeding	1	3.051	0.514	2.044	4.059				
	Total	10	1.080	0.167	0.752	1.408	2	5.99	23.513	0.00

Based on Table 3, the fact that the homogeneity (Q_B = 30.96, p <.05) of the school-level subgroups and the homogeneity value (Q_B = 23.51, p <.05) of the publication-type subgroups were greater than the chi-square critical value (5.99) demonstrated that there was a statistically significant difference between these subgroups. Thus, it was observed that the effect of homework on student achievement was highest in middle school, followed by primary school, and finally at the university level. It was also observed that the effect size was negative at the university level. Furthermore, it was determined that the effect of homework on student achievement was the highest in proceedings, followed by theses, and finally in articles.

Discussion, conclusion and recommendations

In the present study, which aimed to determine the effect of homework on students' academic achievements with the meta-analysis method, empirical studies were reviewed. This meta-analysis was conducted with 10 papers on the effect of homework on academic achievement. The studies were analyzed for publication bias, and it was determined that there was no publication bias. The findings reported on the effect of homework on academic achievement by studies conducted between 2000 and 2019 in Turkey were limited to the findings reported by empirical studies.

It could be suggested that the general effect size of homework on students' academic achievements, namely the Hedges' g value calculated as 0.97, indicated a high effect size. This finding was consistent with other meta-analyses conducted on the topic (Baş, Senturk, & Cigerci, 2017; Cooper & Valentine, 2001; Otto, 1985). Furthermore, Cooper, Robinson, and Pattal (2006) utilized various structural models to determine the effect of homework in their meta-synthesis and reported a positive and statistically significant correlation between the volume of homework completed by the students and their achievement outcomes, except for a few exceptions. Several studies demonstrated that homework had positive effects on student achievement (Murillo & Martinez-Garrido,

2014; Gustafsson, 2013; Minotti, 2005; Van Voorhis, 2003; Trautwein, Köller, Schmitz & Baumert, 2002; Villas-Boas, 1998; Tertemiz, 1991), whereas others reported that there was no correlation (Baran, Sevindik & Karademir, 2016; Kapıkıran & Kıran, 1999). In addition to the analyses conducted to determine the general effect size of homework on student achievement, subgroup comparisons were conducted based on the school level and publication type to determine the source of the heterogeneity in the findings.

The analysis conducted in the present study demonstrated that school level (primary school, middle school, and university) led to a significant change in the effect of homework on student achievement. The findings revealed that the highest effect of homework on student achievement was observed in middle schools, followed by primary schools and universities. Fan, Xu, Cai, He, and Fan (2017) discussed the correlation between homework and achievement in mathematics/science courses in studies conducted between 1986 and 2015 at the primary school, middle school, and high school levels in their meta-analysis. In contrast with the present study findings, they concluded that the correlation between homework and performance in mathematics/science courses was stronger in primary school, while it was weakest in middle school students. Baş, Senturk, and Cigerci (2017) did not report a significant difference in the effect of homework on student achievement based on the school-level variable in their meta-analysis. However, they claimed that although there was no significant difference based on the grade levels, as the grade level increased, the homework assignments increased student achievement. İflazoğlu and Hong (2012), on the other hand, concluded that homework was effective only in the 5th and 6th grades but not in the 7th and 8th grades. In other words, since different findings were reported by various studies, the effect of homework could not be generalized based on grade levels. However, based on these results, it could be suggested that homework could be effective at different educational levels and that the homework effect is different based on grade level. It could also be suggested that homework should not be limited to a certain age; it should be employed in teaching from an early age, and the employment of this method in subsequent educational experiences would have more or less positive effects.

The analyses revealed that the publication type (thesis, article, or proceeding) led to a significant difference in the effect of homework on student achievement. Based on the findings, it was observed that the highest effect of homework on student achievement was mostly reported in proceedings, followed by theses and articles. There were no other studies that reported findings on similar variables, which showed that this finding was significant.

Future analyses could be conducted on variables such as the disciplines where homework is more effective, the effect of the quality of homework and the assignment frequency, or the effect of the time of assignment (i.e., the effect of regular assignments versus homework assigned a few days before the exams on academic achievement).

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Esen Turan Ozpolat
Adıyaman University
Education Faculty
Altınşehir Road, Atatürk Blvd. No:1,
02040 Merkez/Adiyaman, Turkey
esen.turan@hotmail.com

Berna Karakoc
Kilis 7 Aralık University
School of Physical Education and Sports
Dogan Gureş Pasa Blvd. No:84,
79000, Merkez/Kilis, Turkey
bernakarakoc@gmail.com

Ibrahim Yildirim
Gaziantep University
Gaziantep Education Faculty
Osmangazi Road, University Blvd,
27310 Sehitkamil/Gaziantep, Turkey
iyildirim84@gmail.com

Kevser Eryilmaz
Ministry of Education
Akyol Road, Müfide Ferit Street, No:47,
27010, Sahinbey/Gaziantep, Turkey
kevser.0185@gmail.com

Učinak domaće zadaće na postignuća učenika: metaanaliza

Sažetak

Cilj ovoga istraživanja bio je primjenom metaanalize objediniti rezultate eksperimentalnih istraživanja provedenih od 2000. do 2019. godine koja su se bavila učinkom domaće zadaće na akademska postignuća učenika. Deset radova prijavljenih u bazama Google Scholar i Nacionalni centar za disertacije Vijeća za visoko obrazovanje (YÖK) između 2000. i 2019. uključeno je u analizu na temelju određenih kriterija. U istraživanje je također uključena analiza podskupina te utvrđivanje općega učinka domaće zadaće na akademsko postignuće. Rezultati su pokazali da je Hedgesova g vrijednost bila značajna; iznosila je 0,970, što otkriva opći učinak domaće zadaće na postignuća učenika. Nadalje, analiza je pokazala da se učinak domaće zadaće na postignuća učenika značajno razlikuje ovisno o školskoj razini i različitim poddimenzijama koje su prethodno prijavljene.

Ključne riječi: *domaća zadaća; metaanaliza; postignuće.*

Uvod

Još jedno u nizu pitanja jednako važnih kao i tehnološka infrastruktura, materijalna struktura i kvalifikacije nastavnika odnosi se na akademska postignuća učenika i njihovo poboljšanje u školama. U tu svrhu, domaća zadaća koju učitelji i škole smatraju sastavnim dijelom učenja sa značajnim doprinosom učenju također se smatra aktivnošću izvan učionice i produžetkom ili ponavljanjem nastave u učionici. Domaća zadaća opisana je kao zadaća koja bi trebala biti izvršena izvan školskih sati, trebala bi osiguravati trajno učenje i koristiti se kao podrška učenju, a zadaje ju nastavnik. To je nastavna metoda usvojena i implementirana diljem svijeta kako bi se pojačao sadržaj teme i potaklo učenike na istraživanje, a također je dio nastavnoga plana i programa te se smatra važnom za akademska postignuća (Kaplan, 2006; Turan-Özpolat, Karakoç, i Kara, 2017; Yuladır i Doğan, 2009).

Domaća zadaća važan je dio dnevne rutine djece školske dobi i osigurava njihovo aktivno sudjelovanje u procesu učenja. Učitelji već dugo vremena učestalo primjenjuju metodu domaće zadaće kako bi učenicima osigurali dodatno vrijeme za učenje, ojačali njihove vještine učenja i organizacije, pomogli im u stjecanju navika učenja, poboljšali njihova akademska postignuća i informirali roditelje o napretku njihove djece (Cooper,

2015; Jayanthi, Bursuck, Epstein i Polloway, 1997; Minke, 2017). Domaća zadaća poboljšava navike učenja i samostalnoga učenja, samodisciplinu, stavove prema učenju i vještine rješavanja problema učenika te im pomaže u konsolidaciji znanja stečenoga u učionici održavajući kontinuitet između nastave (Cooper, 1989; Painter, 2003). Može se koristiti kao priprema za sljedeći sat, zatim kao dodatne mogućnosti u slučajevima nedostatka vremena u učionici potrebnoga za provođenje sveobuhvatnih aktivnosti, uključivanje roditelja u proces učenja te omogućavanje učenicima, učiteljima i roditeljima da prate napredak i time premoste jaz između škole i doma (Painter, 1999; North i Pillay, 2002). Rosário i sur. (2015) kategoriziraju domaće zadatke kao primjenu, pripremu i dodatne zadatke na temelju prednosti, izvedivosti i praktičnosti. Ove vrste zadataka zadaju nastavnici kako bi osigurali sudjelovanje učenika i potaknuli smisleno učenje.

Zadatak primjene: Usredotočuje se na zadatke koji se daju u učionici kako bi se povećala brzina, poboljšale novostečene vještine, pregledao prethodni rad, učilo za ispite i očuvalo određene vještine tijekom vremena (Rosário i sur., 2015). Nastavnici češće koriste zadatke za primjenu i pripremu jer su praktični i zahtijevaju manje vremena.

Zadatak pripreme: Ovaj je zadatak usmjeren na pripremu učenika za sljedeći nastavni sat (Rosário i sur., 2015). Prema Vatterott (2009), takvi su zadatci prirodno povezani s prethodnim učenjem. Domaća zadaća osmišljena je tako da potakne učenike na razmišljanje o prethodnoj temi o kojoj se raspravljalo u razredu i pripremi ih za buduće teme.

Dodatan/dopunski zadatak: Naglasak je na poticanju prijelaza s prethodnoga učenja na nove zadatke (Rosário i sur., 2015). Ova vrsta zadataka zahtijeva višu razinu apstraktnoga razmišljanja. Učitelji primjenjuju ovu vrstu domaće zadaće kako bi potaknuli učenike na suradnju s vršnjacima i poboljšali kreativno učenje. Praktične vještine iz stvarnoga života koriste se za dovršavanje dodatnih zadataka, što rezultira bogatijem iskustvom učenja.

Prema Vatterott (2010), najbolja domaća zadaća trebala bi imati sljedećih pet razlikovnih značajki: cilj, produktivnost, učenikov osobni rad, kompetencija i atraktivnost; proširiti znanja učenika i razviti osnovne vještine. Domaće zadaće trebaju imati jasan akademski cilj za primjenu znanja ili vještina stečenih u nastavi te provjeru učeničkoga razumijevanja. Zadaće bi također trebale u potpunosti odražavati učenikovo učenje, podržavati podržavati učenikovo osobno rješavanje zadatka putem davanja izbora te omogućiti učenicima da uspješno izvrše zadatak bez pomoći (Vatterott, 2009). Kako navode Cooper, Robinson i Patall (2006), domaće zadaće imaju različite svrhe o kojima se govori u sljedećim odlomcima.

Predučenje: Cilj je domaće zadaće potaknuti učenike na razmišljanje o temi o kojoj se govorilo na prethodnome nastavnom satu i pripremiti ih za teme koje će se obrađivati kasnije. To uključuje dubinsko proučavanje poput čitanja poglavlja ili ocrtavanje teme prije nastave (Rosário i sur., 2015; Vatterott, 2009). Domaće zadaće zadane za prethodno učenje mogu se koristiti za otkrivanje učeničkoga predznanja (Vatterott, 2009).

Kontrola razumijevanja: Prema Vatterott (2009), kontrola razumijevanja je najzanemareniji cilj domaće zadaće, no ujedno i najvrjednija metoda pomoću koje nastavnici postaju svjesni učeničke razine učenja. Rješavanje sličnih pitanja pomoću metoda koje upućuje nastavnik i učenikovo objašnjenje tih metoda vrlo su korisni za kontrolu razumijevanja.

Vježba (Primjena): Domaće zadaće poput učenja tablice množenja napamet ili pisanja riječi smatraju se tradicionalnima. Sposobnost pamćenja učenicima je bitna za vježbu međutim, učitelji bi svojim učenicima trebali osigurati razumijevanje teme ili razumijevanje svojih vještina u učionici. Ako učitelji zanemaruju razumijevanje svojih učenika, svrha domaćih zadaća mogla bi biti promašena, a to će samo dovesti do razočaranja učenika i roditelja. Umjesto pamćenja preko noći, razumijevanje treba rasporediti na nekoliko dana (Vatterott, 2009).

Proces: Prema Vatterott (2009), procesni zadatci koriste se kada učitelji traže od učenika da razmisle o konceptima prikazanima u nastavi. Točnije, učitelji traže od učenika da razmišljaju o novim pitanjima i primijene svoje vještine i znanja naučena u učionici. Obrada zadataka je dugotrajan projekt ili zadatak koji se često usvaja na kraju nastavne jedinice ili cilja učenja.

Iako se smatralo da dobrobiti domaće zadaće uključuju poticanje učenja, pomoć učenicima u stjecanju navika učenja, poboljšanje njihovih akademskih postignuća i informiranje roditelja o napretku njihove djece, postoje i stajališta o domaćoj zadaći koja tvrde suprotno (Henderson, 1996; Van Voorhis, 2004). Kako navode Cooper i sur. (2006), pretjerano zadavanje domaćih zadaća dovodi do nekoliko negativnih učinaka kao što su gubitak interesa učenika za akademsko gradivo, tjelesni i emocionalni umor, smanjeno sudjelovanje u nenastavnim aktivnostima (u školi i izvan škole), nedostatak slobodnoga vremena te roditeljska intervencija (pritisak da se dovrši domaća zadaća i postigne dobar učinak). Učenici bi mogli zanemariti domaće zadaće prigovarajući da su zadaće dosadne ili besmislene, a aktivnosti poput učenja za ispite, vježbe u radnoj bilježnici, završavanja nedovršene nastave i sl. negativno utječu na njih (Cooper, 1989; Cooper i sur., 2006). Loše vođeni zadatci mogu dovesti do povećanja razlike između postignuća visoke i niske razine (Kralovec i Buell, 2001). Ovi problemi obično nastaju zbog određenih ponašanja kao što je dovršavanje domaćih zadaća u učionici, suradnja, varanje ili samo ispunjavanje nužnih zadataka (Cooper i Valentine, 2001; North i Pillay, 2002; Painter, 2003; Kohn, 2006). S druge strane, Cooper (2001) kaže da su učenici koji su napisali više domaćih zadaća imali bolje rezultate. Navodi se da je to moguće u slučajevima kada su učenici svjesni ove činjenice, kada je domaća zadaća usklađena s razinom na kojoj se učenici nalaze te kada se zadaća blago usmjerava.

Domaća zadaća je značajan materijal za učenike kako bi ojačali svoje učenje. Bilo da se radi o kući ili školi, zadaća je najvažniji pokazatelj navika učenja i kvalitete rada učenika. Neizbježno će postojati razlike između rada, stavova i navika učenika koji pravovremeno i pedantno radi domaću zadaću i učenika koji odgađa ili ignorira domaću zadaću (Küçükahmet, 1997, str. 179). Učenici koji shvaćaju pravu vrijednost

i dobrobit domaće zadaće i preuzimaju odgovornost postaju svjesni svojih prioriteta, uče kako rješavati različite probleme, upravljati svojim vremenom, samostalno raditi i preuzimati svoje odgovornosti te shvaćaju važnost planiranja u svim obrazovnim procesima (Cooper, 1989; Sullivan i Sequeira, 1996). Posebno zahvaljujući znanstvenim dostignućima u obrazovanju i konstruktivnome pristupu obrazovanju posljednjih godina, naglašava se važnost domaćih zadaća kao i njihovi negativni učinci te se jasno ističe doprinos zadaća različitim vještinama, cjeloživotnom učenju i školskim postignućima učenika (Tuncer i Altunay, 2009; Güneş, 2014; Roschelle, Feng, Murphy i Mason, 2016). Nekoliko istraživanja pokazalo je da domaće zadaće vode aktivnom učenju, a primjena naučenih znanja i vještina u svakodnevnom životu povećava trajnost učenja i akademskoga uspjeha. Općenito, istraživanja su pokazala da postoji pozitivna korelacija između domaće zadaće i postignuća učenika te su naglasila da su učenici koji redovito pišu zadaću uspješniji u školi u usporedbi s drugima (Hill, Spencer, Alston i Fitzgerald, 1986; Cooper, 1989; Foyle, 1990; Tertemiz, 1991; Epstein i Van Voorhis, 2001; Hong, 2001; Gür, 2002; Baker i LeTendre, 2005; Ilgar, 2005; Bennett i Kalish, 2007; Eren i Henderson, 2008; Kitsantas i Zimmerman, 2009; Hayward, 2010; Yıldız i Büyükkasap 2011; Doğan i Bozgeyikli, 2015; Núñez, Suárez, Rosário, Vallejo, Valle i Epstein, 2015; Roschelle i sur., 2016; Kaya i Kaya, 2018; Koçak i Göçer, 2020). Stoga je ovo istraživanje za cilj imalo kombinirati rezultate prethodnih empirijskih istraživanja o „učinku domaće zadaće na akademska postignuća učenika" s metaanalizom i holističkim pristupom. U tu svrhu identificirani su sljedeći istraživački problemi:

1. Koja je razina učinka domaćih zadaća na akademska postignuća učenika na temelju rezultata eksperimentalnih studija provedenih u Turskoj između 2000. i 2019.?

2. Razlikuje li se prosječna veličina učinka domaće zadaće na akademska postignuća učenika ovisno o razini razreda i vrsti publikacije?

Na temelju gore navedenih istraživačkih problema, ovo je istraživanje imalo za cilj prikupiti rezultate različitih istraživanja o domaćim zadaćama; to se također smatralo važnim jer bi doprinijelo postojećoj literaturi i otkrilo trendove u domaćim zadaćama prikazujući trenutačno stanje.

Metodologija

U istraživanju je upotrijebljena metaanaliza. Broj znanstvenih članaka, a time i onih objavljenih u obrazovnim znanostima, eksponencijalno je rastao, a proširila su se i znanja koja se odražavaju u tim istraživanjima. Ovo je također ukazalo na potrebu za holističkom revizijom i interpretacijom znanja prikupljenoga u literaturi (Bakioğlu i Göktaş, 2018). Metaanaliza je vrsta pregleda literature koja se primjenjuje za statističko i sustavno sažimanje istraživanja provedenih o određenoj temi (Başol Göçmen, 2004). Metaanaliza može se nazvati i analizom analiza (Kaya, 2016). Nadalje, iako je metaanaliza metoda raščlambe, cilj joj je postići sintezu na samome kraju. Stoga pruža dublje znanje o srodnoj temi kombinirajući rezultate prethodnih istraživanja. Kavale (2001) ističe da nijedno istraživanje nije savršeno u otkrivanju istine koja se može generalizirati i napominje da se rezultati istraživanja mogu sažeti holističkom,

sustavnom i objektivnom metodom pomoću metaanalize. Stoga je ovo istraživanje imalo za cilj utvrditi učinak domaćih zadaća na akademska postignuća učenika te su u tu svrhu pregledana empirijska istraživanja vezana uz domaće zadaće između 2000. i 2019. godine.

Prikupljanje podataka

U istraživanju su skenirane baze podataka Google Scholara i Nacionalnog centra za disertacije kako bi se došlo do svih radova objavljenih u Turskoj na turskom ili engleskom jeziku. Pretraživanje je završeno u prosincu 2019., a u ovu analizu uključena su istraživanja provedena u 20-godišnjem razdoblju od 2000. do 2019. u Turskoj. Kriteriji za uključivanje detaljno su navedeni u nastavku:

1. Istraživanja provedena u Turskoj između 2000. i 2019.
2. Sve objavljene i neobjavljene disertacije, članci objavljeni u recenziranim znanstvenim časopisima i zbornici objavljeni na raznim znanstvenim konferencijama na turskom ili engleskom jeziku.
3. Istraživanja koja su ispitivala učinak domaće zadaće na postignuća učenika empirijskim metodama ili empirijskim metodama s kontrolnom skupinom.
4. Uključivanje odgovarajućih brojčanih podataka koji bi omogućili izračun veličine učinka u istraživanju.

✓ U Google Scholaru korištene su ključne riječi „domaća zadaća I postignuće", a pretraga je rezultirala s 1170 radova.

✓ Također, ključne riječi „domaća zadaća I uspjeh ILI postignuće" korištene su u Google Scholaru, a pretraga je otkrila 687 turskih radova.

✓ U Nacionalnom centru za disertacije korištene su ključne riječi „ev ödevi ILI homework", a pretraga je dala 10 radova.

Tijekom pretraživanja pregledano je 1867 radova, uključujući i ponavljanja pojedinih istraživanja. Detaljan pregled otkrio je devet istraživanja koja su u skladu s kriterijima za uključivanje. Budući da je jedno od ovih devet istraživanja provedeno s dvije eksperimentalne skupine, izračunato je ukupno 10 veličina učinka, a analize su provedene na ovom skupu podataka. Opisni podatci o empirijskim istraživanjima provedenima o temi domaćih zadaća u Turskoj između 2000. i 2019. prikazani su u Tablici 1.

Tablica 1

Kao što je vidljivo iz Tablice 1, empirijska istraživanja obuhvaćena ovim istraživanjem provedena su najvećim dijelom s učenicima osnovnih škola, a ukupan broj učenika bio je 653.

Kodiranje podataka

Sve su podatke zasebno kodirala dva istraživača iz područja obrazovnih znanosti te je dobiveno podudaranje kodova. Ovo je istraživanje uključivalo 4 disertacije, 5 članaka i 1 zbornik radova, što je ukupno 10 članaka.

Uz izračun veličine zajedničkoga učinka, moguće je prikupiti podatke za podskupine putem metaanalize. Stoga se usporedbom srednjih učinaka različitih podskupina u istraživanjima može provesti analiza varijance između veličina učinka utvrđenih za pojedinačna istraživanja (Borenstein, Hedges, Higgins i Rothstein, 2009). Prema tome, u ovom su radu također prikazane statističke informacije o radovima, kao što su ime autora, godina izdanja, školska razina (osnovna škola, srednja škola ili fakultet), te vrsta publikacije (diplomski rad, članak ili rad).

Analiza podataka

Srednja veličina učinka izračunata je pomoću Hedgesovoga g u ovome istraživanju. Razine veličine učinka klasificirane su kako slijedi: .2 = mala; .5 = umjerena; .8 velika veličina učinka (Cohen, 1992). Općenito, softver Microsoft Excel korišten je za izračunavanje veličina učinka, a softver Comprehensive Meta-Analysis (CMA) korišten je za sve ostale analize u ovome istraživanju.

Rezultati i interpretacija

U ovom odjeljku raspravlja se o rezultatima vezanima uz veličinu općega učinka, popraćenima rezultatima povezanim s problemima istraživanja i analizom podskupina.

Srednja veličina učinka

Veličine učinka i rezultati ispitivanja homogenosti u dva modela (fiksni i slučajni učinci) dobiveni kombinacijom rezultata istraživanja u metaanalizi prikazani su u Tablici 2.

Tablica 2

Na temelju podataka iz istraživanja uključenih u metaanalizu, veličina učinka bila je 0,640 s modelom fiksnih učinaka i 0,970 s modelom slučajnih učinaka. Podatci su testirani na homogenost (Borenstein i sur., 2009). Stoga je utvrđeno da $Q_{(sd = 9)}$ iznosi 83,141 (p < .01). Budući da je vrijednost Q premašila vrijednost za 9 stupnjeva slobode i .05 razinu pouzdanosti u tablici hi-kvadrat (sd = 9, $\chi2_{(0,05)}$) = 16,92), podatci su heterogeni. Na temelju klasifikacije koju je predložio Cohen (1992), veličina učinka u modelu slučajnih učinaka bila je visoka. Model *forest plot* koji odražava distribuciju veličina učinka na temelju slučajnih učinaka prikazan je na Slici 1.

Slika 1.

Model *forest plot* [dijagram šume] važan je pokazatelj u oba ispitivanja rezultata meta-analize i homogenosti. Kvadrati na slici označavaju veličinu učinka u povezanome istraživanu, a crte pored kvadrata označavaju granice veličine učinka na 95 % intervalu pouzdanosti. Oblik dijamanta ispod grafikona označava veličinu učinka u svim istraživanjima (Ayaz i Söylemez, 2015). Što je vodoravna linija dulja, to je veći interval pouzdanosti. Učinak istraživanja na rezultate meta-analize odražava se težinskim postotkom (%). Stoga viši postotak ukazuje da je učinak istraživanja na ukupni rezultat

meta-analize također visok (Gözüyeşil i Dikici, 2012). Činjenica da su samo dvije od 10 dimenzija učinka bile negativne u istraživanju (u korist kontrolne skupine) i osam pozitivnih (u korist eksperimentalne skupine) ukazuje da je učinak bio pozitivan.

Pristranost objavljivanja

Pristranost objavljivanja jedan je od važnih problema u meta-analizi, a to je problem povezan s preferiranjem pozitivnih i statistički značajnih istraživanja umjesto negativnih i statistički neznačajnih istraživanja u publikacijama (Sarı i Orhan, 2019). Stoga je dijagram lijevka prikazan na Slici 2 upotrijebljen kako bi se ispitalo postoji li pristranost objavljivanja u istraživanjima.

Slika 2.

Metoda *trim-and-fill* [skraćivanje i popunjavanje] korištena je za dobivanje oblika lijevka na Slici 2. Ova metoda je neparametarska tehnika proširenja podataka (Duval i Tweedie, 2000) koja se može koristiti za procjenu broja istraživanja koja nedostaju u metaanalizi. Razlog za ovaj problem je potiskivanje najekstremnijih rezultata na jednom kraju dijagrama lijevka (Paket metaanalize za R, 2019). Crne točke na lijevoj strani grafikona pokazuju da je za simetričnost istraživanja potrebno dodati broj istraživanja jednak broju bodova na lijevoj strani (Kaya i Öçal, 2018). U ovome istraživanju, tri točke na lijevoj strani grafikona koje su dobivene metodom *trim-and-fill* pokazuju da je potrebno dodati tri istraživanja lijevoj strani grafikona kako bi se dobilo simetrično istraživanje. Stoga je moguće zaključiti da nije bilo pristranosti u objavljivanju. Nadalje, Rosenthalov (1979) koeficijent „sigurnosnoga N„ (Rothstein, Sutton i Borenstein, 2005) također je analiziran u ovome istraživanju. Utvrđeno je da je veličina učinka „sigurnosnoga N„ 229 na razini pouzdanosti od .05. Temeljem rezultata moguće je zaključiti da nije bilo pristranosti u objavljivanju jer je ova vrijednost dobivena formulom 5k + 10 (Fragkos, Tsagris i Frangos, 2014) bila veća od 60.

Analize podskupina

Na temelju homogenosti podataka provedene su analize podskupina te je utvrđen izvor homogenosti. Rezultati analize podskupina prikazani su u Tablici 3 na temelju varijabli škole i vrste publikacije.

Tablica 3

Kao što je vidljivo iz Tablice 3, činjenica da su homogenost ($Q_B = 30{,}96$, p <.05) podskupine na školskoj razini i vrijednost homogenosti ($Q_B = 23{,}51$, p <.05) podskupine vrste publikacije bile veće od kritične vrijednost hi-kvadrat (5,99), pokazuje da postoji statistički značajna razlika između ovih dviju podskupina. Tako je uočeno da je učinak domaće zadaće na postignuća učenika najveći u srednjoj školi, zatim u osnovnoj školi i na kraju na sveučilišnoj razini. Također je uočeno da je veličina učinka bila negativna na sveučilišnoj razini. Nadalje, utvrđeno je da je učinak domaće zadaće na postignuća učenika najveći u radovima iz zbornika, zatim u disertacijama te u člancima.

Diskusija, zaključak i preporuke

U ovome istraživanju koje je imalo za cilj utvrditi učinak domaće zadaće na akademska postignuća učenika putem metaanalize pregledana su empirijska istraživanja. Ova je metaanaliza provedena na 10 radova o učinku domaće zadaće na akademska postignuća. Radovi su analizirani na pristranost objave i utvrđeno je da pristranost ne postoji. Rezultati proizišli iz analize istraživanja provedenih u Turskoj između 2000. i 2019. o učinku domaće zadaće na akademska postignuća ograničeni su na rezultate ranijih empirijskih istraživanja.

Može se zaključiti da opća veličina učinka domaće zadaće na akademska postignuća učenika, točnije Hedgesova g vrijednost izračunata kao 0,97, ukazuje na veliku veličinu učinka. Ovaj je rezultat u skladu s drugim metaanalizama provedenima o ovoj temi (Baş, Senturk i Cigerci, 2017; Cooper i Valentine, 2001; Otto, 1985). Nadalje, Cooper, Robinson i Pattal (2006) upotrijebili su različite strukturalne modele kako bi odredili učinak domaće zadaće u svojoj metasintezi i izvijestili o pozitivnoj i statistički značajnoj korelaciji između količine domaće zadaće koju su učenici izvršili i ishoda njihovih postignuća, izuzev nekoliko iznimaka. Nekoliko je istraživanja pokazalo da domaća zadaća ima pozitivne učinke na postignuća učenika (Murillo i Martinez-Garrido, 2014; Gustafsson, 2013; Minotti, 2005; Van Voorhis, 2003; Trautwein, Köller, Schmitz i Baumert, 2002; Villas-Boas, 1998; Tertemiz , 1991), dok su drugi priopćili da nema korelacije (Baran, Sevindik i Karademir, 2016; Kapıkıran i Kıran, 1999).

Uz analize koje su provedene s ciljem utvrđivanja općega učinka domaće zadaće na postignuća učenika, usporedbe podskupina provedene su na temelju školske razine i vrste publikacije kako bi se utvrdio izvor heterogenosti u rezultatima.

Analiza provedena u ovom istraživanju pokazala je da je školska razina (osnovna škola, srednja škola i sveučilište) dovela do značajne promjene u učinku domaće zadaće na postignuća učenika. Rezultati su pokazali da je najveći učinak domaće zadaće na postignuća učenika uočen u srednjim školama, a slijede ih osnovne škole i sveučilišta. Fan, Xu, Cai, He i Fan (2017) raspravljali su o korelaciji između domaće zadaće i postignuća u kolegijima matematike/prirodoslovlja u istraživanjima provedenima između 1986. i 2015. na razini nižih i viših razreda osnovne škole te srednje škole u svojoj meta-analizi. Za razliku od rezultata ovoga istraživanja, zaključili su da je korelacija između domaće zadaće i uspjeha u predmetima matematike/prirodoslovlja jača u osnovnoj školi, dok je najslabija kod srednjoškolaca. Baş, Senturk i Cigerci (2017) u svojoj meta-analizi nisu pronašli značajnu razliku u učinku domaće zadaće na postignuća učenika na temelju varijable koja se odnosi na školsku razinu. Međutim, tvrdili su da iako nije bilo značajne razlike na temelju razina razreda, kako se razina razreda povećavala, domaće zadaće poboljšavale su postignuća učenika. İflazoğlu i Hong (2012), s druge strane, zaključuju da je domaća zadaća učinkovita samo u 5. i 6. razredu, ali ne i u 7. i 8. razredu. Drugim riječima, budući da su različita istraživanja izvijestila o različitim rezultatima, učinak domaće zadaće nije moguće generalizirati na temelju razina razreda. Međutim, na temelju ovih rezultata moguće je zaključiti

da bi domaća zadaća mogla biti učinkovita na različitim obrazovnim razinama i da je učinak domaće zadaće različit ovisno o razini razreda. Također bi se moglo ustvrditi da domaću zadaću ne treba ograničavati na određenu dob; trebalo bi je primjenjivati u nastavi od najranije dobi, a njena primjena u kasnijim obrazovnim iskustvima imala bi više ili manje pozitivne učinke.

Analizom je utvrđeno da je vrsta publikacije (diplomski rad, članak ili zbornik radova) pokazala značajne razlike u učinku domaće zadaće na postignuća učenika. Na temelju rezultata uočeno je da je najveći učinak domaćih zadaća na postignuća učenika većinom zabilježen u zbornicima radova, a zatim u diplomskim radovima i člancima. Nije bilo drugih istraživanja koja bi govorila o rezultatima sa sličnim varijablama, što pokazuje da je ovaj rezultat značajan.

Buduće analize mogle bi uključivati varijable poput disciplina u kojima je domaća zadaća učinkovitija, zatim učinak kvalitete domaće zadaće i učestalosti zadavanja, ili pak učinak vremena zadavanja (tj. učinak redovitih zadaća u odnosu na domaću zadaću koja se dodjeljuje nekoliko dana prije ispita koji provjerava školski uspjeh).