



## Investigation of the Articles Published in the Journal of 'Education and Science' between 2011 & 2016 in the Context of the Use of SPSS and AMOS

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## 2011-2016 Yılları Arasında 'Eğitim ve Bilim' Dergisinde Yayımlanan Makalelerin SPSS ve AMOS Kullanımı Kapsamında İncelenmesi

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### Abstract

The purpose of this study is to examine the articles, which utilized SPSS and AMOS programs in the data analysis, and were published in 2011-2016 in the journal of Science and Education that is in the scope of SSCI. For this aim, 343 articles out of 688 were examined from the perspectives of the type of statistical technique, the number of authors, sample size, research design, group of sample and the method of analysis. The data were examined through content analysis and presented by means of descriptive statistical methods. According to the results of this research, parametric tests were the most utilized statistical tests in the data analyses and the studies were mostly designed compatible with quantitative research. The studies were conducted mostly by one or two authors. Elementary and middle school students and undergraduates were the most frequently studied participants. The results of the study will be a guide and light for the future studies.

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## 2011-2016 Yılları Arasında 'Eğitim ve Bilim' Dergisinde Yayımlanan Makalelerin SPSS ve AMOS Kullanımı Kapsamında İncelenmesi

### Öz

Bu çalışmanın amacı veri analizinde SPSS ve AMOS programlarını kullanıp 2011-2016 yılları arasında SSCI indexli Eğitim ve Bilim dergisinde yayımlanan makaleleri incelemektir. Bu amaçla, araştırmanın evrenini oluşturan 688 makaleden bu araştırmanın örneklemini oluşturan 343 makale; kullanılan istatistiksel teknikler, yazar sayısı, örneklem büyüklüğü, araştırma deseni, örneklem grubu ve veri analizi yöntemleri perspektiflerinden incelenmiştir. Çalışmada elde edilen veriler içerik analizine göre incelenmiş ve betimsel istatistiksel metoduyla sunulmuştur. Çalışmadan elde edilen bulgulara göre, veri analizinde en fazla parametrik testler kullanılmış olup, çalışmalar çoğunlukla nicel araştırma desenine göre dizayn edilmiştir. Makalelerin çoğunlukla bir ya da iki araştırmacı tarafından yapıldığı görülmüştür. Ayrıca ilköğretim, ortaöğretim ve üniversite öğrencilerinin en fazla çalışılan örneklem grupları olduğu tespit edilmiştir. Bu çalışmanın sonuçlarının ilerideki çalışmalar için bir rehber ve yol gösterici olacağı düşünülmektedir.

### Makale Bilgisi

**Anahtar Kelimeler:** 'Eğitim ve Bilim' dergisi, İçerik analizi, İstatistiksel teknik

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## Introduction

Today, there is a great deal of research on almost all subjects in the field of education. It is supposed to be useful to examine and determine trends periodically so that educational researchers can perform their functions. In line with this aim, the results of meta-analysis and content analysis studies related to research conducted in a certain area can provide a considerable advantage to the researchers. Such meta-analysis and content analysis studies have been drawing attention of researchers especially over the last few years and the number of such studies has been increasing gradually (Kutluca & Gündüz, 2016; Salas-Zapata, Rios-Osorio & Cardona-Arias, 2018). There are a limited number of studies in our country to determine the content of research published in the field of education. For example, Arık and Türkmen (2009) also point out that criticism of the periodical publications is a rarely applied method in the literature. However, examining researches in education in a regular manner and determining their trends will be a light to and helpful for the researchers.

In the academic studies implemented in the field of science, knowledge and experiences are shared, as a very natural consequence; communication is established by providing new ideas and discussions. Every science or discipline aims to produce valid and reliable information. (Tavşancıl, Çokluk, Gözen, Kezer, Yalçın, Bilican & Özmen, 2010). Sharing of the produced knowledge can be achieved through scientific journals or a variety of media. Scientific journals within the scope of accessibility of the knowledge contained in scientific journals are indispensable in the development of science in the world (Arık & Türkmen, 2009).

The needs of society are changing rapidly in our changing world. Educational researches are of great importance in terms of training of the human power that can respond to these needs. (Kayhan & Koca, 2004). Educational researches including research processes specific to the field of education are known as the process of systematically recording, analyzing and publishing data obtained by various techniques (Mortimore, 2000). Nowadays, there are a lot of studies carried out related to almost every subject in educational sciences. Besides their significant contributions to the literature and the researchers, it is also important to classify these academic studies, identify their trends and make evaluations according to the findings of the researches (Selçuk, Palancı, Kandemir & Dündar, 2014).

By examining researches conducted in any discipline, the research trends in that discipline can be determined. The tendency of research refers to the change in the research over time and the direction of this change. When research trends are determined, the changes that the data reveal in the years following the reference year are examined. The studies to determine research trends can be used to predict future events as well as to reveal the current state of the research discipline (Ozan & Köse, 2014; Salas-Zapata, Ríos-Osorio & Cardona-Arias, 2018).

The review and critiques of periodicals are a rarely applied method in the literature. However, examination of the periodicals provides valuable information about these publications to the researchers or to the people who plan to conduct academic studies. In this way, the gaps in the literature or in the field are becoming more apparent (Arık & Türkmen, 2009). In addition, Lee, Wu and Tsai (2009) point out that researchers will contribute to their careers and academic publications in that they have the knowledge of current situations and research trends in their field.

In the literature; in educational sciences (Arık & Türkmen, 2009; Erdem, 2011; Göktaş, Hasançebi, Varışoğlu, Akçay, Bayrak, Baran & Sözbilir, 2012a; Hsu, 2005; Karadağ, 2009; Kieffer, Reese & Thompson, 2001; Kutluca, Mut & Gündüz, 2017; Salas-Zapata et al., 2018; Selçuk, Palancı, Kandemir & Dündar, 2014; Tavşancıl, et al., 2010), in educational programs and their teaching (Ozan & Köse, 2014; Kozikoğlu & Senemoğlu, 2015), in educational technologies (Alper & Gülbahar, 2009; Çelen & Seferoğlu, 2016; Göktaş et al., 2012b), in educational administration (Aydın, Erdağ & Sarier, 2010; Turan, Karadağ, Bektaş & Yalçın, 2014), in mathematics education (Çiltaş, Güler & Sözbilir, 2012; Hart, Smith, Swars & Smith, 2009; Kayhan & Koca, 2004; Kutluca, Hacıömeroğlu & Gündüz, 2016; Ulutaş & Ubuz, 2008), in science education (Chang, Chang & Tseng, 2010; Lee, Wu & Tsai, 2009; Sözbilir & Kutu, 2008; Taş, Şener & Yalçın, 2013; Tsai & Wen, 2005; Yayla-Eskici & Özsevgeç, 2019), in Turkish Education (Varışoğlu, Şahin & Göktaş, 2013) and in the other fields (Kleinsasser, 2014; Yılmaz & Altinkurt, 2012), there can be found lots of studies including the examination of theses and/or articles.

Determination of the trends in the field of the research by means of regular and periodical research studies have a potential to guide and help many researchers and scientists in the field. This is important for the conducted or completed educational studies to fulfill the aims of a research specified in the literature (Cohen, Manion & Morrison, 2007). When the related literature is scrutinized, it can be realized that there are lots of studies related to the research

trends in various periods (Arık & Türkmen, 2009; Ece, 2007; Salas-Zapata et al., 2018; Telli & Yurdugül, 2012). However, there could not be found any studies focusing on the investigation of the articles or theses in terms of the utilization of the statistical programs for the data analyses. Thus, it was decided to examine the articles published in a journal, which is in the scope of Social Science Citation Index (SSCI) in terms of the use of SPSS (Statistical Package for the Social Sciences) and AMOS (Analysis of Moment Structures) in the phase of data analyses. In this respect, the articles published in Turkey addressed “Education and Science” journal between the years 2011 and 2016 were examined in the current study. The main objective of the study is to reveal the distribution of the specified articles according to the targeted period by examining these articles from the perspectives of the type of test utilized in the data analyses, the number of authors, the sample size, the research design, the sample group and statistical techniques used in data analyses. The examination of the articles published in the Journal of Education and Science in various dimensions will contribute to the direction of future research. Therefore, the following seven research questions will be tried to be answered in this study.

For the articles published in “Education and Science” journal between 2011-2016;

1. How is the distribution of the articles with respect to the type of technique?
2. How is the distribution of the articles with respect to the use of SPSS and AMOS in the data analyses?
3. How is the distribution of the articles with respect to the number of the authors?
4. How is the distribution of the articles with respect to the sample size?
5. How is the distribution of the articles with respect to the research design?
6. How is the distribution of the articles with respect to the sample group?
7. How is the distribution of the articles with respect to the statistical techniques used in data analyses?

### Method

In this study, one of the qualitative research methods; “document analysis method” was utilized. Document analysis includes the analysis of the written materials containing knowledge related to the targeted cases or events. (Yıldırım & Şimşek, 2011). Furthermore, the content analysis method was preferred because it could make possible to bring together similar data under specific themes in order to give an opportunity to the reader to better understand the focused issue. Moreover, since the analyses of the studies in the journal of Education and Science were included in this research, it was decided to utilize document analysis method as the proper method to implement this study.

### Population and Sample

688 articles published in the journal of Education and Science in the time interval 2011-2016 form the population for this research. The sampling method utilized for this study is purposive sampling method, which is one of the non-random sampling methods. According to Fraenkel, Wallen and Hyun (2012, p.100), the researchers might prefer to study on a sample based on the specific purpose of the research on some occasions. They classify this type of sampling method as purposive sampling. Therefore, by purposive sampling method, one of the sampling methods, 343 articles in which SPSS and/or AMOS programs were utilized to analyze the data constituted the sample of the study. As can be seen in the Table 1, the data of the studies were analyzed through SPSS in 314 studies, through AMOS in 13 studies and through both of the programs in 16 studies out of 343 articles.

**Table 1.** Statistical package utilized in the articles

<b>Statistical Package</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
SPSS	314	91.5
AMOS	13	3.8
SPSS & AMOS	16	4.7
Total	343	100

### Data Collection

In this study, articles published between the years 2011 and 2016 in Education and Science journal were analyzed, and research problems were tried to be answered. The articles were examined in terms of the predetermined variables, and

then the frequencies and the percentages of the categories and sub categories were obtained. After that, these frequencies and percentages were tabulated matching with the purposes of the study.

### Analyses of the Data

The articles analyzed throughout this research were classified according to the categorical analysis technique of content analysis. Content analysis is the method of interpreting similar data in a way that the reader can understand in the context of certain concepts and themes (Yıldırım & Şimşek, 2011). Categorical analysis, on the other hand, allows a certain theme to be divided into units and categorized according to certain criteria (Bilgin, 2006). In the process of coding phase of the study, the data were elaborated and it was attempted to express conceptual meaning of each category showing consistency within itself. The examined articles were coded according to the type of test used in the data analysis, the number of authors, sample size, the research design, sample group and statistical techniques used in data analysis. After that, the related codes were combined under the proper categories. Finally, the obtained findings were tabulated, including frequencies and percentages.

### Results

According to the examination of Turkey addressed Education and Science journal which is in the scope of Social Science Citation Index (SSCI), the change of the articles with respect to subsequent years, the number of the authors, the research design, sample size and group of the samples, the type of the utilized statistical tests and the packages were presented by means of tabulating the data of the articles.

**Table 2.** The distribution of the articles with respect to test technique in data analyses

Type of Technique	Frequency (f)	Percentage (%)
Parametric	278	76,8
Non-Parametric	63	17,4
Other	21	5,8
Total	362	100

According to the Table 2, the researchers utilized parametric techniques in 278 (76,8%) articles and non-parametric techniques for 63 (17,4%) studies in Education and Science journal for the period of 2011-2016. However, there were not any techniques specified in 21 (5,8%) articles.

**Table 3.** The Distribution of the articles with respect to the number of the authors through the years

The Number of the Authors	2011 (f)	2012 (f)	2013 (f)	2014 (f)	2015 (f)	2016 (f)	Total	Percentage (%)
1	24	18	25	39	18	16	140	40,82
2	17	16	18	32	23	23	129	37,61
3	5	6	7	12	8	10	48	13,99
4	1	2	3	8	1	1	16	4,66
5	1	0	1	1	2	0	5	1,46
Others	0	0	0	2	2	1	5	1,46
Total	48	42	54	94	54	51	343	100
Percentage	13,99	12,24	15,74	27,41	15,74	14,87	100	

As can be recognized in Table 3, when the frequencies (percentages) of the articles that utilized SPSS and/or AMOS with respect to the specified years are examined, the number of the studies were determined as 48 (13,99%) in 2011, 42 (12,24%) in 2012, 54 (15,74%) in 2013, 94 (27,41%) in 2014, 54 (15,74%) in 2015 and 51 (14,87%) in 2016. Moreover, it was understood that the numbers of the authors were different in the articles published in Education and Science journal in the period of 2011 and 2016 (see. Table 3). In fact, these articles were published by one author for 140 (40,82%) studies, by two authors for 129 (37,61%) studies, by three authors for 48 (13,99%) studies, by four authors for 16 (4,66%) studies and by five authors for 5 (1,46%) studies. In addition to this picture, there are totally 5 (1,46%) studies in the "Others" category in which there were two studies with six authors, and one study with seven, eight and eleven authors.

**Table 4.** The distribution of the articles with respect to the sample size

Sample Size	Frequency (f)	Percentage (%)
Less than 100	81	23,6
Between 100 and 400	131	38,2
Greater than 400	131	38,2
Total	343	100

The distribution of the sample size for the articles in Education and Science journal is given in the Table 4. According to this table, there were 81 (23,6%) articles with the sample size 1-100 and 131 (38,2%) articles with the sample size 101-400. The frequency of the articles with the sample size greater than 400 was also found as 131 (38,2%).

**Table 5.** The distribution of the articles with respect to the research design

Research Design	Frequency (f)	Percentage (%)
Quantitative	304	88,6
Qualitative	10	2,9
Mixed	29	8,5
Total	343	100

As shown in Table 5, 304 (89,4%) of the selected articles in Education and Science for this study were conducted in accordance with the quantitative research design. The frequencies of qualitative and mixed methods were 10 (3,1%) and 29 (7,5%) respectively.

**Table 6.** The distribution of the articles with respect to the group of sample

Group of Sample	Frequency (f)	Percentage (%)
Preschool students	25	6,7
Elementary and middle school students	84	22,6
High school students	60	16,2
Undergraduate students	39	10,5
Prospective teachers	53	14,3
In-service teachers	45	12,1
Academics	15	4,1
Parents	9	2,4
Administrators	11	3,0
Others	30	8,1
Total	371	100

According to the Table 6, the samples of the articles in the journal of Education and Science consist of various groups. The most frequent studied groups were elementary and middle school students with the frequency of 84 articles. This is followed by secondary school students (60) and prospective teachers (53). The sample groups outside these and the frequencies and percentages of these groups are presented in Table 6. Furthermore, the sample groups shown as "Others" consist of the following groups of participants: "theses and/or articles, TIMSS data, immigrants, married adults, foreign students, interns, MEB (Ministry of National Education) personel, teachers and trainees in Public Education Centers". Moreover, in some of the articles; schools, books and data from TÜİK (Turkish Statistical Institute) are seen as the focused sample groups.

In the Table 7, there are descriptive findings about the data analyses of the articles published in the journal of Education and Science. When the research findings were examined, it was seen that t-test (135) and descriptive statistics (130) were the most preferred data analyses methods. Besides, Anova was used in 106 studies and correlation

methods were utilized in 82 studies. As a result of this research, non-parametric tests were found to be less utilized analysis methods.

**Table 7.** The distribution of the articles with respect to the method of analyses

<b>The Method of Analysis</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Descriptive Statistics	130	18,9
t-test	135	19,5
Anova	106	15,4
Manova	25	3,6
Ancova	17	2,4
Mancova	7	1,0
Wilcoxon	20	2,9
Kruskal Wallis	13	1,9
Mann Whitney U	32	4,6
Chi-Square	19	2,8
Regression	56	8,1
Correlation	82	11,9
Factor Analysis	34	4,9
Path Analysis	4	0,6
Structural Equation Modeling	8	1,2
Maximum Likelihood	2	0,3
Total*	690	100

*\*In the same article, more than 1 data analysis methods were utilized.*

### **Discussion and Conclusion**

In this study, the articles in the journal of Education and Science, which is Turkey addressed were examined from various perspectives. In fact, the data in these articles were analyzed through SPSS and AMOS. Between the years 2011 and 2016, 688 papers were published in the Journal of Education and Science. From these papers, 343 articles utilizing SPSS and AMOS programs for data analysis were focused on for this study. It was remarkable that SPSS program was utilized for data analysis in 314 articles out of 343. In a small frequency (13), it appears that the AMOS program was used. In some of the articles (16), both of the programs were applied. The finding that SPSS was the most used statistical package programs for the analyses made in the research is also similar to the findings of Arık and Türkmen (2009) in their own researches. A similar finding emerged in the research carried out by Kutluca and Gündüz (2016) that is based on the examination of another journal.

When the study was conducted, the answers to the categories of the change in the number of the articles according to years, the number of the authors in the articles, the research design, the sample groups and sample sizes in the articles, the analysis and test types preferred, and the computer package programs utilized in the researches were investigated. Parametric tests appear to be the majority in the published articles. The number of the articles in which the authors applied parametric and non-parametric techniques are 278 and 63 respectively. This situation overlaps with the result obtained by Karagöz (2010). Among the academician participants in the study of Karagöz (2010), it was reported that 80,5 of the participants did not utilize non-parametric test techniques in their studies and only 19 % of the non-parametric test users were aware of the power and effects of these tests. According to Pallant (2007, p.210) non-parametric tests have their disadvantages although the conditions of use of non-parametric test are easier than their parametric alternatives. To illustrate, they may fail to determine the actual difference among the groups. However, researchers want to know whether treatments they have implemented yield a difference or not. This is important for them. When considered from this point of view, it is normal for the researchers to prefer parametric tests that are more successful in finding possible differences among the groups. Furthermore, non-parametric tests are used when small sample sizes are studied. From these directions, the lower frequency of non-parametric tests can be explained with the fact that the samples of the articles examined in this study are mostly large. When the articles were examined, it was also determined that both of the test techniques were utilized, compatible with the nature of the research. Besides, it was also found that the tests necessitating normal distribution were conducted although there

were non-normal distribution of the data by ignoring normality assumption. Besides, it was determined that some of the authors did not specify the test technique that they utilized.

When the distribution of the number of published articles by years is examined, it is found that the articles published in 2014 are more than the other years. It is thought that this is due to the publication of special issues by the journal in 2014. There is no significant difference between the numbers of articles for the other years. In addition, when the articles are examined by the number of authors, it is generally understood that there are mostly single-authored and two-authored articles. However, there were studies conducted by 3 and more than 3 authors.

The studies were classified under three categories when the articles were taken into consideration by regarding sample size. The number of the articles with a sample size of 1-100 is 81. The frequencies of the articles with the sample size as 101-400 and more than 400, were found to be equal to each other. Whereas. In the first group of articles, it is generally found that experimental, quasi-experimental and qualitative studies were conducted and in the second and third group of articles, the survey method is generally used. When the samples were analyzed according to the participant groups, it was understood that the researchers mostly studied with elementary and secondary students. A similar situation for this finding is also found in related research (Çiltaş et al., 2012; Göktaş, 2013; Ulutaş & Ubuz, 2008; Varışoğlu, Şahin & Yalçın et al., 2015). It is seen that university students are the most studied sample group among the sample groups if the teacher candidates and university students are gathered under the same category (Table 6). This may be due to the fact that researchers can reach university students more easily and conveniently.

Majority of the articles were conducted in accordance with the quantitative research design because the articles utilizing SPSS and/or AMOS programs were preferred to focus on for this study. Similar instances parallel to this result can be found as well in some of the related studies (Çiltaş et al., 2012; Göktaş et al., 2012b; Ozan & Köse, 2014; Selçuk et al., 2014; Ulutaş & Ubuz, 2008). Besides, there were some studies conducted by means of qualitative and mixed research designs. In fact, descriptive statistics by means of SPSS were utilized in the qualitative designed studies. Moreover, the rare utilization of AMOS in the articles is noteworthy. The seldom use of AMOS can be explained with the fact that it is used for advanced statistical analysis purposes. Besides, the researchers utilized structural equation modeling and factor analysis in the articles that were analyzed through AMOS. In the articles in which SPSS were utilized, the researchers applied t-test mostly. In addition, descriptive statistics, Anova and correlation techniques were used more frequently. Parallel to this result, there are similar cases reported in related research (Arık & Türkmen, 2009; Erdem, 2011; Göktaş et al., 2012a; Göktaş et al., 2012b; Turan et al., 2014; Varışoğlu, Şahin & Göktaş, 2013).

### **Suggestions**

In this study, a content analysis of the articles in the journal of Education and Science was conducted in the context of the utilization of SPSS and AMOS in the data analyses. Other studies may contribute to the literature by conducting similar studies in the context of the utilization of the qualitative data analysis programs for the journal of Education and Science. In fact, the content analyses of some of the other journals and theses completed in Turkey for specified periods in terms of the utilization of quantitative (SPSS, LISREL, AMOS etc.) and qualitative (MaxQuda, NVivo etc.) data analysis programs may contribute to the related literature.

When studies using quantitative data analysis programs were examined, it was found that parametric tests were mostly applied. When researchers use parametric or nonparametric tests, it is possible to examine whether they considers certain criteria, or whether they make their preferences in line with the usual criteria.

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