



Fen Eğitiminde Dijital Destekli Teknolojilerin Kullanımına Yönelik Türkiye'de Hazırlanan Lisansüstü Tezlerin İncelenmesi

Investigation Of Graduate Theses About The Use Of Digital Technologies In Science Education In Turkey

Doç Dr. Faruk KARDAŞ

Erzincan Binali Yıldırım Üniversitesi Eğitim Fakültesi Matematik ve Fen Bilimleri Eğitimi Anabilim Dalı
ERZİNCAN / TÜRKİYE

ORCID: 0000-0002-0900-7503

Selçuk ARABACI

Erzincan Binali Yıldırım Üniversitesi Matematik ve Fen Bilimleri Eğitimi Anabilim Dalı yüksek Lisans Öğrencisi
ERZİNCAN / TÜRKİYE

ORCID: 0000-0002-6094-7031

ÖZET

Bu çalışmada fen eğitiminde dijital teknolojilerin kullanımına yönelik olarak Türkiye'de hazırlanan yüksek lisans ve doktora tezlerinin eğilimlerinin ortaya çıkarılması amaçlanmıştır. Nitel araştırma yöntemlerinden doküman analizinin kullanıldığı çalışmada, tezler Yüksek Öğretim Kurumu'na ait Ulusal Tez Merkezi sayfasında ulaşılmasına izin verilen ve 2005-2019 yılları arasında hazırlanmış 18 tez ele alınarak incelenmiştir. Hazırlanan tezler; yıl ve türüne göre dağılımı, üniversitelere göre dağılımı, araştırmacı cinsiyetine göre dağılımı, hazırlanan tezlerin yürütülmesinden sorumlu danışmanların unvan dağılımı, araştırma yöntemine göre dağılımı, veri toplama örnekleme göre sınıflandırılması ve veri toplama araçlarına göre sınıflandırılması bakımından ele alınmıştır. Elde edilen veriler tablolar haline dönüştürülmüş frekans ve yüzdeleri hesaplanmıştır. Araştırma sonucunda, veri toplama örnekleme olarak en çok ortaokul öğrencileri seçilirken, araştırma yöntemi olarak en fazla karma yöntem kullanıldığı ve veri toplama tekniğinde test ile birlikte ölçek kullanımının fazla kullanıldığı görülmüştür.

Anahtar Kelimeler: Fen eğitimi, Dijital teknoloji, Lisansüstü tez

ABSTRACT

This study aims to reveal the trend of the master and doctoral theses in Turkey about digital technology use in science education. The study adopted document analysis, one of the qualitative research methods. The theses were examined by considering 18 theses between 2005-2019 that were open-access on the National Thesis Center of the Turkish Higher Education Institution. The theses were investigated according to their distribution by year, type, universities, researcher gender, advisors' title, research method, data collection sample and tools. The obtained data were presented in frequencies and percentages and shown in tables. The study results showed that secondary school students were mostly chosen as the data collection sample in the theses, the mixed method was used the most accepted as the research method, and the use of scale with test was seen to be used more in data collection technique.

Keywords: Science education, Digital technology, graduate thesi

1-INTRODUCTION

Today, we use computers, notebooks, smart phones etc. connected to the internet to benefit from digital technologies. Depending on vehicles' developments, the increasing impact of digital technologies on the world has brought different dimensions in social and individual interactions. The opportunities offered by digital technologies are trade, education, communication, etc. situations have now moved from our real-life to digital media (İsmael, & Taşer, 2018). While this situation enables digital technologies to change and develop rapidly in the world, it also affects our whole life together with science education. Science education is to train students to follow science and technological developments, understand the world, solve the problems they encounter in life by using science, structure the knowledge, and respect the environment and nature (Yavuz, 2012). With the developing digital technology, science education, which is life itself, is being given to individuals in different dimensions today. In addition, the current student profile changes as a result of technological advances. This situation keeps the student away from the former student position. Nowadays, network communication reveals the student who interacts together. Nowadays, network communication reveals the student who interacts together. As a result of the network environment and technology interaction, students now have a profile called digital (Emel & Yalman, 2018). In 's world, where science education aims to improve students' scientific literacy, the aim of aims to improve students' scientific literacy, educators and researchers should be to integrate educational technologies and digital technologies with developing technology. In our country, studies are continuing rapidly to prepare students who will be shaped by technology and science for the future. In science education, individuals have caused changes in the science course curriculum to become science literate individuals. This situation enabled changes to be made based on research and inquiry that enable students to structure information in their minds (Saklan & Cezmi, 2019). Teachers can use digital technologies throughout the classroom, with small groups or individually with students. While lecturing with students using digital technologies, it can explain the skills and concepts of science education, provide bridging between students' students' thoughts, give images with sound, and show the texts. (Ekici & Ekici, 2011). It is an indisputable fact that computers and technologies are the most striking materials for students today. Many researches and studies have been carried out on computer games prepared using digital technologies since 1995. Science has led to changes in the science course curriculum so that individuals can become science literate individuals in science education. This situation enabled changes to be made based on research and inquiry that enable students to structure information in their minds (Saklan & Cezmi, 2019). Teachers can use digital technologies throughout the classroom, with small groups or individually with students. While lecturing with students using digital technologies, it can explain the skills and concepts of science education, provide bridging between students' students' thoughts, give images with sound, and show the texts. (Ekici & Ekici, 2011). It is an indisputable fact that computers and technologies are the most striking materials for students today. Many researches and studies have been carried out on computer games prepared using digital technologies since 1995. It has been emphasized in the studies that these games prepared by using digital technologies attract the attention of students and spend a lot of time. In order for the success achieved in digital games to achieve academic success for students, a design in terms of digital technologies and methods for the implementation of the design are needed (Dinçer, 2019). When the literature is examined; In a quasi-experimental study, Tavukcu (2008) tried to determine students' academic achievement, scientific process skills and attitudes towards computer technologies in relation to the use of digital technologies for primary school 6th grade students. As a result of the study, in which the achievement test, the scientific process skills test and the computer attitude scale were used as data collection tools, it was seen that computer-aided instruction had an effect on students' academic achievement, positively affected cognitive teaching processes and displayed a positive attitude towards computers. Yıldız (2019). In her research, she investigated the effect of educational digital games and in-class educational games in preschool science education to measure students' cognitive

development levels and scientific process skills. According to the research results, it was observed that educational digital games and in-class educational activities were effective in increasing the scientific process skills and the cognitive development levels of the preschool students. Urhan (2016) In his study, he tried to determine attitudes towards science education and academic achievement of 4D mobile applications regarding digital technologies. In the semi-experimental study, an achievement test was applied to the students, and as a result of the interviews with some of the students, it was observed that mobile applications positively affected the students' academic achievement and attitudes towards science education. In his study, Kırmızıgül (2019) concluded that digitally supported, activity and inquiry-oriented teaching methods positively affect students' attitudes, motivation, anxiety and academic achievement towards science education.

2. THE OBJECTIVE OF THE RESEARCH

This study shows the use of digital technology in science education graduates prepared in Turkey and aimed to reveal the trend of the doctoral thesis. The results to be obtained are considered to be important in terms of contributing to future research. For this purpose, the answers to the following questions were sought:

What is the distribution of these prepared by year and type?

- How is the distribution of these prepared according to universities?
- What is the distribution of the prepared theses according to the gender of the researcher?
- How is the title distribution of the consultants responsible for the execution of the prepared theses?
- What is the distribution of the prepared theses according to the research method?
- How is the classification of the prepared theses according to the data collection sample and the data collection tools?

3. METHOD

3.1 Sample

The study population between the years 2005-2019 as prepared for digital technology in science education in Turkey consists of 19 graduate thesis. In the study, in which no sampling method was used, 18 theses were included in the research sample due to the access restriction of a thesis that is open to access in the national thesis center database of the Higher Education Institution as of 21.09.2020.

3.2 Research Model

Document analysis, one of the qualitative research methods, was used in this study. The document review includes the content that contains data regarding the events and facts (Şimşek, 2009). Theses obtained as a result of document analysis were subjected to content analysis. The aim of the content analysis is to collect the data obtained under the subject headings determined in a way that the reader can easily understand (Yıldırım & Şimşek, 2008). Theses obtained as a result of content analysis are collected under certain subject headings, and percentage and frequency data are obtained by digitizing (Büyüköztürk et al., 2008). The Theses between the years 2005-2019 were investigated in accordance with their distribution their type, university, researchers' gender, avisord' title , research method, data collection sample and tools. The obtained data were presented in frequencies and percentages and shown in tables .

3.3 Data Collection

In the study in which the document analysis method was used, the theses examined between 2005 and 2019 were first recorded by numbering and similar studies in the literature were examined and the data thesis review form was created.

Two expert faculty members examined the form, and the form was finalized by making various arrangements.

3.4 Analysis of Data

The frequency and percentage values of the examined theses were calculated according to the categories in the thesis examination form in the computer environment in Excel file format. The data obtained were analyzed independently by the two researchers, after which the analyzes reached a consensus were combined. The comparison was made before the merger, and the reliability of the research was calculated as 92% according to the formula “Consensus / (Consensus + Disagreement)” of Miles and Huberman (1994). In qualitative research, a desired level of reliability can be achieved when the agreement between experts and researcher evaluations is 70% and above (Miles, M.B., & Huberman, A.M. (1994).

4. FINDINGS

The theses examined in this section were analyzed within the framework of the questions specified in the research, and the findings obtained were converted into tables.

4.1 Distribution of Theses by Year and Types

The distribution of the theses examined in the study by year and type is shown in Table 1.

Table 1. Distribution of theses by Year and Type

Year	Type of Thesis				Total	
	Master of Arts		Doctorate		Frequency	%
Frequency	%	Frequency	%	Frequency	%	
2005	-	-	1	5,56	1	5,56
2006	-	-	-	-	-	-
2007	-	-	-	-	-	-
2008	2	11,11	-	-	2	11,11
2009	-	-	-	-	-	-
2010	-	-	-	-	-	-
2011	-	-	-	-	-	-
2012	1	5,56	-	-	1	5,56
2013	1	5,56	-	-	1	5,56
2014	-	-	-	-	-	-
2015	-	-	1	5,56	1	5,56
2016	2	11,11	-	-	2	11,11
2017	-	-	-	-	-	-
2018	2	11,11	-	-	2	11,11
2019	5	27,75	3	16,68	8	44,43
Total	13	72,22	5	27,78	18	100

When Table 1 is examined, it is seen that most of the theses were prepared in 2019 between 2005 and 2019. It is observed that no thesis was prepared for the use of digital technologies in science education in 2006, 2007, 2009, 2010, 2011, 2014, 2015 and 2017. While the number of master theses on the subject in the research is 13, the number of doctoral dissertations prepared is 5. When the literature was examined, Özenç and Özenç (2013) and Yücedağ (2010) emphasized in their studies that the most thesis was made in the field of master's degree.

4.2 Distribution of Theses According to Universities

The distribution of the theses by universities is shown in Table 2.

Table2. Distribution of Theses Prepared According to Universities

Universities	Master of Arts		Doctorate		Total	
	Frequency	%	Frequency	%	Frequency	%
Adnan Menderes Univrsiy	1	5,56	-	-	1	5,56
Ağrı İbrahim Çeçen Univrsiy	1	5,56	-	-	1	5,56
Aksaray Univrsiy	1	5,56	-	-	1	5,56
Anatolian University	1	5,56	-	-	1	5,56
Celal Bayar Univrsiy	1	5,56	-	-	1	5,56
Dokuz Eylül Univrsiy	1	5,56	-	-	1	5,56
Erciyes Universitesi	-	-	2	11,11	2	11,11
Erzincan Binali Yıldırım Univrsiy	1	5,56	-	-	1	5,56
Eskişehir Osman Gazi Univrsiy	1	5,56	-	-	1	5,56
Fırat Univrsiy	1	5,56	1	5,56	2	11,11
Gazi Univrsiy	-	-	1	5,56	1	5,56
İnönü Univrsiy	1	5,56	-	-	1	5,56
Caucasian University	1	5,56	-	-	1	5,56
Mersin Univrsiy	1	5,56	-	-	1	5,56
Ondokuz Mayıs Univrsiy	-	-	1	5,56	1	5,56
Zonguldak Karaelmas Univrsiy	1	5,56	-	-	1	5,56
Total	13	72,22	5	27,78	18	100

When **Table 2** is examined, it is seen that Erciyes University (11.11%) is the university where the most thesis was prepared for the use of digital technologies in science education. It is seen that 13 (72.22%) of the theses prepared in 16 universities are master's theses and 5 (27.78%) theses are prepared in the field of doctorate.

4.3 Distribution of Theses by Researcher Gender

The distribution of theses according to the gender of the researcher is shown.

Table 3. Distribution of Theses Prepared by Researcher Gender

Gender	Frequency	%
Woman	7	39
Male	11	61
Total	18	100

When we examine Table 3, it is seen that the number of theses prepared by men is 11 (61%), while the number of theses prepared by women is 7 (39%).

4.4 Distribution of Theses According to Titles of Advisors' Title

The title distribution of the consultants responsible for the execution of the theses prepared in the study is shown in Table 4.

Table 4. Title Distribution of Theses according to Advisors' Title

Advisor Title	Frequency	%
Prof. Dr.	8	44,44
Assoc.Prof. Dr.	2	11,12
Assist. Prof. Dr.	8	44,44
Total	18	100

When Table 4 is examined, most of the theses prepared for the use of digital technologies in science education are under the responsibility of consultants with the title of professor doctor and assistant professor (doctoral lecturer), while the theses under the responsibility of consultants with the title of assistant professor are 8 percent, 44.44%, while consultants with at least the title of associate professor. The number of theses prepared under his responsibility is 2 and the percentage is 11.12%.

4.5 The distribution of the theses prepared in the study according to the research method is shown in Table 5.

Table 5. Distribution of Theses Prepared According to Research Method

Research Method	Frequency	%
Qualitative Method	2	11,11
Quantitative Method	6	33,33
Mixed Method	10	55,56
Total	18	100

When Table 5 is examined, it is seen that the prepared theses used the mixed method as a research method in 10 theses (55.56%), the quantitative method in 6 theses (33.33%), and at least in 2 (11.11%) the qualitative method.

4.6 Classification of Theses According to Data Collection Sampling

The classification of the theses prepared in the study according to the data collection sample is shown in Table 6.

Table 6. Classification of Theses According to Data Collection Sampling

Sampling	Frequency	%
Preschool and middle school students	2	11,11
Middle school students	13	72,21
Parents	1	5,56
Teachers	1	5,56
Undergraduate students and lecturers	1	5,56
Total	18	100

When Table 6 is examined, it is seen that in the theses prepared, middle school students were selected as the data collection sample for most of the theses (72.21), parents, teachers, associate degree students and lecturers (5.56%) were preferred as the sample of school students (11.11%).

4.7 Classification of Theses According to Data Collection Tools

Classification of theses according to data collection tools is shown in Table 7.

Table 7. Classification of Theses According to Data Collection Tools

Data collection tool	Frequency	%
Test (Achievement, Skill)	18	40,9
Scale (Attitude, motivation)	15	34,1
Form (Interview, Interview)	7	15,9
Survey	3	6,82
Document Analysis	1	2,28
Total	44	100

When Table 7 is examined, it is seen that in the theses prepared, according to the data collection tools, the test is the most used tool, especially the achievement tests and attitude tests. Similar results can be seen in the studies of Ergun and Çilingir (2013) and Ulutaş and Ubuz (2008). The number of test uses was 18 and 40.9%. The number of scales as data collection tools has a usage rate of 15 and 34.1%, and attitude scales and motivation scales are among the scales used. 7 forms were used with a rate of 15.9%, especially interview forms and interview forms were preferred in theses. The least preferred data collection tools were used in 3 theses and 6.82% survey, document analysis in 1 thesis and 2.28%.

CONCLUSION AND DISCUSSION

Master and doctoral theses in order to reveal the trends in science education in Turkey between the years 2005-2019 in the study were examined for the use of digital technologies. The number of master's theses prepared is 13, the number of doctoral theses is 5. While the rate of master theses is 72.2%, it has been observed that the rate of doctoral theses is 27.8%. Most of the theses prepared were prepared in 2019, in parallel with the developments in digital technologies, a total of 8 theses were prepared in 2019, and the ratio of all the examined theses was calculated as 44.44%. In the examined theses, it was concluded that the universities where most theses were prepared were by Erciyes University and Fırat University. The striking situation is that the theses at Erciyes University are at doctoral level. In other universities, it was concluded that the number of theses prepared was one and there was not enough. In the distribution of the analyzed theses according to the graduate level, it was concluded that the most prepared at the graduate level, while the number of doctoral theses was the least. These results are based on the literature review of Vari (2015), Ahi and Kıldan (2013), Şahin, Calp, Bulut and Kuşdemir (2013), Doğru, Gençosman, Ataalkın, and Şeker, (2012) and Karadağ (2009). It is similar to graduate theses. It is seen that the number of male researchers whose distribution of theses prepared by researcher gender is examined is higher than the number of female researchers. The rate of male researchers is 61% and the rate of female researchers is 39%. In the distribution of theses according to the research method, mixed research method (55.56%) was the most preferred method, while qualitative research methods (11.11%) were used as the least research method. This situation shows that qualitative research methods are generally not preferred much. Similar results can be seen in the study of Saban et al. (2010). This situation shows that qualitative research methods are generally not preferred much. In the distribution of the titles of the advisors responsible for the execution of the theses prepared, the number of theses prepared by professors and doctoral lecturers (assistant professors) is 8, and the number of theses prepared by lecturers with the title of associate professor is 2. It was observed that most of the theses used middle school students as a sample and this rate was 72.11%, and they used preschool students and middle school students as a sample of 11.11%. It was observed that the least used samples were parents, teachers, associate degree students and lecturers and were 5.56%. It is an expected result that secondary school students, who are the main actors of science education, should be selected as the most sample. Similar results were found by Özenç and Özenç (2013) and Hacıömeroğlu et al. (2016) shows similarities with the findings of their studies. When examined in terms of classification of theses according to data collection tools, it is seen that tests are the most used as data collection tools, especially success and skill tests are preferred. Test usage rate is 40.9%. Although the rate of using data collection tool scales is 34.1%, attitude and motivation scales were preferred. The usage rate of the forms is 15.9%, especially interview and interview forms were used. It was observed that the least used questionnaire was used as the data collection tool at 6.82% and document analysis was used at a rate of 2.28%. The reason why test scales and questionnaires are mostly used in the prepared theses is thought to be that the data analysis obtained is easy and it facilitates the application of statistical tests. A similar situation is similar to the findings of the studies of İşçi (2013), Uysal (2013), Polat (2010) and Sert (2010). The use of the interview technique as a data collection tool, on the other hand, can be thought to be due to the fact that the researchers show little orientation to this technique, as it is included in qualitative and mixed studies. Çanakçı (2015) stated that although similar results were observed in the examination of theses belonging to his graduate studies, the mixed method started to be used in theses since 2009 and the rate of use of this method increased in the following years. The low use of document analysis is seen as a result of the low use of qualitative research methods. The following recommendations are made in line with the data obtained in the study:

- The number of master and doctoral theses in Turkey is prepared for the use of digital technologies in science education that is quite low, and especially it is necessary to increase the number of doctoral theses in the field.
- The number of use of qualitative research methods in terms of research methods of prepared theses should be increased.
- In terms of sample selection, it is necessary to select students at all levels together with secondary school students, and the samples of parents, teachers, teacher candidates and lecturers should be included in sufficient proportion.
- Today, when it is inevitable that digital technologies are used in all areas of our lives, science education should be given by using the possibilities of this technology.

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