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Sosyal Bilgiler Öğretiminde Bilgi İletişim Teknolojilerinin Akademik Başarıya Etkisi: Meta Analiz Çalışması

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Özet

Bu çalışmanın amacı Türkiye'de Sosyal Bilgiler Öğretimi kapsamında Bilgi İletişim Teknolojileri ve geleneksel öğretim yöntemlerinin öğrencilerin akademik başarı puanları üzerindeki etkilerini incelemektir. Bu amaç doğrultusunda alanda yapılmış araştırmalara ait nicel veriler meta analiz yöntemiyle incelenmiş ve elde edilen sonuçlar yorumlanmıştır. Çalışma 47 adet lisansüstü teze ait nicel veriler üzerinden yürütülmüştür. Çalışma kapsamında rastgele etkiler modeline göre E++= 1.062 olarak hesaplanmıştır. Etki büyüklüğü geniş aralıkta olarak yorumlanmaktadır. Rastgele etkiler modeline göre p değeri 0.05'ten küçük olduğu sonucuna ulaşılmış ve anlamlı düzeyde farkın olduğuna ulaşılmıştır. Çalışma sonucunda Bilgi İletişim Teknolojilerinin öğrenci akademik başarıları üzerinde geleneksel yöntemlere karşı daha etkili olduğu, Bilgi İletişim Teknolojileri ve akademik başarı arasında pozitif yönde geniş ölçüde etki yarattığı sonucuna ulaşılmıştır.

Anahtar Kelimeler

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A Meta-Analysis Study: The Effect of Information Communication Technology on Academic Success in Social Studies Teaching

Abstract

The aim of this study is to examine the effects of Information Communication Technologies and traditional teaching methods on students' academic achievement scores in Social Studies teaching. For this purpose, the quantitative data of the research conducted in the field were analyzed by meta-analysis method and the results obtained were interpreted. The study was conducted on quantitative data from 47 graduate thesis. Within the scope of the study, it was calculated as E ++ = 1.062 according to the effects model. The effect is interpreted as broadly. According to the random effects model, it was concluded that the p-value was less than 0.05 and a significant difference was reached. It has been concluded that Study and Information Communication Technologies are more effective on students' academic achievement than traditional ones and have a positive and broad impact on Information Communication Technologies and achievement.

Keywords

Social Studies Teaching
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About Article

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Introduction

Throughout history, people have continued to work to understand society and the individual, using the knowledge and experience they have gained in their daily lives, but passing it on to new generations. Currently, this transfer occurs in the field of Education with a social studies course. MEB (2018: 12) social studies "history, geography, economics, sociology, psychology, philosophy, social sciences, and Human Rights, civics and citizenship issues such as integration and interdisciplinary perspectives, historical awareness, and educate students of high national consciousness should" is expressed as. Ozturk (2015: 4) expressed social knowledge as "teaching used by combining the knowledge and methods it receives from the social sciences and Humanities in order to make informed decisions and train effective citizens in problem solving in almost all changing country and world conditions".

Although the aim principles and skills for Social Studies course and teaching are clearly stated, it is known that different paths are followed during the implementation phase. 3 different traditional approaches are mentioned in Social Studies teaching (Bart and Demirtaş, 1997). The Social Studies approach as citizenship transfer was expressed by Doğanay (2002: 20) and Kılıçoğlu (2015: 6) as follows; its aim is to ensure that individuals become good citizens, dominating our cultural values and heritage. It focuses on the concepts of learning the past, traditions, responsibility and commitment to authority.

Social Studies as Social Science by Öztürk (2012: 25); it has been expressed as the best preparation for the acquisition of social knowledge and values. Information collection and interpretation processes dominate.

As a reflective study, in Social Studies teaching, individuals acquire skills through the real problems they face in their lives. Decision-making methods used in the problem-solving phase instead of information are important (Doganay, 2002: 21).

Meydan ve Akdag (2008: 147) "if the environment does not fit into the school, if history does not go back, if the time tunnel is an imaginary creature, how will Education be the product of life."they used their words. In Social Studies teaching, given the content, it cannot create opportunities for students to use the experimental observation path, which is expressed verbally, and observe the repetition of events; it can be said that education becomes difficult to be a product of life. In the prepared curriculum, when the title of skills, values and goals is

examined, emphasis is made on the use of extracurricular materials and teaching methods to eliminate this deficiency. Lean (2008: 82-90) defined materials as tools used to enrich the teaching process, increase learning, and support learning. Today, along with technology, the preparation and use of these materials has become easier.

Technological materials and learning environments used in the field of education are presented under the Title Information Communication Technologies. TDK collected information technology and Communication Technology Information and communication technologies under one roof (2019) "by the combined use of information technologies and Communication Technologies" is defined as. Erdogan and Bilir (2002: 50) when defining Information Communication Technologies, they expressed them as a whole of the technologies in which information is transmitted through networks. Enterprise (2006: 3) defines Information Communication Technologies as communication and computer technologies that ensure the regular and accurate production, collection, storage and transmission of information.

Information and Communication Technologies have gained a place in society over time and have started to be used effectively in the field of Education. "Can Education be given more effectively?"based on the question, educational and Information Communication Technologies were encountered (Saban, 2007: 24). Technological elements of our time have brought learning and teaching opportunities in schools that were previously difficult to realize. Technology-enriched learning environments offer dynamic and interactive spaces. It provided the opportunity to examine the individual learning characteristics of the students more comfortably. As part of their personal abilities and interests, students access and produce knowledge and have the opportunity to develop lifelong learning skills. Technology has helped schools enter a systematic process of innovation (Saban, 2007: 24).

The effect of Information Communication Technologies on education has been studied by academic studies and it has been stated that they are more effective than traditional teaching methods. The positive effects it provides in every discipline it applies are supported by research. Social Studies has also taken its place among the disciplines in which technology is used. The importance of Information Communication Technologies in Social Studies teaching has also found its place in the curriculum. In the article "digital competence", when

the qualifications of the curriculum are examined, and the specific objectives of the curriculum 11. in the article, the following expressions given in (MEB, 2018);

> *"Digital competence ensures secure, critical use of ICT for work, everyday life and communication. The competence in question should be supported by basic skills such as access to and evaluation of information, storage, production, use of computers for presentation and participation in common networks through the internet, communication.*
>
> *11. matter; understanding the development process of Science and technology, its effects on social life and conscious use of ICT"*

Except these substances, which include information and communication technologies directly gain the desired social studies skills students with a "digital literacy", "map literacy", "communication", "media literacy", "table, chart and diagram drawing skills such as interpreting indirectly have found a place for themselves in information and communication technologies (MEB, 2018).

The base there (2000: 53) the fusion of communication technologies and information social information about "the aim of deficiencies in the transfer of social information, especially the lack of visual material of the courses could not reach any desired targets, and so in our lives, it is important to be used in social studies of information and Communication Technology." expressed in the form. It is argued that students who are in the period of concrete operations will solve the problems they experience as a result of straight narratives through information and Communication Technologies, the lessons will be more enjoyable and will have a positive impact on the level of realization of the goals of the program.

In this study, "what is the effect of Information Communication Technologies on academic success in Teaching Social Studies?"the answer to the question was sought. Effect sizes were calculated; results of year, publication level, sample size, applications used and publication bias data were examined. It can be stated that the absence of meta-analysis studies for research conducted in Social Studies teaching and the study of the effectiveness of these studies are important in terms of providing recommendations to new researchers.

Method

This study aims to compare quantitative data from studies that examine the impact of Information Communication Technologies and traditional teaching methods on student academic achievement scores in the context of Social Research Teaching. For this purpose, the meta-analysis method was preferred in the study. The Meta-analysis method is defined by Dinçer in his book "Applied Meta-analysis in Educational Sciences" (2014: 4) and is expressed as "combining quantitative findings of studies and interpreting them". The Meta-analysis method is preferred to learn the effectiveness of significantly different studies prepared by researchers within the same subject. In this study, the meta-analysis method was used to interpret the significant difference in terms of combining, interpreting and effect size of the data contained in the graduate theses examined.

The Meta-analysis method was stated by Durlak (1995) as having six process steps. Steps of this process:

- ***Determination Of Research Problem***

As with any research, the researcher needs a good research question in the meta-analysis method. The research question should be carefully selected, as it will cover the overall study in meta-analysis methods. The problem sentence should cover all of the studies to be examined within the scope of meta-analysis.

- ***Literature Review***

After determining the research question, what researchers should do is scan the literature for the topic title. Literature review is the same in meta-analysis as in all research.

- ***Coding of Found Works***

After a literature review, all studies on the subject cannot be expected to be the same and cannot be included in the meta-analysis. Studies that meet the inclusion and exclusion criteria determined by the researcher should be subjected to meta-analysis. The coding form can be sampled or recreated from other research. For the reliability of the coding form, it must be completed by other people or repeated by the researcher at certain intervals.

- ***Calculation Of Effect Size***

Effect size is the sine qua non of meta-analysis studies, the concept that gives direction to the study. For each of the studies are specified separately. The total result, which

covers the entire study, is expressed as the overall effect size. By interpreting the effect size, it is determined by which method to examine the variables.

- ***Analysis***

The Meta-analysis method does not include a single analysis method. The analysis method is determined based on the effect size results and coding form. Analyses are made by selecting the appropriate method for quantitative data to be examined within the scope of the research.

- ***Interpretation Of Findings***

The data obtained by calculating the overall effect size, effect sizes of variables, heterogeneity tests and publication bias are interpreted in accordance with the meta-analysis by expressing the reasons for the occurrence of significant differences.

Collection of Data

During the data collection phase, a literature review was carried out in accordance with the method of the study. Graduate theses and articles found in databases such as Higher Education Council thesis Center, Google academic were scanned. As a result of these scans, 70 graduate theses have been reached that examine the impact of Information Communication Technologies and traditional teaching on academic success score in Social Studies teaching. 10 studies that did not have permission to publish, 14 studies that did not meet the inclusion criteria were published, and the study continued with 46 graduate theses. When quantitative data from 46 studies were examined, it was observed that one of the experimental studies belonging to two separate schools was conducted and compared with each other. Due to the acceptance of quantitative data belonging to these two separate schools in the method of meta-analysis, the study continued as if 47 studies were to be examined.

In the data collection process, inclusion criteria determined by the researchers were determined within the meta analysis method. These criteria;

- Year Criteria: thesis studies conducted after 2004 are included in the meta-analysis.

- Source of the study: master's and doctoral theses conducted in Turkey were obtained through the catalog of the National dissertation center of the Council of Higher Education.
- Variables: the impact of Information Communication Technologies on academic success in Social Research Teaching has been included in the meta-analysis.
- Statistical data: studies with a pre-test-final test model were included, which contained quantitative characteristics from the determined thesis studies; arithmetic mean, standard deviation and sample size of the groups were specified.
- Applications: studies in which traditional learning of control groups and information communication technologies are used in experimental groups have been studied.

Variables of Study

The effect sizes calculated in this study of Information Communication Technologies on academic achievement of the "dependent variable"; the range of years of study, sample size, methods and materials that are used in the experimental group, the level of the publication of the study "arguments" is designated.

Analysis of The Data

In order to analyze the data within the scope of the study, it is necessary to code the graduate theses to be examined within the meta-analysis method. The data to be examined should be processed in the headings determined by the researcher in the meta-analysis program and within the method to be used. In this study, meta-analysis data was encoded in the experimental and control group separately under the headings of sample number, arithmetic mean and standard deviation.

At the stage of data analysis, the meta-analysis method has a model of "fixed, random and mixed" effects. In order to examine quantitative data according to the fixed effects model, the data processed in the encoding form must be common and the single effect size must be output. In the random effects model, the data processed into the encoding form must be different, and the effect size will be more than one. Since "arithmetic mean, sample size and

standard deviation" are common in all graduate thesis studies studied as statistical data in this study, the method titled "Unmatched groups, post data only" was selected in accordance with the data in the meta analysis program. After that, the data entry was done in favor of the experimental group and the tests to be used were applied.

Findings

This section contains the results of 47 thesis studies obtained as a result of processing the data to be examined through the statistical program. Its effect on academic success in Social Studies teaching is shown in tables. When examining the combined effect sizes of thesis studies, it is found that the largest effect in hedges ' G format is ES=3,876 and the lowest effect is ES=0,199, except for those in favor of the control group in a negative direction, taking a confidence interval of 95%.

Table 1 Distributions Of Effect Size Direction

ES Direction	**f**	**%**
Positive	45	96%
Negative	2	4%
Zero (0)	0	0%
Total	**47**	**100%**

Heterogeneity				
Total Between	**Q-value**	**df(Q)**	**p-value**	**I-squared**
	332,302	46	0,000	86,157

It was concluded that 45 (96%) of the 47 thesis studies examined by Meta-analysis method were positive. It shows that a positive result, such as 96%, leads to a result in favor of technological applications in Teaching Social Studies. Looking at the heterogeneity values of the studied theses, it was found to be "Q-value=332,302". Critical value for df(Q)=46 specified in the table when examining the chi square table, it seems that the value of Q is excessive. These results indicate that the study has heterogeneous structural characteristics. According to the results obtained, it is concluded that our research has heterogeneous properties and therefore should be analyzed and interpreted according to the random effects model.

Table 2 Effect Magnitudes For The Random Effects Model

Model Type		Overall Effect Size	Standard Error	Variance	Lower Limit	Upper Limit	Z	p
Random	3	1,062	0,104	0,011	0,857	1,267	10,166	0,000

Random effects were calculated as E++=1,062 and according to Cohen's d classification criteria, the effect size is in a "wide" range. There is a significant difference between social studies teaching and the technological tools and teaching methods included in ICT.

Table 3 Distribution Of Combined Effect Sizes And Heterogeneity Test By Year

	N	ES	Standard Error	Variance	Lower Limit	Upper Limit	Z	p
2006	4	0,934	0,166	0,028	0,608	1,259	5,622	0,000
2007	3	1,340	0,326	0,106	0,701	1,978	4,113	0,000
2008	4	1,145	0,228	0,052	0,699	1,591	5,030	0,000
2010	5	0,772	0,165	0,027	0,448	1,096	4,676	0,000
2011	3	0,752	0,161	0,026	0,437	1,068	4,670	0,000
2012	6	1,341	0,252	0,064	0,847	1,836	5,315	0,000
2013	3	2,093	0,753	0,568	0,616	3,570	2,778	0,005
2015	3	0,703	0,264	0,070	0,186	1,220	2,664	0,008
2017	6	1,730	0,444	0,197	0,860	2,599	3,899	0,000
2018	6	0,323	0,129	0,017	0,069	0,577	2,497	0,013
Total	**43**	**0,797**	**0,065**	**0,004**	**0,670**	**0,925**	**12,269**	**0,000**

Heterogeneity

	Q-value	df(Q)	p-value	I-squared
Total Between	31,467	9	0,000	-

Due to the fact that one dissertation study was found in 2004, 2005, 2009 and 2014, it was not included in the calculation of impact size by year. The fact that the p value of the Q result is less than 0.05 indicates a heterogeneous structure. Looking at the table x^2 to reach a final judgment on heterogeneity, it seems that the value of Q is higher than the critical value of df=9, and the value of p is less than 0.05. It is observed that the distribution of the research by year is heterogeneous and significant differences occur. The reason for the significant difference can be expressed as differences in the process, sample sizes, applications and development, dissemination.

Table 4. Effect size distribution and heterogeneity Test by Publication Type

	N	ES	Standard Error	Variance	Lower Limit	Upper Limit	Z	p
PG	40	1,101	0,116	0,013	0,873	1,328	9,490	-
DR	7	0,853	0,238	0,057	0,387	1,319	3,585	0,000
Total	**47**	**1,053**	**0,104**	**0,011**	**0,849**	**1,257**	**10,101**	**-**
Heterogeneity								
Total Between		**Q-value**	**df(Q)**		**p-value**		**I-squared**	
		0,875	1		0,350			

Of the graduate theses studied according to the random effects model, 40 are master's theses and 7 are doctoral theses. The result of whether the thesis studies studied show a significant difference in the level of publication is reached by looking at the results of the heterogeneity test of the type of publication. When examining the heterogeneity test table of the publication type, no significant difference was found between his studies, since the Q value is less than df=1 in the x^2 table and p>0.05. The reason why there are no significant differences depending on the type of publication is that master's and doctoral theses progress in the same format as preparation.

Table 5 effect size distribution and heterogeneity Test For Sample criteria

	N	ES	Standard Error	Variance	Lower Limit	Upper Limit	Z	p
0-50	19	1,194	0,191	0,036	0,820	1,568	6,259	0,000
51-100	20	0,776	0,118	0,014	0,545	1,008	6,574	0,000
101-150	6	1,865	0,363	0,132	1,154	2,576	5,139	0,000
150+	2	0,571	0,233	0,054	0,115	1,026	2,454	0,014
Total	**47**	**0,904**	**0,089**	**0,008**	**0,728**	**1,079**	**10,113**	**-**
Heterogeneity								
Total Between	**Q-value**		**df(Q)**		**p-value**		**I-squared**	
	12,542		3		0,006			

When the heterogeneity test of the sample size was examined, the Q value was calculated as 12,542. The p value of the heterogeneity test is less than 0.05 and the Q value is higher than df=3 when looking at the results of the x^2 table. It can be said that there is a significant difference between them in classification according to the sample size. The reason for the significant difference in sample size is the sample size, students 'attitudes towards the course, students' interests, course hours allocated in the curriculum, preferred social studies

subject when transferring applications to students, individual development levels of students and the increase in the current number can be said to differ because it creates difficulties in reaching students.

Table 6 variables affecting academic success and heterogeneity testing

Değişkenler	N	ES	Standard Error	Variance	Lower Limit	Upper Limit	Z	p
ICT	23	1,182	0,149	0,891	0,022	1,474	7,949	0,000
TM	24	0,939	0,139	0,667	0,019	1,212	6,755	0,000
Total	**47**	**1,053**	**0,102**	**0,854**	**0,010**	**1,252**	**10,363**	**-**

Heterogeneity				
Total	**Q-value**	**df(Q)**	**p-value**	**I-squared**
Between	1,422	1	0,233	

Effect of academic success when examining the heterogeneity test table of the subject title studied, no significant difference was found between his studies, since the Q value is less than df=1 in the x^2 table and p>0.05. . It seems that the effect of ICT tools and teaching methods on students ' academic achievement scores does not differ between social studies teaching. Impact on academic success the reason why there are no significant differences compared to the variables studied is that studies prepare them as a research topic in order to prove that Information Communication Technologies have an impact on student academic success in Teaching Social Studies.

Publication bias is one of the factors affecting meta-analysis studies. Publication bias is formed as a result of collecting studies focused on a specific result and analyzing them with the help of meta-analysis. According to Dinçer (2014: 21), publication bias is caused by researchers finding a significant difference, high overall impact expectation, limited subject area work, and the inclusion of randomly added Studies in the analysis to increase the number of studies studied.

Publication bias means that the "number of error protection" is calculated by how many studies should be included in the study in order to find the overall impact size of the thesis studies being studied as zero. 47 in order to override the results of the graduate thesis study and reduce the overall impact size to zero, the number of error protection calculated in the classical method shows that 7606 individual studies are needed that do not have a significant effect. According to Orwin's error protection number, another error protection number

calculation process, 8879.0 concludes that individual studies should not have a significant impact on academic success. The tau coefficient must also be looked at for the final result to indicate that there is no publication bias. The fact that the tau floor number is close to 1.00 and the p value is greater than 0.05 indicates that the thesis studies examined within the scope of the meta-analysis have a publication bias. Tau=0.35 p=0.000<0.05 was calculated when the data of 47 thesis studies examined within the scope of the research were examined. According to these results, it seems that our research does not have a publication bias.

Conclusion and Discussion

"What is the effect of Information Communication Technologies on academic achievement scores in Social Studies teaching?"based on the question, the results of the meta-analysis data are as follows:

When data on impact sizes by year were examined, the combined impact size for 10 years was calculated as 0.797. Looking at the results of the impact sizes for years, it is observed that the least impact was in 2018 and the most impact was in 2013. When the results of the heterogeneity test were examined, it was concluded that there was a significant difference between the years. Variables such as sample size, material used, preferred teaching method, differences in students ' social studies course, technological developments were instrumental in the formation of significant differences.

No significant differences were found between master's dissertations and doctoral dissertations when examining the effect sizes on the publication levels of the studies studied. The fact that they are progressing in the same format as the preparation and that they are preparing for the common purpose prevents significant differences from occurring.

A significant difference was found, albeit at a low level, when examining the effect sizes and heterogeneity results obtained from coded sample sizes. The reason for the difference observed in the sample size based on the number of students who achieved significant, students ' attitudes and interest in social studies, social studies lesson, the subject of the developmental levels of individual students and between the studies because of difficulties due to the rise in the current issue there is a difference.

It was concluded that there were no significant differences when looking at the results of learning methods compared with traditional teaching methods and the size of the impact on

the materials used. The reason why there is no difference in the type of publication of dissertations is that the dissertations studied are carried out within the common purpose and scope of the same subject.

Looking at the results obtained in this study, 47 publications investigating the impact of Information Communication Technologies on academic success in teaching social studies were examined. As a result of combining statistical data from independent studies, it was found that the impact of Information Communication Technologies on academic success in Social Research Teaching is higher than traditional teaching methods. Information Communication Technologies were found to be more effective in the process of transferring the information presented to students within the scope of Social Studies teaching and the behavior, skills and competencies that they are expected to acquire.

When we also examined meta-analysis studies, which are considered as a single topic related to Information Communication Technologies and learning environments, it was concluded that it positively affects academic success compared to the traditional method in the field of Education. Sahin (2005), internet-based studies that examine the impact of distance education on academic achievement in examining the effect sizes of studies with 58 master's thesis was more effective than traditional training concluded. Camnalbur (2008) compared computer-aided teaching with traditional teaching as a master's thesis and concluded that computer-aided teaching is more effective through 78 studies that he examined through the meta-analysis method. Gözuyeşil (2012) examined the impact of brain-based learning, Sunğur (2015) Computer-Based Learning, Ekemen (2017) brain-based learning, Durak Men (2018) Web-based learning and Root (2018) blended learning on academic success by meta-analysis method and concluded that it is more effective than traditional teaching. In the results of the studies in the literature, it is seen that the relationship between Information Communication Technologies and academic achievement is examined under various headings and is more effective. In this study, studies comparing Information Communication Technologies and traditional teaching in Social Research Teaching were examined by meta analysis method; it was concluded that information communication technologies are more effective on academic achievement scores.

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