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A Content Analysis of 2012-2017 Decade Academic Achievement Researches
2012-2017 Dönemi Akademik Başarı Araştırmalarının İçerik Analizi

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Abstract

This study aims to determine the descriptive properties and methodological tendencies in empirical studies focusing on academic achievement. Educational research studies taking academic achievement as the dependent variable were considered in this study. The articles published in SSCI indexed journals in the period between 2012 and 2017 were scanned through Web of Science database. The sample for the study was composed of 80 articles using experimental research method. Educational Technologies Publication Classification Form was used as the data collection tool in this study. The articles collected were put to content analysis. On examining the independent variables influencing academic achievement in the articles, it was found that experimental studies in the categories of use of materials, teaching approaches/strategies, learning environments, assessment types and teaching techniques predominated. It was found that such variables as critical thinking, problem solving and attitudes in addition to academic achievement were also used as the dependent variable in the studies analyzed. Besides, it was also found that the studies frequently used t-test, variance analysis (ANOVA/ANCOVA) as data analysis methods. It is thought that the results obtained will guide researchers intending to conduct studies on academic achievement.

Keywords: Academic achievement, academic performance, student achievement, student performance

Öz

Bu çalışmada, akademik başarıya odaklanan deneysel çalışmalara ait tanımlayıcı özelliklerin ve yöntemsel eğilimlerin tespit edilmesi amaçlanmaktadır. Çalışmanın amacı doğrultusunda bağımlı değişken olarak akademik başarının kabul edildiği eğitim araştırmaları ele alınmıştır, 2012-2017 yılları arasında SSCI indeksli dergilerde yayınlanmış makaleler Web of Science veri tabanı aracılığı ile taranmıştır. Erişilen makalelerden deneysel araştırma yönteminin kullanıldığı 80 makale çalışmanın örneklemini oluşturmuştur. Çalışmada veri toplama aracı olarak Eğitim Teknolojileri Yayın Sınıflama Formu kullanılmıştır. Elde edilen makaleler içerik analizi yöntemiyle analiz edilmiştir. Çalışmalarda akademik başarıya etki eden bağımsız değişkenlere bakıldığında materyal kullanımı, öğretim yaklaşımları/stratejileri, öğrenme ortamları, değerlendirme türleri ve öğretim teknikleri kategorilerinde deneysel çalışmaların yoğunlukta olduğu görülmüştür. Çalışmalarda akademik başarı değişkeninin yanı sıra; eleştirel düşünme, problem çözme ve tutum gibi değişkenlerin bağımlı değişken olarak incelendikleri tespit edilmiştir. Ayrıca yapılan analizler sonucunda söz konusu araştırmalarda sıklıkla t-testi, varyans analizi (ANOVA/ANCOVA) veri analiz yöntemlerinin kullanıldığı anlaşılmıştır. Elde edilen sonuçların akademik başarıyla ilgili çalışma yapmak isteyen araştırmacılara yön gösterici nitelikte olduğu düşünülmektedir.

Anahtar Kelimeler: Akademik başarı, akademik performans, öğrenci başarısı, öğrenci performansı

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Extended Abstract

Introduction: *One of the indicators of individuals' success is undoubtedly academic achievement. Kaggwa (2003) defines academic achievement as the knowledge, skills, techniques, positive attitudes, behaviours, the quality and quantity of philosophy students acquire. According to Çırak and Çokluk (2013, p. 72), on the other hand, academic achievement is the whole of behaviours consistent with curriculum objectives." In other words, a student is considered successful if he or she displays the behaviours targeted in the curriculum. Academic achievement is considered very important by families and the immediate circle because it is the indicator of students' well-equipped preparation for professional and social life and because it shapes their future. Therefore, it is important to see the factors affecting students' academic achievement and the effects of different technologies, methods and techniques on their academic achievement in that in determining the quality indicators of educational system and in guiding the changes in educational policies (Alnabhan, Al-Zegoul and Harwell, 2001). The required precautions are also taken by determining students' levels of achievement. Thus, efforts are made to maximise effectiveness, efficiency and satisfaction in learning (Özçelik, 2010). Therefore, academic achievement is often regarded as the dependent variable in educational studies. In accordance with this, the current study aims to determine the descriptive properties and methodological tendencies in experimental studies concerning academic achievement.*

Method: *The research population was composed of articles concerning academic achievement published in SSCI indexed journals in the period between 2012 and 2017. After scanning, 788 articles in total were reached. 80 of them using experimental research model constituted the sample of the research. Studies which were not experimental and studies of meta-analysis were excluded from analyses. Educational Technologies Publication Classification Form (ETPCF) was used as the data collection tool in this study (Göktaş et al., 2012). The data collected from the articles were put to content analysis. Educational Technologies Publication Classification Form (Göktaş et al., 2012) was firstly put to the web for this purpose and thus it was stored on the database. The frequencies and for the responses to each research question and the percentages for the frequencies were calculated in relation to the data saved on the database. The numerical data obtained in consequence were shown in tables and graphs. A guide leading the researchers was used in analyzing the articles. Additionally, the publication classification form was broadcast on the web page and thus it was assured that the data were entered and checked on the web by three researchers. The articles analyzed were shared by the researchers to increase the reliability of the study. Classification was made by the researchers at three stages. At stage one, each researcher added the data for the articles they had analyzed to the form available on the web, at stage two the data entered were checked by the other researchers for confirmation; and at the final stage the data were checked again by the research coordinator and the lacking parts were dealt with.*

Findings: *Most of the studies focus on the area of science, which is followed by mathematics/geometry, computers, management/economics/economy and foreign languages respectively. The independent variables considered in the experimental studies concerning academic achievement are use of materials, teaching approaches/strategies, learning environments, types of assessment, teaching techniques and other situations apart from these. The studies make efforts to demonstrate effects of computers as the materials, game-based learning as the approach of learning, online learning as the learning environment, formative and portfolio evaluation as the type of assessment and of student achievement teams as the learning technique on academic achievement. 52 studies focus only on academic achievement whereas 28 studies include one or more dependent variables in addition to academic achievement. The variables of participation in lessons, critical thinking skills, motivation 29 and self-efficacy are analyzed along with academic achievement.*

Discussion: *It was found in this study that the independent variables affecting academic achievement were mostly in the use of materials, teaching approaches, learning environments, types of assessment and teaching techniques. This situation can be interpreted as that it is the indicator of the fact that media-methods discussions are still continuing. Hence, the discussion "is it the media or methods?" between Richard Clark and Robert Kozma has manifested its effects on the area for a long time. The experimental studies analyzed were found to centre mostly around the area of science. It was also found that they were also concerned with mathematics/geometry, computer and management/economics/economy. The fact that the number of studies concerning academic achievement was greater in the fields of science, mathematics, technology and computers than in the other fields can be interpreted as that the effects of differing instruments of media were analyzed in those fields and that the number of such studies was greater as a result. Another finding in this study was that the number of studies analyzing academic achievement on its own as the dependent variable was greater. Yet, critical thinking skills, self-efficacy, problem solving and creative thinking skills in addition to academic achievement were also considered in the studies. The explanation for this could be that the studies were conducted in the context of digital competence and the purpose was to equip students with the skills required by our era. It is pointed out that individuals in the work force will need to have complex problem solving, critical thinking, creativity, human management, coordination with others, affective intelligence, making judgements and decisions, regulating services, negotiation skills and cognitive flexibility skills in 2020 (Mittal, Zuma, Kagame, Nielsen, Onyema and Coumantaros, 2015).*

1. Introduction

An important goal of education offered in schools is to increase successful individuals who can keep up with the requirements of the age, who research, who inquire and who have self-confidence and responsibility (Anıl, 2010). One of the indicators of individuals' success is undoubtedly academic achievement. Kaggwa (2003) defines academic achievement as the knowledge, skills, techniques, positive attitudes, behaviours, the quality and quantity of philosophy students acquire. According to Çırak and Çokluk (2013, p. 72), on the other hand, "academic achievement is the whole of behaviours consistent with curriculum objectives." In other words, a student is considered successful if he or she displays the behaviours targeted in the curriculum. Academic achievement is considered very important by families and the immediate circle because it is the indicator of students' well-equipped preparation for professional and social life and because it shapes their future.

Academic failure in addition to academic achievement is also on the agenda of the public and the educational community from preschool to tertiary education (Sezgin, Koşar, Koşar, & Er, p.206). Therefore, factors capable of influencing students' academic achievement have been considered in a number of studies. Studies demonstrate that those factors have various aspects. The aspects include environmental factors such as students' affective and cognitive properties (Bempechat, Li, & Ronfard, 2016), family support (Bean, Bush, McKenry, &Wilson, 2003), and socio-economic status (Rosen, Sheridan, Sambrook, Meltzoff, & McLaughlin, 2018). Besides, it is also pointed out in those studies that the adopted learning strategies (Yıldırım, 2017), the teaching methods and techniques employed (Sevim, 2015), materials (Nam, 2017) and the types of assessment (Zhang, Lai, Cheng, & Chen, 2017; Morris & Chikwa, 2016) are influential in academic achievement.

It is important to see the factors affecting students' academic achievement and the effects of different technologies, methods and techniques on their academic achievement in determining the quality indicators of educational system and in guiding the changes in educational policies (Alnabhan, Al-Zegoul, & Harwell, 2001). The required precautions are also taken by determining students' levels of academic achievement. Thus, efforts are made to maximise effectiveness, efficiency and satisfaction in learning (Özçelik, 2010, p.25). Therefore, academic achievement is often regarded as the dependent variable in educational studies. In accordance with this, the current study aims to determine the descriptive properties and methodological tendencies in experimental studies concerning academic achievement. For this purpose, this study seeks answers to the following research questions:

1. What is the distribution of experimental studies concerning academic achievement according to years?
2. What is the distribution of experimental studies concerning academic achievement according to journals?
3. What are the area trends in experimental studies concerning academic achievement?
4. What are the independent variables considered in experimental studies concerning academic achievement?
5. What are the dependent variables considered apart from academic achievement?
6. What are the data collection tool trends of experimental studies concerning academic achievement?
7. What are the sampling trends of experimental studies concerning academic achievement?
8. What are the data analysis method trends of experimental studies concerning academic achievement?

The results to be obtained are important in that they bring to light the variables influencing academic achievement and thus they offer up to date information and demonstrate the general tendencies. It is hoped that demonstrating the general inclinations with their differing aspects will enable researchers who are to conduct studies on academic achievement to follow the frequently studied subjects in the area and to determine the inadequacies. In addition to that, it is also believed to be effective in yielding better results in future studies concerning academic achievement.

2. Method

Population/Sample

The universe of the research consists of articles focusing academic achievement and published in SSCI indexed journals. The research population was composed of empirical articles focusing on academic achievement and published in SSCI indexed journals in the period between 2012 and 2017. Since there are many studies (articles,

papers, theses) related to academic achievement in the field of education, it was decided to focus on the articles published in SSCI indexed journals that include reviewer process. Also, SSCI indexed journals were chosen because of the high citation rate of their published articles compared to other academic studies. Of the articles published in SSCI indexed journals in the field of educational sciences in Web of Science database, those containing the key words "academic achievement", "academic success", "academic performance", "student achievement", "student success" and "student performance" were determined. In determining the keywords, firstly the keywords used in 15 empirical articles related to academic achievement were examined and it was decided to search using these keywords. After scanning, 788 articles in total were reached. 80 of them using experimental research model constituted the sample of the research. Studies which were not experimental and studies of meta-analysis were excluded from analyses. The articles examined within the scope of this research are presented in Appendix-1.

Data Collection Tools

Educational Technologies Publication Classification Form (ETPCF) was used as the data collection tool in this study (Göktaş et al., 2012). The form was composed of 7 parts. Part one is the part giving the tag of the articles analysed and containing such descriptive properties as the title and the author of the articles and the journals in which they were published. The remaining parts included such information as the type of articles, the subject matter of the articles, the methods used in the articles, data collection tools, sampling methods and analysis methods, respectively.

Data Analysis

The data collected from the articles were put to content analysis. Cohen, Manion and Morrison (2007) stresses that content analysis is a research technique which involves arranging, classifying and comparing texts and making inferences from them. This study chooses to use content analysis because it brings similar data together in certain concepts and themes and thus transforms them into a form in which readers can easily understand in addition to the above mentioned properties (Bauer, 2003; Fraenkel & Wallen, 2000; Yıldırım & Şimşek, 2005). Educational Technologies Publication Classification Form (Göktaş et al., 2012) was firstly put to the web for this purpose and thus it was stored on the database. The frequencies and for the responses to each research question and the percentages for the frequencies were calculated in relation to the data saved on the database. The numerical data obtained in consequence were shown in tables and graphs.

Validity and Reliability

A guide leading the researchers was used in analysing the articles. Additionally, the publication classification form was broadcast on the web page and thus it was assured that the data were entered and checked on the web by three researchers. The articles analysed were shared by the researchers to increase the reliability of the study. Classification was made by the researchers at three stages. At stage one, each researcher added the data for the articles they had analysed to the form available on the web, at stage two the data entered were checked by the other researchers for confirmation; and at the final stage the data were checked again by the research coordinator and the lacking parts were dealt with.

3. Findings

The 80 articles considering academic achievement as the dependent variable, conducted by using the experimental method in the field of education and published in SSCI indexed journals between the years 2012 and 2017 were analysed on the basis of the research questions. The findings obtained are presented below in parallel to the research questions.

The Distribution of the Experimental Studies Concerning Academic Achievement According to Years

The distribution of the experimental studies concerning academic achievement according to years was calculated in frequencies. The distribution is shown in Figure 1 below.

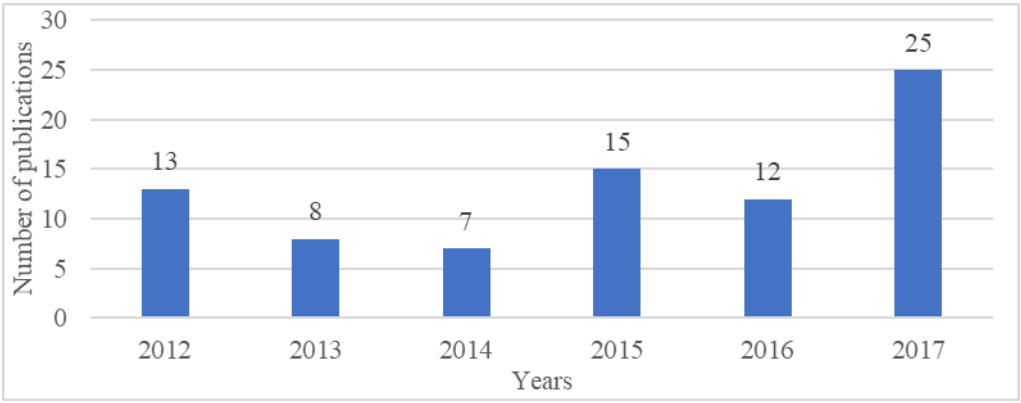

Figure. 1. Distribution of the experimental studies according to years

It is evident from Figure 1 that most of the experimental studies concerning academic achievement conducted in the period between 2012 and 2017 (25 studies in total) were performed in 2017. While the number of studies exposed to analysis was 28 in the first three years, the number went up to 52 in the final three years.

The Distribution of the Experimental Studies Concerning Academic Achievement According to the Journals

Following the analyses, the number of journals in which the articles were published and the number of articles on academic achievement published in each journal was calculated. The data concerning the journals and the number of articles in the journals are shown in Table 1.

Table 1. Journals in which Articles on Academic achievement are published

Journals	*f*	%
Education and Science	9	11,25
Computers & Education	7	8,75
Hacettepe University Journal of Education	5	6,25
Teaching of Psychology	5	6,25
Educational Sciences: Theory and Practice	4	5,00
BMC Medical Education	3	3,75
Journal of Computer Assisted Learning	3	3,75
Innovations in Education and Teaching International	3	3,75
Higher Education Research & Development	2	2,50
Chemistry Education Research & Practice	2	2,50
Educational Technology & Society	2	2,50
The Internet and Higher Education	2	2,50
Journal of Baltic Science Education	2	2,50
Journal of Science Education and Technology	2	2,50
Others	29	36,25
Total	80	100

According to Table 1, the articles published between the years 2012 and 2017 appeared in 44 different journals. Accordingly, the biggest number of articles were published in Education & Science (9), Computers & Education (7) which was followed by Hacettepe University Journal of Education (5), Teaching of Psychology (5), and Educational Sciences: Theory and Practice (4). On the other hand the other journals contained 1 article.

The Areas of Interest in the Articles

The area trends in the articles concerning academic achievement were uncovered through analyses. The areas of the articles are shown in Table 2 below.

Table 2. Area Trends in the Experimental Studies concerning Academic Achievement

Topics/Areas	*f*	%
Science (physics/chemistry/biology)	21	26.25
Mathematics/geometry	10	12.50
Computers	8	10.00
Management / economics/economy	8	10.00
Foreign languages	7	8.75
Medicine	6	7.50
Sociology	5	6.25
Psychology	4	5.00
History/geography	4	5.00
Educational sciences	3	3.75
Communication	1	1.25
Music	1	1.25
Sport	1	1.25
Law	1	1.25
Total	80	100

As clear from Table 2, most of the studies focus on the area of science (21), which is followed by mathematics/geometry (10), computers (8), management/economics/economy (8) and foreign languages (7) respectively.

Independent Variable Trends in the Articles Concerning Academic Achievement

Independent variables affecting academic achievement were also analysed in accordance with the research questions. Accordingly, the independent variables in the articles are shown in Table 3.

Table 3. Independent Variables in the Articles

Category	Independent Variables	*f*	Total *f*	%
Material	Technological devices (personal computer, laptop, tablet	5	20	25,00
	Multimedia learning material	3		
	Simulation	2		
	Digital Story	2		
	Video-lecture	2		
	Augmented reality	2		
	Smart Board	1		
	Newspapers	1		
	Puzzle-based lecture	1		
	Learning objects	1		
Teaching Approaches / Strategies	Game-based learning	5	19	23,75
	Cooperative learning	4		
	Problem-based learning	2		
	Flipped classroom model	1		
	Mastery learning	1		
	Experiential learning	1		
	Projected based learning	1		
	Immersion Scheduling	1		
	Mindfulness-based program	1		
	Example-based learning	1		
	Query-based learning	1		
Learning Environments	Online learning environments	9	15	18,75
	Blended learning environments	4		
	Social sharing environments	2		
Assessment	Formative assessment	3	13	16,25
	Portfolio assessment	3		
	Peer assessment	2		
	Self-assessment	2		
	Assessment through feedback.	1		
	Computer-based assessment	1		

	Type of assessment tool (single-double use of exam paper)	1		
Teaching techniques	Student teams-achıevement divisions technique	3	7	8,75
	The jigsaw technique	1		
	The six thinking hats technique	1		
	Creative drama	1		
	Small group discussion technique	1		
Other situations	Peer Mentorship	1	6	7,50
	Self-development coaching	1		
	Personal learning plan	1		
	Locus of control	1		
	Subconscious Performance Goals	1		
	Study Strategies (Individual- Group)	1		
Total			80	100

Table 3 shows that the independent variables considered in the experimental studies concerning academic achievement are use of materials (21), teaching approaches/strategies (19), learning environments (14), types of assessment (13), teaching techniques (7) and other situations apart from these (6). On examining the Table 3, it is found that the studies make efforts to demonstrate effects of computers as the materials (5), game-based learning as the approach of learning (5), online learning (8) as the learning environment, formative (3) and portfolio evaluation (3) as the type of assessment and of student achievement teams (3) as the learning technique on academic achievement.

Dependent Variables Considered Apart from Academic Achievement

It was found that the experimental studies concerning academic achievement also considered other variables in addition to academic achievement and students' performance as dependent variables. The dependent variables considered in the articles which were analysed in this study are shown in Table 4.

Table 4. Dependent Variables analysed in addition to Academic Achievement

Dependent variable 1	Dependent variable 2	Dependent variable 3	Dependent variable 4	Dependent Variable 5
Academic achievement	Level of motivation (2)	--	--	--
	Transfer skills (2)	--	--	--
	Participation in lessons (2)	--	--	--
	Motivational strategies	--	--	--
	Problem solving skills	--	--	--
	Sense of community	--	--	--
	Self-regulation skills	--	--	--
	Assessment (of teacher by students)	--	--	--
	Satisfaction	--	--	--
	Time for doing tests	--	--	--
	Psychological health	--	--	--
	Study habits	--	--	--
	Spatial abilities	--	--	--
	Transactional distance	--	--	--
	Attitudes (towards use of knowledge and academic career)	--	--	--
	Self-efficacy (2)	Cognitive load	--	--
	Self-efficacy	Test anxiety	--	--
	High-level thinking skills	Student interaction	--	--
	Attitudes (towards educational use of social networks)	Social availability		
	Permanence in learning	Level of social skills	--	--
	Participation in lessons	Peer evaluation	--	--
	Critical thinking skills (3)	Motivation	--	--
	Critical thinking skills	Level of concentration		
	Critical thinking skills	Problem solving skills	Creative thinking skills	--
	Participation in lessons	Motivational strategies	Social comparison	Satisfaction

According to Table 4, 52 studies focus only on academic achievement whereas 28 studies include one or more dependent variables in addition to academic achievement. It is clear from the Table 4 that especially the variables of participation in lessons (3), critical thinking skills (3), motivation 29 and self-efficacy (2) are analysed along with academic achievement.

The Data Collection Tools of the Experimental Studies Concerning Academic Achievement

The data collection tools used by the experimental studies concerning academic achievement were also brought to light by this study. The findings obtained are shown in Table 5.

Table 5. The Data Collection Tools used by the Experimental Studies Concerning Academic Achievement

	Tools of data collection	*f*	%
Academic achievement variable	Tests	74	92.5
	Test scores	3	3.75
	System records	3	3.75
	Total	80	100
Variables apart from academic achievement	Scales	18	36
	Questionnaires	16	32
	Interviews	9	18
	Charts of participation in lessons	4	8
	Inventories	3	6
	Total	50	100

A close examination of Table 5 makes it clear that the data collection tool the most frequently used by the experimental studies concerning academic achievement is tests (achievement tests, recall tests, graph reading tests). It is also evident from the Table 5 that test scores (3) and system records (3) were also analysed by the experimental studies. The most frequently used data collection tools for the dependent variables analysed in addition to academic achievement were scales (18), questionnaires (18), interviews (9), charts of participation in lessons (4) and inventories (3) respectively.

The Levels and Number of Samples Used by the Experimental Studies Concerning Academic Achievement

The properties of the samples used by the articles analysed were also determined in this study. The articles were analysed from two aspects in terms of the properties of the samples they used. First, the frequencies of sample levels were analysed. Table 6 shows the levels of samples.

Table 6. Levels of Samples Used in the Experimental Studies Concerning Academic Achievement

Levels of the samples	*f*	%
University	43	53.75
Secondary education (9-12)	17	21.25
Elementary school (1-5)	10	12.50
Elementary school (6-8)	9	11.25
Associate degree	3	3.75
Total	80	100

According to Table 6, mostly university level students (43) were chosen as the sample level. Besides, samples of students of secondary education (9-12), elementary school (6-8) and elementary school (1-5) were also used. There were no studies using samples of pre-school or post-graduate students. It was found that the number in addition to the levels of samples was mentioned in the studies. The number of samples used in the experimental studies concerning academic achievement is shown in Table 7.

Table 7. Number of Samples

Number	*f*	%
10-100	33	41.25
101-300	31	38.75
301 – 1000	12	15.00
1001 and above	4	5.00
Total	80	100

According to Table 7, samples of 10-100 (33) and 101-300 participants (31) were used by the experimental studies concerning academic achievement. It was found that the studies using samples with 301-1000 and more than 1000 participants were fewer.

Data Analysis Methods Used by the Experimental Studies Concerning Academic Achievement

The data analysis methods used by the studies were also determined. Thus, data analysis methods used only in 52 experimental studies concerning academic achievement are shown in Table 8.

Table 8. Data Analysis Methods Used in the Studies (only for the variable of academic achievement)

Methods of data analysis	*f*	%
T-test	20	38.46
Variance analysis (ANOVA – MANOVA)	13	25.00
Covariance analysis (ANCOVA – MANCOVA)	9	17.30
Regression	7	13.46
Chi square test	3	5.76
Total	52	100

As is clear from Table 8, t-test employed in finding the differences between the averages of two groups (20), variance analysis employed in comparing the averages of more than two groups (13) and covariance analysis (9) were used more frequently in the studies analysed. In addition to that, it was also found that ANOVA/MANOVA and regression analysis which were employed in finding the correlations between variables- were used. The data analysis methods used by studies analysing other variables in addition to academic achievement are shown in Table 9.

Table 9. The Trends of Data Analysis Methods in the Studies (for variables apart from academic achievement)

Data analysis methods	*f*	%
Variance analysis (ANOVA – MANOVA)	21	24.41
T-test	15	17.44
Covariance analysis (ANCOVA – MANCOVA)	15	17.44
Descriptive statistics (frequencies, percentage, averages, standard deviations)	14	16.27
Regression	7	8.13
Chi square test	6	6.97
Nonparametric tests	4	4.65
Correlation tests	4	4.65
Total	86	100

According to Table 9, frequently used data analysis methods in the studies are ANOVA/MANOVA (21), t-test (15), covariance analysis (15) and regression employed in finding the correlations between variables (7) in addition to chi square (6).

4. Discussions

This study focussed on articles published in SSCI indexed journals in the period between 2012 and 2017. 80 articles using experimental study methods and considering academic achievement as the dependent variable were determined and they were analysed according to the years of publication in journals, the journals in which they had been published, the variables they considered, the independent variables they considered apart from academic achievement, the samples they used, the data collection tools they used and the way they analysed their data.

It was found in this current study that the experimental studies concerning academic achievement were mostly conducted in the year 2017. This situation might have stemmed from the increase in the methods and media elements capable of influencing academic achievement in recent years. In addition to that, the experimental studies focussing on academic achievement also gathered momentum in recent years. The above-mentioned increase can be attributed to researchers' desire to uncover the correlations between a number of variables and academic achievement.

It was found in consequence that the articles analysed in this study had been published in 44 different journals. The greatest number of the articles were published in Education & Science, and in Computer & Education-

which was followed by Hacettepe University Journal of Education and Teaching of Psychology. This might have stemmed from the subjects, methods, scope and research domains that the journals of Education & Science and Computer & Education focussed on.

The experimental studies analysed were found to centre mostly on the area of science. It was also found that they were also concerned with mathematics/geometry, computer and management/economics/economy. The fact that the number of studies concerning academic achievement was greater in the fields of science, mathematics, technology and computers than in the other fields can be interpreted as that the effects of differing instruments of media were analysed in those fields and that the number of such studies was greater as a result.

It was found in this study that the independent variables affecting academic achievement were mostly in the use of materials, teaching approaches, learning environments, types of assessment and teaching techniques. This situation can be interpreted as that it is the indicator of the fact that media-methods discussions are still continuing. Hence, the discussion "is it the media or methods?" between Richard Clark and Robert Kozma has manifested its effects on the area for a long time. Clark (1984) argues that learning occurs through methods rather than through environments or environmental abilities and that if meaningful learning has occurred in consequence of using an environment, the reason for it is the methods used. According to Kozma (1991), on the other hand, environments cannot be said to be unnecessary; because environments enable methods and make them obligatory. Methods, however, make use of the benefits offered by environments. For this reason, researchers might have wished to investigate the effects of media- whose capacities were seriously developed- and of the new methods developed depending on the media on academic achievement.

Another conclusion in this study was that the number of studies analysing academic achievement on its own as the dependent variable was greater. Yet, critical thinking skills, self-efficacy, problem solving and creative thinking skills in addition to academic achievement were also considered in the studies. The explanation for this could be that the studies were conducted in the context of digital competence and the purpose was to equip students with the skills required by our era. It is pointed out that individuals in the work force will need to have complex problem solving, critical thinking, creativity, human management, coordination with others, affective intelligence, making judgements and decisions, regulating services, negotiation skills and cognitive flexibility skills in 2020 (Mittal, Zuma, Kagame, Nielsen, Onyema, & Coumantaros, 2015). Therefore, studies may focus on the variables mentioned.

The most frequently used data collection tools in the experimental studies concerning academic achievement were found to be tests. This situation might have stemmed from the fact that academic achievement was used as the dependent variable in those studies. In other words, the researchers might have used tests in measuring academic achievement to attain objectivity in assessment. In studies considering other variables, however, scales and questionnaires in addition to tests were used most frequently as data collection tools. The fact that quantitative analysis methods were heavily used in the studies concerning academic achievement might have caused more inclusion of scales in measuring different variables.

It was found in terms of levels of the samples that the samples of participants of university level students were heavily used in the studies. The studies available in the literature (Akça -Üstündağ, 2009; Alper & Gülbahar, 2009; Şimşek el al., 2009) also report that university level is the most frequently used sample. It may be said that this stems from researchers' awareness of the problems in their immediate environment and the need they feel to find solutions to the problems and from easiness to reach the sample (Göktaş et al., 2012). Considering the variables most frequently used in the studies, it is an expected result to have university students as their audience.

Besides, approximately 80% of the studies were found to have samples with fewer than 300 participants. Considering the fact that the studies analysed were experimental studies, having very big samples can influence the conductibility of studies. Therefore, it is thought that the researchers have avoided having samples of great number of participants. Sönmez (2005) points out that such a situation can stem from uncertainty of sub-problems or from restriction in researchers' knowledge of statistics and methods. As a matter of fact, it is stated that the data obtained from 300 or more samples meet the assumptions of parametric tests (Field, 2009). The fact that parametric tests can be performed increases the possibility of further explanation from the data obtained. Erdoğmuş (2009), on the other hand states that it can also be caused by researchers' limited time, official and ethical processes and by researchers' goal to reach the data in a shorter time and more easily.

This study also found that the articles analysed frequently used such data analysis methods as the t-test, ANOVA/ANCOVA, regression and correlation. Considering the fact that the analysed studies put academic achievement in their focus and that they mostly used achievement tests as the tool of data collection, it may be said that tests such as ANOVA/ANCOVA and the t test were frequently used so as to uncover the differences between averages for achievement tests (pre-test, post-test, recalling test, etc.). Additionally, considering the independent variables in teaching techniques, teaching approaches, learning environments, use of materials and types of assessment might have caused the frequent use of t test and ANOVA/ANCOVA as the method of analysis.

5. Conclusion and Recommendations

This study reveals the inclinations (such as the properties of their samples, data collection tools, distribution according to years, variables analysed, etc.) displayed by the experimental studies concerning academic achievement which were published in SSCI indexed journals between 2012 and 2017. It is though that the findings obtained in this study can be useful in seeing the strengths and weaknesses of the experimental studies concerning academic achievement and can be used as a source guiding the future studies. They are also thought to serve as an important source of data to editors and referees. Yet, the fact that the scope of this study is restricted to 80 experimental studies should be taken into consideration. Based on the conclusions, the following recommendations can be made:

- In 2015-2017, there is an increasing trend in the number of studies related to academic achievement compared to other years. Since the use of different technologies in education is gaining importance day by day, it can be stated that studies related to academic achievement will always be needed.
- The studies related to academic achievement are published in 44 different journals and the weight given to the studies on this subject varies according to the scope of the journals. Therefore, it can be stated that the researches related to academic achievement are more likely to be accepted by different journals. However, it can be stated that this possibility is more due to the scope of Education and Science, Computers & Education and Hacettepe University Journal of Education journals.
- It was determined that the researches related to academic achievement were generally conducted in the fields of science, mathematics, computers, economics and foreign languages. Future studies in these areas may be useful in achieving more effective results related to academic achievement.
- In academic achievement researches, the independent variables related to materials, methods, learning environments and assessment are discussed further. Since the media-method discussion is still accepted today, focusing on the variables related to these issues will continue to be important for future studies.
- In the studies, also participation in lessons, critical thinking skills, motivation and self-efficacy was considered as dependent variable as well as academic achievement. Since high-level thinking skills are gaining importance today, it may be interesting to consider the variables of critical thinking skills, motivation, self-efficacy, problem solving and creative thinking skills in future studies.
- In academic achievement researches, achievement tests, questionnaires, scales and interviews are generally used as data collection tools for other dependent variables. Therefore, the use of different data collection tools in future studies may be effective in acquiring different perspectives.
- Studies on academic achievement are generally conducted with university students and with less than 300 samples. It is important to conduct research with primary, middle and high school students in future studies in terms of considering the effects of different technologies and methods on these levels. In addition, reaching larger samples can provide researchers with more flexibility in terms of generalizing and interpreting the results obtained.
- It is determined that t-test, ANOVA/ANCOVA, regression and correlation data analysis techniques are used in studies related to academic achievement. In future studies, addressing the structural equality models examining the total and indirect effects of different variables on each other may help to address the research questions more comprehensively and make different interpretations.

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Appendix 1. A List of the Studies Analysed

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