Bilgisayar ve Eğitim Araştırmaları Dergisi
www.joucer.com

Journal of Computer and Educational Research
www.joucer.com

An Analysis of Scientific Researches in the Field of Technology-Assisted Science Education between the Years 2005-2012

2005 -2012 Yılları Arasında Teknoloji Destekli Fen Eğitimi Alanında Yapılan Bilimsel Araştırmaların Analizi

Erol TAŞ[1], Nilay ŞENER[2], Mübeccel YALÇIN[3]

Abstract

This study analyzes the distribution of scientific researches made on technology-assisted science education in Turkey between 2005-2012 by years in terms of type of publication, sample group, research design, data collection tools, the scientific subject used in the content and education material. The study examines the scientific researches made on technology-assisted science education and aims to detect the shortcomings in this field and to guide future researches with the resulting data. The study uses case study design which is a qualitative research design. The universe of the study consists of articles, doctorate and master theses published on technology-assisted science education between the years 2005-2012. For this purpose, articles published in refereed journals reviewed from Ulakbim (Turkish National Academic Network and Information Center) Social Sciences Data Base and master and doctorate theses published by Council of Higher Education Thesis Search Center were included in the research. As for data collection method, documentary analysis was used. For the analysis of data, content analysis was used and the results were presented in percentages and frequency values. As a result of the research, it was found out that majority of the researches on technology-assisted science education were published in the form of master thesis; the subjects studied most were "Systems in our Body" for biology, "structure and properties of matter" for chemistry, "Light and Sound" for physics

Öz

Bu araştırmada, Türkiye'de 2005 - 2012 yılları arasında teknoloji destekli fen eğitimi alanında yapılmış olan bilimsel araştırmalar yayın türü, örneklem grubu, araştırma deseni, veri toplama araçları, içerikte kullanılan fen konusu ve eğitim materyali açısından yıllara göre dağılımı belirlenmiştir. Çalışmada, teknoloji destekli fen eğitimi alanında gerçekleştirilmiş olan bilimsel araştırmalar incelenip, bu alandaki eksiklikler belirlenerek elde edilen sonuçların daha sonra gerçekleştirilecek olan araştırmalara yol göstermesi amaçlanmaktadır. Araştırmada nitel araştırma desenlerinden durum çalışması kullanılmıştır. Araştırmanın evrenini, teknoloji destekli fen eğitimi alanın da 2005-2012 yılları arasında yayınlanmış olan makaleler, doktora ve yüksek lisans tezleri oluşturmaktadır. Bu amaçla, Ulakbim Sosyal Bilimler Veri Tabanında taranan hakemli dergilerde yayınlanan makaleler, Ulusal Yüksek Öğretim Kurumu Tez Tarama Merkezi tarafından yayınlanmış olan yüksek lisans ve doktora tezleri araştırma kapsamına dahil edilmiştir. Araştırmada veri toplama yöntemi olarak doküman analizi kullanılmıştır. Verilerin çözümlenmesinde içerik analizi kullanılarak, elde edilen sonuçlar yüzde ve frekans değerleri olarak yansıtılmıştır. Araştırma sonucunda, teknoloji destekli fen eğitimi alanında araştırmaların en fazla yüksek lisan tezi olarak yayınlandığı, özellikle biyoloji konularından "Vücudumuzdaki Sistemler", kimya konularından

[1] Doç.Dr., Ondokuz Mayıs University, Education Faculty, Primary Science Education Department, Samsun, Turkey.
[2] Arş. Gör., Ondokuz Mayıs University, Education Faculty, Primary Science Education Department, Samsun, Turkey.
[3] Yrd.Doç.Dr., Ondokuz Mayıs University, Education Faculty, Primary Science Education Department, Samsun, Turkey.

and the biggest sample groups were in researches which were conducted on secondary school students. While the researches were generally similar in terms of research design and data collection tools, they were different in terms of the technology-assisted education materials they used. Thus, it is important for future researches on technology-assisted science education to be designed by taking different sample groups and different subjects into consideration for a qualified science education.

"Maddenin Yapısı ve Özellikleri", fizik konularından ise "Işık ve Ses" konularında ağırlıklı olarak çalışmaların gerçekleştirildiği ve en fazla örneklemi ortaokul öğrencileri olan çalışmaların yürütüldüğü saptanmıştır. Genel olarak çalışmalar araştırma deseni ve veri toplama araçları açısından benzerlik gösterirken, kullandıkları teknoloji destekli öğretim materyali açısından farklılıklar göstermektedir. Bu nedenle bundan sonraki teknoloji destekli fen eğitimi alanında gerçekleştirilecek olan araştırmaların farklı örneklem grupları ve fen konuları göz önüne alınarak tasarlanması, nitelikli fen eğitimi gerçekleştirilebilmesi açısından için önem taşımaktadır.

Keywords: Web based, computer-assisted, technology-assisted, science education, documentary analysis.

Anahtar Kelimeler: Web tabanlı, bilgisayar destekli, teknoloji destekli, fen eğitimi, doküman analizi.

Introduction

Science and technology play an important role in shaping the future of societies since science influences every part of our lives. Educating individuals who can keep up with the fast developments in technology can only be possible with the planned integration of technology to education. Thus, for an effective science education, technological possibilities should be used and a technology-assisted education environment in which students can follow new developments should be prepared. İşman (2005) states that "The technology is a relationship with society, culture, technical substructure, and machines. Educators should interpret that this relationship is effective in design of teaching and learning setting". A great number of researches have been conducted show that using technology in science lessons increases interest and academic achievement of students (Çelikler & Yalçın, 2011; Chiu, Huang, & Chang, 2000; Taş & Çepni, 2011; Yenice, 2003).

With the rapid development of technology and its being integrated into education systems, the concept of technology-assisted education has come to light. In general, technology-assisted education can be defined as using information and communication technologies in every stage of education or in any stage of education. According to Özden (2002), technology-assisted education is: "A personal or mass application which can be used through computer or network (LAN, İntranet, İnternet), which has multimedia features and pedagogic features, which is interactive and oriented to give skills as well as transferring

information, the performances of which can be evaluated and recorded by computer, which enables individuals to move in accordance with their perception and comprehension speed and which is done with the use of course materials enabling everyone to be educated whenever and wherever is suitable for them" (Özden, 2002, p.37).

There are two different views on using technology in education. In the first one, technology exists to support the transfer of information to the student through traditional teaching. Thus, information can be transferred faster, more systematically and more visually. In the second one, the student is active and uses the technology by himself/herself. He/she uses technology as a material to reach information, to improve and to make experiments. In the second view, it is not possible to teach without technology (Maddux & Johnson, 2006). Learning through technology helps students to construct information based on their cognitive structures, to try to reach information, to learn by doing and living and to cooperate (Jonassen, 2000).

Science education is a field that lays the foundation for technology. Thus, science education should give positive attitudes and behaviors to students about technology. Researches show that using technology in science lessons increases positive attitudes to academic success and science more than the other methods (Hounsell & Hill, 1989; Yenice, 2003). Also, as a result of technological development, microcomputers have become important tolls in science education. The studies on these subject indicated that computer makes learning environment enrich and to improve the quality of education (Şengel & Özden, 2010). Within the context of technology-assisted science education (TASE), we can see every kind of material presented from computer, internet, stimulations, multimedia and hypermedia, probewareweb assisted education and interactive boards.

The close relationship between science and technology and the rapid increase in information have caused societies to increase the quality of science and technology. Thus, in reform movements of all countries, we can see a focus on the importance of educating science and technology literate individuals. In accordance with these reform movements, pilot studies were started in our country in the academic year 2004-2005. As a result of these studies, in 2005, new student-centered science and technology program was started throughout the country which was based on constructivist approach and the vision of which

was defined as "no matter what their individual differences are, all students should be educated as science and technology literate" (MEB, 2005). Also, by MEB (the Ministry of National Education) the mission of establishing a computer lab and providing internet access for every school was speeded up after 2005. In order to meet the strategically needs of State Planning Organization, FATİH (The movement of increasing opportunities and improving technology) Project was started by MEB. The Project will have been completed between the years 2010-2013 and its objective can be expressed as "to create equal opportunities in education and to improve technology in our schools". Within this context, for the efficient use of CT tools in the process of learning-teaching process, laptop computers, projectors and internet substructure will be supplied to 620.000 classes of pre-schools, primary and secondary schools in our country. Because of these practices, the articles, master and doctorate theses examined in this study were chosen by reviewing the researches between the years 2005-2012.

It has been thought that this study will make an important contribution to future studies in the field of technology-assisted science education by analyzing the content of the articles, master and doctorate theses published for determining the current tendencies in technology-assisted science education.

In this study, scientific researches made in Turkey between the years 2005-2012 in the field of technology-assisted science education were analyzed by years in terms of their subject, education level, sample, assessment tools and research models. In the light of analysis results, the study aims to detect the shortcomings in this field and to guide future researches with the resulting data. In line with this objective, research questions are as follow.

In Turkish education journals indexed by ULAKBİM Social Sciences Data Base and master and doctorate theses indexed by National Thesis Center published between the years 2005-2012 which dealt with technology assisted science education;

[1] How is the distribution of researches by years and type of publication?

[2] How is the distribution of design of researches by years and type of publication?

[3] How is the distribution of researches by sample group?

[4] How is the distribution of data collection tools used in researches by sample group and type of publication?

[5] How is the distribution of subjects in the researches by sample group and type of publication?

[6] How is the distribution of teaching materials used in researches by years and type of publication?

Research Design

This study uses case study design which is a one of the qualitative research designs. The universe of the study consists of articles, master theses and doctorate theses on technology assisted science education published in the last 8 years (2005-2012). Maximum variation sampling method was used in this study. The research sample involving primary schools, secondary schools, prospective teachers and science teachers that can reflect technology assisted science education (TASE) were included in the study while physics, chemistry and biology fields of secondary school were not included. For this purpose, doctorate and master theses published by Council of Higher Education and articles published by ULAKBİM Social Sciences Data Base (SSDB) were included in the study to be used within the study. As for data collection method, documentary analysis was used in the study. Documentary analysis is the process of analyzing written materials that contain information about the case or cases intended to be analyzed and it includes stages such as reaching the documents, checking their originality, understanding the documents, analyzing them and using them (Yıldırım & Şimşek, 2011, p.193).

Key words such as technology assisted, technology based, computer assisted, computer based, web based, web assisted, web designed, animation and simulation were used and articles, doctorate and master theses published in Turkey were found. Of the studies found, the ones which were about science education and which included samples of primary school, secondary school, prospective teachers and teachers were taken into consideration and the studies which were to be included in the study were determined. In addition, the articles chosen were not from a master or doctorate thesis.

Data Analysis

For the analysis of data; involves analyzing, one of the qualitative data analysis methods, was used. During the analysis process of the data, first the data was collected under specific themes (categories) by significant codes within the context of research questions. Later, these themes were defined within a regular whole and commented and each category was made into tables by calculating the percentage and frequency values.

Findings

This part analyzes the articles, master and doctorate theses on technology assisted science education by years in terms of their subject, education level, sample, assessment tools, research model and education materials used and gives the results in tables as percentage (%) and frequency (f) values.

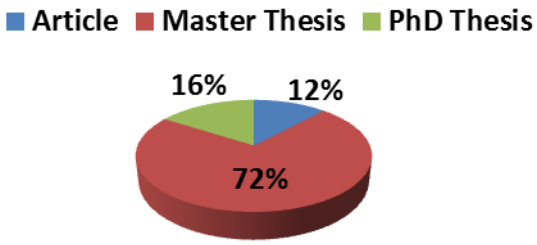


Figure 1. Circular Chart of Studies on TASE Published Between the Years 2005-2012

When the articles, master and doctorate researches on technology assisted science education published between the years 2005-2012 were reviewed, 122 studies were found. 9 articles published on technology assisted science education were not included in the study since they were from master /doctorate theses. It can be seen that of 122 studies included in the research, 12% were articles, 16% were doctorate theses and 72% were master theses (Figure 1).

Table 1. Distribution of Researches on TASE by Years and Type of Publication

Year	Article	Master Thesis	PhD Thesis	Total

	f	%	f	%	f	%	f	%
2005	2	1.6	6	4.9	3	2.5	11	9.0
2006	-	-	15	12.3	1	0.8	16	13.1
2007	2	1.6	6	4.9	1	0.8	9	7.4
2008	2	1.6	11	9.0	1	0.8	14	11.5
2009	3	2.5	11	9.0	2	1.6	16	13.1
2010	-	-	15	12.3	4	3.3	19	15.6
2011	3	2.5	11	9.0	5	4.1	19	15.6
2012	3	2.5	13	10.7	2	1.6	18	14.8
Total	15	12.3	88	72.1	19	15.6	122	100

When table 1 is reviewed, it can be seen that researches increased especially between the years 2010-2012. Between the years 2005-2012, it can be seen that master theses were published predominantly each year while doctorate theses and articles were published with low rates of 1% and 2%. There was a big increase in the number of master theses especially in 2006 and 2010 (12%) while no articles were published in these years (Figure 2).

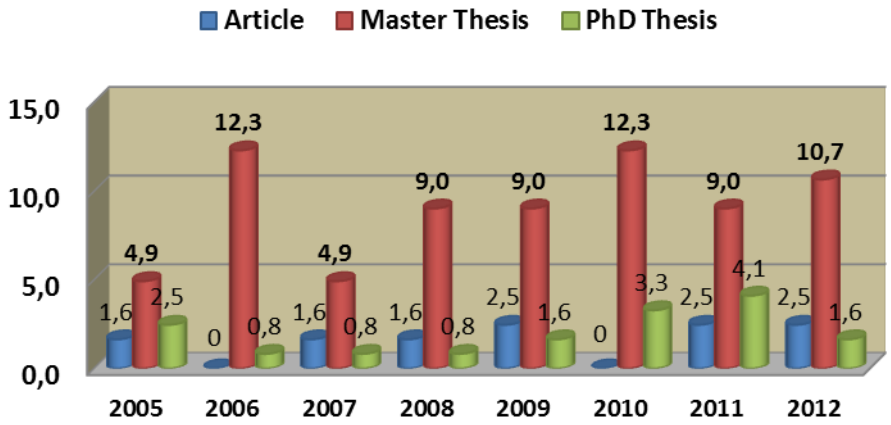


Figure 2. Distribution of Researches Published on TASE by Years and Type of Publication

Table 2. Distribution of Research Designs Used in Researches Published on TASE by Years and Type of Publication.

	Quantitative Research			Qualitative Research			Quantitative and Qualitative Research (Mixed Method Design)		
Year	Article	Master Thesis	PhD. Thesis	Article	Master Thesis	PhD. Thesis	Article	Master Thesis	PhD. Thesis
2005	2	3	2	-	1	-	-	2	1
2006	-	13	-	-	2	-	-	-	1
2007	2	3	1	-	1	-	-	2	-
2008	2	8	1	-	1	-	-	2	-
2009	2	7	-	1	1	1	-	2	1
2010	-	11	3	-	-	-	-	4	1
2011	3	8	3	-	1	1	-	3	1
2012	2	9	1	-	1	-	1	2	1
Total	**13**	**62**	**11**	**1**	**8**	**2**	**1**	**17**	**6**

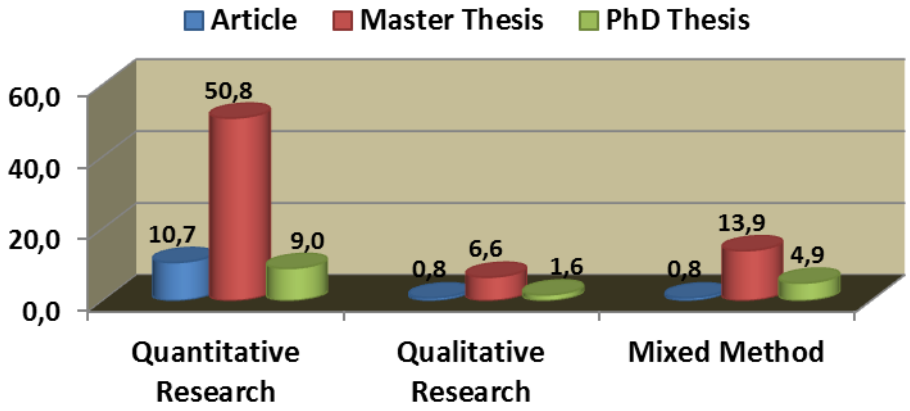


Figure 3. Total Distributions of Research Designs Used in Researches Published on TASE by Type of Publication.

When figure 3 is reviewed, it can be seen that 71% (86) of the models used in researches between the years 2005-2012 were quantitative while 9% (11) were qualitative and 20% (24) were mixed design. It can be seen that quantitative research design was the most preferred research model in the technology assisted science education studies between the years 2005-2012.

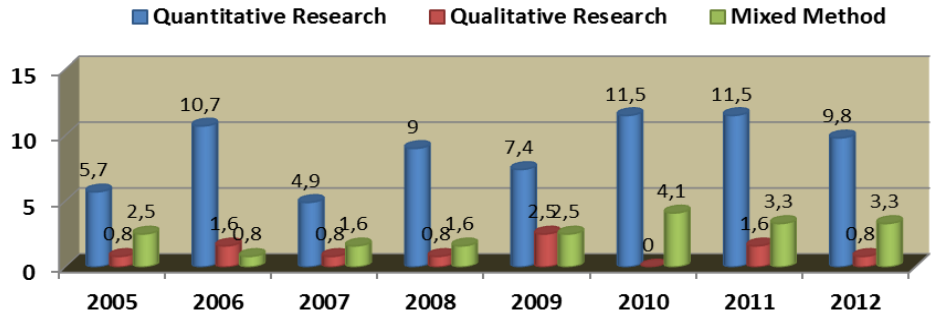


Figure 4. Distribution of Research Designs Used in Researches Published on TASE by Years.

As can be seen from figure 3.4, while quantitative research design is used predominantly in researches each year, there is an increase, even though small, in the number of studies that used mixed design beginning from 2010. However, there are scarcely any studies that used qualitative design.

Table 3. Distribution of Researches Published on TASE by Sample Group.

Sample	Type of Publication	2005	2006	2007	2008	2009	2010	2011	2012	Total	
		f	f	f	f	f	f	f	f	N	%
Primary	Article	-	-	-	-	-	-	1	-	1	0.8
	Master Thesis	-	-	-	1	-	-	-	-	1	0.8
	PhD. Thesis	-	-	-	-	-	-	1	-	1	0.8
Secondary	Article	2	-	1	1	2	-	2	2	10	8.2
	Master Thesis	4	13	5	8	8	11	8	10	67	**54.9**
	PhD. Thesis	3	1	1	-	-	1	1	1	8	6.6
Prospective Teacher	Article	-	-	1	-	-	-	-	1	2	1.6
	Master Thesis	1	1	-	2	3	4	3	2	16	13.1
	PhD. Thesis	-	-	-	1	1	3	3	-	8	6.6
Teacher	Article	-	-	-	1	1	-	-	-	2	1.6
	Master Thesis	1	-	1	1	-	-	1	1	5	4.1
	PhD. Thesis	-	-	-	-	1	-	-	-	1	0.8
Total		11	15	9	15	16	19	20	17	122	100

Table 3 shows the distribution of studies by sample groups and years. Most studied sample group is secondary schools with a rate of 69.7%(5th, 6th,7th, 8th grades). There are a total of 85 studies, 10 articles (8.2%), 67 master theses (54.9%) and 8 doctorate theses (0.6%), which used secondary school students as the sample group. Least studied sample group is primary school (4th grade) with a total of 3 studies, 1 article (0.8%), 1 master thesis (0.8%) and 1 doctorate thesis (0.8%). Prospective science teachers are the second most preferred sample group with a total of 26 (21.3%) studies while science teachers are the third most preferred sample group with a total of 8 (6.5%) studies (Figure 4).

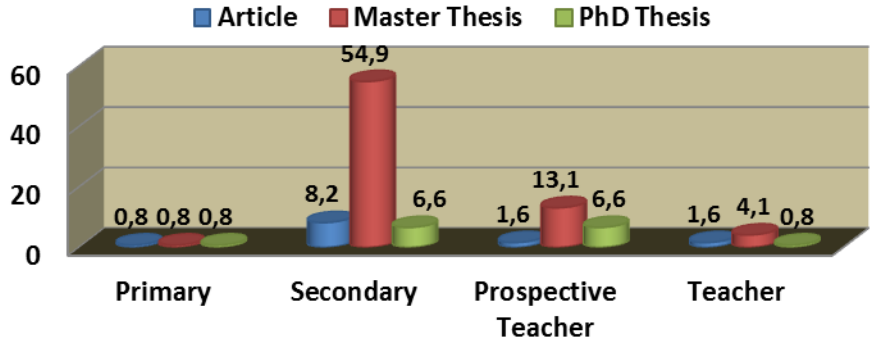


Figure 5. Distribution of Researches Published on TASE by Sample Group.

Table 4. Data Collection Tools Used in Researches Published on TASE and the Frequency of Use by Sample Groups.

Sample	Type of Publication	Academic Achievement Test	Attitude Scale				Survey		Interview	Observation	The Other Data Collection Tools
		Test	Open-ended Question	Science	Computer	Other	Personal Information	Other			
4	A	1	-	1	1	-	-	-	-	-	-
	M	1	-	-	-	1	-	-	-	-	Peer Evaluation Form(1)
	D	-	-	-	-	-	-	-	1	-	Web Portfolio(1)
5	A	1	-	-	-	-	-	-	-	-	-
	M	8	-	2	1	-	1	3	3	-	Misconception Questionary (1)

											Opinionaire (1)
	D	1	1	1	-	-	-	-	-	-	Opinionaire (1)
	A	5	-	2	-	-	-	-	-	-	-
6	**M**	20	2	12	3	4	5	5	2	3	Learning Object Evaluation Form(1) Worksheet (1) Animation Opinionaire (1) Motivation Scale (1) Opinionaire (2) Scientific Process Skills Test (1) Sensation Skills Test (1)
	D	1	1	1	-	-	-	-	-	-	Opinionaire (1)
	A	2	-	3	-	-	-	-	-	-	Concept Mapping Attitude Scale (1) İnternet Attitude Scale (1)
7	**M**	20	-	13	3	-	2	-	2	4	Motivation Scale (1) Performans Evaluation Test(1) Logical Thinking Ability Test(1) Scientific Procedure Skills Test (1) Worksheet (1) Multiple İntelligences İnventory (1) Computer Usage Scale(1) Science and Technology Motivation Scale (1)
	D	2	-	1	-	-	-	-	1	-	Scientific Process Skills Test (1)
	A	1	-	1	-	-	-	-	-	-	-
8	**M**	17	4	10	2		2	3	1	2	Cornell Critical Thinking Test-X(1) Multiple İntelligences İnventory (1) Animation Opinionaire (1) Scientific Thinking Test (1) Opinionaire (3) Logical Thinking Ability Test(1) Conceptual Understanding Scale(1)
	D	3	-	1	1	-	-	-	1	-	Scientific Process Skills Test (1) Animation Opinionaire (1)

Prospective Teacher	A	-	-	-	-	2	-	-	1	1	-
	M	9	1	4	-	2	3	2	1	2	Scientific Process Skills Test (2) Opinionaire (1) Misconception Questionary (1)
	D	7	1	5	2	-	1	-	4	3	İntellectul Model Test (1) Spatiai Animation Test(1) 3D Computer Models Opinionaire (1) Spatial Visualization Test(1) Scientific Thinking Skills Test(2) Molecular Geometry Spatial Visualization Test (1) Opinionaire (1) Word Association Test (1) Self-confidance Scale(1) Self-efficacy Belief Scale(1)
Teacher	A	-	-	-	-	-	-	-	-	-	Wes Assisted Education Opinionaire(1) Document Analysis (1)
	M	-	-	-	-	-	-	1	-	-	Result of Online İnteractive Learning Activities(1)
	D	1	-	1	-	-	-	-	1	-	İntellectual Conversation Test (1) Logical Thinkink Ability Test(1)
Total		100	10	58	13	9	14	14	18	15	56

A: Article, M: Master thesis, D: Doctorate Thesis

Table 4 shows the distribution of data collection tools used in 122 studies on technology assisted science education between the years2005-2012 by sample groups. Of 122 studies, 110 (89.3%) of the studies used an achievement test to determine the academic success of the sample. 100 of these achievement tests consisted of multiple choice questions while 10 were prepared in the form of open ended questions. 80 (65.6%) of the studies used attitude scale. 58 (47.5%) of these scales were about attitudes to science and technology lesson while 13 (10.7%) were about attitudes to computer and 9 (7.4%) were about special subjects related to the field the research was on. 28 (23%) of the studies used questionnaire as

the data collection tool. 14 (11.5%) of these questionnaires were preferred to get demographic information about the sample group while the other 14 (11.5%) were preferred to get information and views about the study subject. 18 (14.8%) of the studies collected data through interview method. 15 (12.3%) of the studies used observation method to collect data. In 122 studies included in our study, in addition to other data collection tools; 56 different tests, forms and scales were used which were chosen or developed in accordance with the study areas, as can be seen from table 4. In addition, tests such as self-sufficiency scale and self-confidence test were used with prospective teachers in order to find out their efficiencies in their occupation and their use of the technology. Tests aimed at predicting the scientific process skills of the sample group were used with primary and secondary school sample groups. The interview form, which was prepared to find out the views of the sample group about the teaching activity, was a frequently used data collection tool used with secondary school sample group.

Table 5. Distribution of Subjects Included in Researches Published on TASE by Sample Group and Type of Publication.

	Subject	Article	Master	PhD	Total	
		f	f	f	f	%
4th Grade	Let's Solve the Puzzle Our Body (2011)	1	-	-	1	0.8
	Force and Movement (2008)	-	1	-	1	0.8
5th Grade	Flowering Plants (2005)	1	-	-	1	0.8
	The Taxonomy of The Living Things (2008)	-	1	-	1	0.8
	Let's Solve the Puzzle Our Body (2009)	-	1	-	1	0.8
	Earth,Sun and Moon (2007)	-	-	1	1	0.8
	Light and Sound (2007, 2009)	1	2	-	3	2,5
	Electricity in Our Life (2012)	-	1	-	1	0.8
	The Change and Recognize of Matter (2006)	-	1	-	1	0.8
6th Grade	Canlılarda Üreme, Büyüme, Gelişme (2010 (2))	-	2	-	2	1.6
	Cruising to Interior Structure of Alive (2005 (2), 2006 (2))	1	3	-	4	3.3
	Systems in Our Body (2006(2), 2009 (2), 2010 (2), 2011 (3), 2012)	1	9	-	10	8,2
	Force and Movement (2010)	-	1	-	1	0.8
	Structure of Matter (2008(2), 2010, 2012)	-	4	-	4	3,3
	Electricity in Our Life (2006 (2), 2008, 2011)	-	3	1	4	3,3

	Light and Sound (2012)	-	1	-	1	0,8
	Discovering Space (2008, 2006 (2))	1	2	-	3	2,5
	Matter and Heat (2008, 2011 (2))	1	2	-	3	2,5
7th Grade	Systems in Our Body (2005, 2009, 2010 (2), 2012)	-	4	1	5	4,1
	Human and Ecology (2008, 2012 (3))	-	4	-	4	3,3
	Force and Movement (2005 (2), 2006, 2007, 2012)	-	4	1	5	4,1
	Electricity in Our Life (2007, 2009, 2010, 2011 (2))	-	5	-	5	4,1
	Solar System and Beyond: Enigmatic Space (2011)	1	-	-	1	0,8
	Light (2012)	1	-	-	1	0,8
	Structure and Properties of Matter (2005(2), 2006, 2007, 2010(6), 2011, 2012)	1	10	1	12	9,8
8th Grade	Cell Division and Heritage (2005, 2006 (4), 2007 (2), 2008(2), 2010)	-	10	-	10	8,2
	Force and Movement (2009)	-	1	-	1	0,8
	Sound (2011(2))	-	2	-	2	1,6
	Electricity in Our Life (2009, 2012 (2))	-	2	1	3	2.4
	Acids and Bases (2012)	-	-	1	1	0,8
	Structure and Properties of Matter (2006, 2007, 2010, 2011, 2012)	2	3	-	5	4,1
	States of Matter and Heat (2007, 2010)	-	1	1	2	1,6
Prospective Teacher	Ecology (2010 (2))	-	-	2	2	1,6
	Excretory System (2008 (2))	-	1	1	2	1,6
	The Taxonomy of The Living Things (2010)	-	-	1	1	0,8
	Photosynthesis and Plant Respiration (2010)	-	-	1	1	0,8
	Force and Movement (2011)	-	1	-	1	0,8
	Gravitation Law (2009)	-	-	1	1	0,8
	Propagation of Heat and Effect (2010, 2011)	-	2	-	2	1,6
	Heat and Temperature (2011)	-	-	1	1	0,8
	Matter Cycles (2008, 2011)	-	1	1	2	1,6
	Electromagnetic Wave Granul Model (2009)	-	-	1	1	0,8
	Affect Solubility Factors (2011 (2))	-	1	1	2	1,6
	Atomic Structure and Orbitals(2010, 2011)	-	2	-	2	1,6
	Electrochemistry ve Chemical Bonds (2010, 2011)	-	2	-	2	1,6
	The Neutralization Reactions of Acid – Base 2011)	-	1	-	1	0,8
	Gas Laws (2011)	-	1	-	1	0,8
	The Factor Effected on Reaction Rate (2011)	-	1	-	1	0.8
	Nature of Science (2012)	-	-	1	1	0,8
	All Subject In Biyology Lab. II (2009)	-	1	-	1	0.8
	All Subject In Physics Lab. II (2005)	-	1	-	1	0.8
	All Subject In Science Lab. II (2011, 2012)	-	1	1	2	1.6
Teacher	Structure of Matter (2005)	-	1	-	1	0,8
	Electrochemistry (2009)	-	-	1	1	0,8
	CAE Proficiencies (2007)	-	1	-	1	0,8
	Views on Computer-Assisted Education (2008)	-	1	-	1	0,8
	Web Vitamin Assessment (2011, 212)	-	2	-	2	1,6

As can be seen from Table 5, "Let's Solve the Puzzle Our Body" and "Force and Movement" units were chosen for 4th grades, while the units "Light and Sound" for 5th grades, "Systems in Our Body" (8.2%) for 6th grades, "Structure and Properties of Matter" (%9,2) for 7th grades and "Cell Division and Heritage" (8.2%) unit for 8th grade were chosen predominantly. For 6th and 7th grades, at least one study was made from all units; however, there was no study that dealt with the units "Living Beings and Energy" and "Natural Processes" for 8th grades. In prospective teachers group, technology assisted studies were made in experimental practices that were in course content of laboratory practices. In the studies which chose teachers as the sample group, the subjects of studies were "Web Vitamin" and "Views and Proficiencies on Computer-assisted Education". When the total distribution of subjects were reviewed in terms of physics, chemistry and biology, it was found out that the greatest number of studies were in biology (37.7%) with a total of 14 subjects and46 studies in different sample groups. Chemistry (33.6%) was the second most studied subject with a total of 18 subjects and 41 studies in different sample groups while physics (32.7%) was the third most studied subject with a total of 19 subjects and 40 studies in different sample groups.

As for sample groups, most preferred subject field was physics for 5th grades, biology for 6th grades, chemistry for 7th grades, biology in 8th grades and chemistry for prospective teachers.

When the science subjects in technology assisted science education studies were reviewed, it was found out that the most studied subjects were "Systems in Our Body" for biology, "Structure and Properties of Matter" for chemistry and "Light and Sound" for physics (Table 5).

Table 3.6. Education Materials used in Articles and Master and Doctorate Theses on TASE.

Year	Article	Master Thesis	PhD. Thesis

2005	- Computer Assisted Instruction, Macromedia Authorware 4 Software - Learning Environment with Information And Communication Technologies	- Experiment with Data Logger - Computer-assisted Conceptual Mapping - Webscience Educational Software - Science Software and compact-disc (Product by Sebit, Britannica and EARGED) - Computer-assisted Educational Software - Computer-assisted Instruction Materials	- Computer-assisted Conceptual Mapping - Computer-assisted Educational Software - Computer-assisted Instruction Materials
2006	-	- Computer-assisted Instruction Materials - Computer-assisted Conceptual Mapping - Animation - Web Vitamin Software - Interactive Video Software - Simulation - Educational Software	- Computer-assisted Educational Software
2007	- Web-Based Instruction	- 3D Educational Software - Animations - Simulations - Computer-assisted Instruction Materials	- Computer-assisted Educational Software
2008	- Computer-assisted Educational Software	- Computer-assisted Misconception Material - Animation - Computer-assisted Instruction Materials - Project-based Computer-assisted Materials	- Computer-assisted Educational Software
2009	- Technology-assisted Intellectual and Conceptual Mapping - Mobides Computer Assisted Education System	- Distance Education - ARCS Motivation Model Software - Computer-assisted Intellectual Mapping - Blended Learning - Computer-assisted Instruction Materials - PowerPoint Slideshow - Animation - Analogy Mapping - Computer-assisted Instruction Materials	- Simulation
2010	-	- Web-assisted Conceptual Mapping - Computer-assisted Instruction Materials	- Animation, Jigsaw - Web-assisted Educational

		- Hybrid Learning Model - Animation - Computer-assisted Conceptual Change Text - Www.Benanlatsam.Com - Web-based 2D and 3D Multimedia - Wed-supported Educational Software	Software - 3D Educational Software
2011	- Computer-Assisted Instruction Based On The Constructivist Approach - Web-assisted Conceptual Mapping - Web-assisted Diagnostic Tree	- Fenokulu.Net - Animation - Simulation - Web-assisted Conceptual Mapping Web-based Multimedia-assisted Software - Computer-assisted Graphs and Graph Drawing - Web-assisted Educational Software - 5e Educational Software	- Web Portfolio 3d Educational Software - Computer-assisted Worksheets - Animation and Simulation Model - Computer-assisted Conceptual Change Text
2012	- Technology-assisted Instruction (Video, Computer, Slideshow, Poster) - Computer-assisted Instruction (Vitamin Software, Animation, subject test, crossword and experiment video)	- Computer-assisted Intellectual Mapping - Animation - Interactive Board - Webquest - Web-assisted Educational Software - Meb Vitamin	- Hyper-media Analogy - Animation

Table 6 shows the materials used in technology assisted science education studies. The studies made in 2005 and 2006 used previously prepared teaching software (Web vitamin, videos, CDs) in general.

Result and Discussion

The studies between the years 2007-2012 got diversified and materials about misconceptions, software with a focus on movement such as animation and simulation, 3D

teaching software, web-assisted educational materials were used. Since some of the reviewed studies did not specify the features of the education material that was used, they were defined as "*computer-assisted teaching software*" in our study.

When the results of the research were reviewed, it was found that the studies published on technology assisted science education between the years 2005-2012 in Turkey were mostly published in the form of master thesis. According to the data of National Thesis Center, between the years 2005-2012, there are 1236 master theses and 302 doctorate theses in the field of science. Master theses are predominant in the literature reviews in Turkey, thus, master theses are more frequently seen in the researches reviewed in our study.

There was a big increase (12%) in the number of master theses especially in 2006 and 2010; however, no articles were published in these years except for the articles made from the master and doctorate theses of these years. On the other hand, it was found that there was an increase in doctorate theses in 2010 and 2011 when compared with other years. When the distribution of the studies by years was reviewed, an increase was observed in the technology assisted science education studies especially after 2008. The fact that there was an increase in the number of projects which were implemented with the cooperation of MEB and TÜBİTAK beginning from 2008 and also the fact that TÜBİTAK increased "*TÜBİTAK (2010) scientist supports for undergraduate and post graduate students and post doctorate researchers*" can be the reason of the increase in the number of technology assisted science education studies. In addition, with the target "*Information and communication technologies will be a basic tool of education process and teachers and students will be made to use these technologies effectively*" in the 2006-2010 reports prepared by State Planning Organization, MEB started works to realize the services asked from them. In accordance with the target "*to enable all the schools and institutions of our ministry to make use of information technologies until the end of 2014 in order to eliminate the differences in regions*", Fatih Project was started beginning from 2010 (MEB, 2012). All these works and attempts explain the reason why the studies included in the study showed an increase starting from 2008.

It can be seen that the studies between the years 2005-2012 used quantitative research method with a high incidence and qualitative research method with a low incidence (Table 2 and Figure 3). The use of statistical methods in applied studies and the difficulties

encountered in analyzing and commenting on the data can be the reason why qualitative research methods are not preferred. In addition, the length of interviews and their printout in qualitative research methods can be another reason why researchers do not prefer this method (Bayraktaroğlu, et al., 2006; Göktaş et al., 2012; Şimşek et al., 2009). The fact that researchers want to increase the validity and reliability of their quantitative data by supporting them with qualitative data collection tools such as observations and interviews increases the use of mixed research design. Mixed research design has become a widely recognized and rising paradigm by researchers especially after the year 2003 (Şimşek et al., 2009; Kıral & Kıral, 2011). Thus, according to the data obtained from the study, it can be seen that the use of mixed research design increased after the year 2010.

It was found that the researchers of the technology assisted science education studies included in our study preferred secondary school students (5th, 6th, 7th and 8th grade) the most and primary school students the least. Since a great number of researches in technology assisted science education are applied, researchers may have preferred to work with older samples considering that primary school students can have difficulties during applications. In addition, it has been found that science and technology teachers were also used with a low incidence in researches. The reasons for this may be the fact that there are fewer teachers than students or it may be because they are not willing to allocate the necessary time to be involved in the study or that they are difficult to reach.

When the subjects included in technology assisted science education are reviewed, it can be seen that the most studied subjects were "*Systems in Our Body*" for biology, "*Structure and Properties of Matter*" for chemistry and "*Light and Sound*" for physics.

It was found that the studies reviewed used achievement tests as the data collection tool with a high incidence. Researchers use especially attitude scales to examine the variables which are effective on achievement. It was seen that researchers developed various data collection tools depending on the subject.

Studies in science have recently shown the importance of using technology as a teaching material in learning environment. The main reason for this is the rapid development of technology and technology being used as a part of education rather than a supplementary tool. In addition, the developments and enrichments in the materials used for

education causes the possibility to reach more sources and enable the technology used previously as presentations and slides to become multimedia tools such as 3D teaching software, animations and simulations.

In the light of the findings of this study, the following suggestions can be made:

- By taking into consideration the changes made in the education system and science and technology lesson starting from the academic year 2011-2012; studies should be made in accordance with the purposes of science lessons, they should be student centered, they should integrate technology in education and their subjects should consider the components of subject- technology-pedagogy.
- The number of articles and doctorate theses on technology assisted science teaching which examine the effects and efficiency of using technology in education should be increased.
- Mixed research designs which use quantitative and qualitative research methods together should be used more so that more thorough information can be obtained and many variables that affect learning can be presented.
- Teachers should be used more as sample group in researches and working methods and problems of the teachers should be examined and solutions should be offered.
- As for subjects, subjects which were not studied before in primary and secondary school levels should be discussed and the deficiencies in this field should be dealt with.
- New models and methods in technology-assisted education should be examined and the questions of how these methods serve the individual differences of students, which teaching methods yield more positive results, which method is better for which sample group should be addressed.
- Fatih Project realized by MEB should be taken into consideration and future studies should enable the integration of technology, pedagogy and field information to learning environments and thus help effective science education.

References

Bayraktaroğlu, S., Kutaris, R., Özdemir, Y., Alpaslan, S., & Dil, E. (2006). *Methodology preference in knowledge economy and management congresses: qualitative research methods*. Kocaeli: 5th International Knowledge, Economy and Management Congress.

Chiu, C.H., Huang, C.C., & Chang, W.T. (2000). The evaluation and influence of interaction in network supported collaborative concept mapping. *Computers and. Education*, 34, 1 17–25.

Çelikler, D. & Yalçın, M. (2011). The effect of computer-assisted applications in the teaching of "matter and heat" subject. *Eurasian Journal of Educational Research*, 42, 273-290.

Göktaş, Y., Arpacık, Ö., Yıldırım G., Aydemir, M., Küçük, S., Telli E., & Reisoğlu, İ. (2012). Educational Technology Research Trends in Turkey: A Content Analysis of the 2000-2009 Decade. *Educational Sciences: Theory & Practice (ESTP)*, 12(1), 177-199.

Hounshell, P.B. & Hill, S.R. (1989).The microcomputer and achievement and attitudes in high school biology. *Journal of Research in Science Teaching*, 26(6), 543-549.

İşman, A. (2005). Technology and technique: an educational perspective. *Eurasian Journal of Educational Research*, 19.

Jonassen, D. (2000). *Computers as mind tools for schools: Engaging critical thinking* (2nd edition).Columbus, OH: Merril, an imprint of Prentice Hall.

Kıral, B. & Kıral, E. (2011). Mixed research design. *2nd International Conference on New Trends in Education and Their Implications* (27-29 April), Antalya, 294-298.

Maddux, C.D. & Johnson, D.L. (2006). Type II application of information technology in education: Then extre volution. *Computer in the schools*, 20 (1/2), 93-106.

Milli Eğitim Bakanlığı, (MEB). (2005). *İlköğretim fen ve teknoloji dersi öğretim programı*. Talim ve Terbiye Kurulu Başkanlığı, Ankara.

MEB. (2012). Eğitimde Fatih Projesi/Proje Hakkında. Retrieved from http://fatihprojesi.meb.gov.tr/tr/icerikincele.php?id=6.

Özden, Y. (2002). *Sınıf içinde öğrenme öğretme ortamının düzenlenmesi*. Ankara: Pegem A Publishing.

Şengel, E. & Özden, M.Y. (2010). The effects of computer simulated experiments on high school students' understanding of the displacement and velocity concepts. *Eurasian Journal of Educational Research*, 39, 191-211.

Şimşek, A., Özdamar, N., Uysal, Ö., Kobak, K., Berk, C., Kılıçer, T., & Çiğdem, H. (2009). Current trends in educational technology research in Turkey in the new millennium. *Educational Sciences: Theory & Practice (ESTP)*, 9(2), 941-966.

Taş, E. & Çepni, S. (2011). Developing, implementing and evaluating of a web designed science material. *Journal of Uludag University Faculty of Education*, 24(1), 93-115.

TÜBİTAK. (2010). 2011-2016 Bilim ve Teknoloji İnsan Kaynağı Stratejisi ve Eylem Planı. Ankara: Tübitak Bilim, Teknoloji ve Yenilik Politikaları Daire Başkanlığı. Retrieved

from http://www.tubitak.gov.tr/tubitak_content_files/BTYPD/strateji_belgeleri/BT_IK_STRATEJI_BELGESI_2011_2016.pdf

Yenice, N. (2003). Bilgisayar destekli fen bilgisi öğretiminin öğrencilerin fen ve bilgisayar tutumlarına etkisi. *The Turkish Online Journal of Education Technology*, 2(4), 79-85.

Yıldırım, A. & Şimşek, H. (2011). *Qualitative Research Methods in Social Sciences* (8th ed.). Ankara: Seçkin Publishing.