



Participatory Educational Research (PER)
Vol.9(6), pp. 19-40, November 2022
Available online at <http://www.perjournal.com>
ISSN: 2148-6123
<http://dx.doi.org/10.17275/per.22.127.9.6>

Id: 1049299

A Thematic Analysis of Theses Prepared on Mathematics Education with Gifted and Talented Students in Türkiye

Elvan İNAN*

Bandırma Science and Art Centre, Balıkesir, Türkiye
ORCID: 0000-0002-2719-9668

Sevinç MERT UYANGÖR

Necatibey Faculty of Education, Balıkesir University, Balıkesir, Türkiye
ORCID: 0000-0002-3307-1492

Article history

Received:
27.12.2021

Received in revised form:
05.01.2022

Accepted:
31.08.2022

Key words:

gifted and talented students,
theses prepared, mathematics
education

The aim of this research is to examine the postgraduate studies conducted in the field of mathematics education with individuals diagnosed as gifted and talented students in Türkiye. For this purpose, master's and doctoral studies in the database of the National Thesis Center of the Council of Higher Education [CHE] of Türkiye were examined. The first graduate thesis carried out in the field of mathematics education with gifted and talented students was carried out in 2009. In this context, the research includes 55 master's and doctoral studies from 2009 to 2020. In this study, in which the qualitative research approach was preferred, thematic content analysis (meta-synthesis) one of the content analysis types was used. The theses included in the scope of the study were examined under different headings such as year, type, subject, approach, research design, sample, data collection tool, and data analysis techniques. This research is important in terms of giving a general idea about the studies carried out in the field of gifted students and mathematics education, providing information pertaining to the relevant literature for the studies to be carried out, helping expand the field with studies with more different content by determining the subjects and scopes that have not been researched in the field, and giving inspiration related to different research ideas that will contribute to the literature.

Introduction

Intelligence is one of the most researched subjects in psychology and educational science. However, in the literature, there is no consensus on the definition of intelligence, and therefore, scientists have developed different theories and definitions of intelligence throughout the history (Gardner, 1993; Sternberg & Grigorenko, 2000). Sir Francis Galton, the owner of the work titled "Hereditary Genius", which is accepted as a beginning in the field of gifted people, expressed the question of whether intelligence is hereditary or environmental in 1869, and suggested that intelligence may be hereditary, and developed the

* Correspondency: inanelvan10@gmail.com

“Consistency of Intelligence Theory” (Sternberg, 2000). In 1904, Spearman addressed intelligence in two structures as general and special mental abilities, which is affected by all kinds of mental activities, and introduced the General Theory of Intelligence, called the "two-factor theory", to the scientific world (Sak, 2008). Alfred Binet, on the other hand, drew attention to environmental stimuli and stated that the structure of intelligence can be revealed by studying complex mental functions. In 1905, Binet developed the Binet-Simon Intelligence test, which is accepted as the father of modern intelligence tests, with a study he carried out to identify students who were at a low level in learning within the scope of the education policies of the French government (Gardner, 1993). Lewis Terman, who was very impressed by Binet’s work, revised the test developed by Binet by using the concept of IQ formulated by William Stern and developed the intelligence test known as the Stanford-Binet Intelligence Test (Terman, 1916). Thurstone (1931) gathered intelligence under seven factors, which he called basic mental abilities, with the statement “intelligence is not a single but a multiple structure” and suggested the Theory of Primary Mental Abilities (Sak, 2008). Raymond Cattell (1963), who suggested the theory of Fluent Intelligence and Crystallized Intelligence, named the biological component of intelligence transferred by heredity as fluid intelligence and the physiological component formed by experience as crystallized intelligence (Sak, 2012). In 1990, Gardner addressed intelligence with a holistic perspective that included the mind, body, and emotion components, and expressed the abilities and potentials of each individual in eight intelligence areas and suggested the Theory of Multiple Intelligences (Gardner, 1980).

In scientific field studies for the explanation of intelligence, in addition to gifted individuals with high-level skills, attention was drawn to individuals with special abilities, and a gifted individual was defined as a gift of God (Reis & Callahan, 1989). While superior mind is defined as individuals who consistently score 130 and above on various scales observed at high levels of cognitive, affective, psychomotor, and neural communication; gifted is the name given to superior individuals who have special abilities in fields such as fine arts, mathematics, and technique, and who have more specific skills than their peers with scores of 120 and above in measurements (Treffinger & Renzulli, 1986). Since the concept of gifted is affected by the social structure, the society in which the individuals live shapes the structure of this concept (Callahan, 2005).

Renzulli (1985), who has made important studies in the field of gifted individuals, defines gifted people as individuals who can use the interaction of talent, creativity, and motivation together. According to the American National Association for Gifted Children, a gifted individual was defined as a leader and creative individual who has special talents in the academic sense and general talents in the intellectual sense, who perform at a high level in areas such as visual art practices, and who use this potential to contribute positively to their country (VanTassel-Baska, 2007). According to the directive of the Science and Art Center (Bilim ve Sanat Merkezi, [BİLSEM]), which is managed by the Ministry of National Education (Milli Eğitim Bakanlığı, [MEB]) in Türkiye and provides education to gifted individuals, gifted people “defined as individuals who learn faster than their peers; who are ahead in creativity, art, and leadership capacity; have special academic abilities; can understand abstract ideas; like to act independently in their interests; and perform at a high level (T.R. Ministry of National Education Board of Education and Discipline [MEB], 2019).

When the literature is examined, gifted individuals, who make up 2% of the societies they live in, appear as human resources that are effective in the development and progress of countries by adding value to the societies in which they exist. In this respect, the education of gifted



individuals gains importance in terms of the fate of societies. For this reason, from past to present, countries use different education and training methods to identify talented individuals and then reveal their potential (Altun, 2015). There are different education systems that vary from country to country, such as schools for the gifted and talented students where curriculum for the skills of talented individuals are applied, enriched classroom programs in normal education institutions to keep them in touch with their peers, or out-of-school education programs (Ataman, Dağlıoğlu, & Şahin, 2014).

In Türkiye, very important steps have been taken from the past to the present regarding the education of gifted and talented individuals. The education process, which started with the application of homogeneous talent groups in 1959, continued with the establishment of Ankara Science High School (Ankara Fen Lisesi) in 1964, and the sending of talented individuals abroad in the fields of academic and art. In 2002, Beyazıt Ford-Otosan Primary School, the only official school offering special education opportunities for talented students, began to provide education within the scope of the Education of the Gifted and Talented Project carried out by the Hasan Ali Yücel Education Faculty of Istanbul University. The foundation of social sciences, fine arts and sports high schools by the Ministry of National Education is actually a continuation of this process. The General Directorate of Special Education and Guidance Services of the Ministry of National Education (Milli Eğitim Bakanlığı Özel Eğitim ve Rehberlik Hizmetleri Genel Müdürlüğü) continued to work on this issue and eventually founded the BİLSEM. Founded for the first time in 1995, BİLSEMs offer additional out-of-school education opportunities to selected students who continue to receive education in schools (Ataman, 2004; Çitil, 2018; Özer, 2020; Sak, 2020).

BİLSEMs are educational institutions affiliated to the General Directorate of Special Education and Guidance Services, which were opened to ensure that students who are diagnosed as talented in the fields of general mental ability, visual arts, and music are aware of their individual talents and use their capacities at the highest level while they continue their education in primary, middle, and high schools (MEB, 2018). BİLSEMs have been expanded in 81 provinces and there are still 182 BİLSEMs in service in Türkiye (Özer, 2021).

BİLSEMs are educational institutions that were opened to ensure that talented students (visual arts, music, and general mental ability) at the age of pre-school, primary, middle, and high school are aware of their individual talents and use their capacities at the highest level without disrupting their education in formal education institutions. BİLSEMs offer a differentiated education program beyond the education given in normal schools so that talented students can understand their own potential and contribute to themselves and the society (Ataman et al., 2014; Kurnaz & Ekici, 2020).

The diagnosis process for BİLSEMs begins with the registration of students who are considered to be highly different from their peers in general and special abilities, via the e-School Management Information System. The determined students are firstly taken into the group screening application, which is applied with tablet computers throughout the country. Then, the Anadolu-Sak Intelligence Scale (ASIS) and the Wechsler Nonverbal Scale of Ability (WNV) are applied to successful students by taking individual assessments according to their talent areas. Students who score above a certain threshold score as a result of the intelligence test applied in the field of general mental ability are entitled to be placed in BİLSEM. Evaluations of students who are put into practice in the field of visual arts and music talent are made by forming talent/skill commissions in the relevant field (Sak, 2020).

General framework curriculum and workshops regarding 19 branches such as Elementary Mathematics, High School Mathematics, Science, Physics, Chemistry, Biology, Turkish, Turkish Language and Literature, Philosophy, Geography, History, Music, Visual Arts, English, Social Sciences, pre-service Classroom Teacher, Information Technologies, Technology Design, and Guidance are implemented. Students who register to BİLSEMs at the end of the diagnosis process are admitted to training programs such as the Integration Program, Support Education Program, Individual Talent Recognition Program, Special Talent Development Program, and Project Production and Management Program. These programs ensure that students realize their talents and receive training to develop these talents (Çamdeviren, 2014).

Russian psychologist Krutetskii (1976), who works on the diagnosis of gifted and talented students in mathematics, describes talented individuals in mathematics as special individuals who have a different mental structure from their peers, perceive the world with a mathematical perspective, and analyze the nature of mathematics and reconstruct it in different forms. The mathematics education of talented individuals who can think analytically, creatively, fluently, and flexibly in the field of mathematics, have high motivation, can make logical reasoning, have high reasoning and predictive power, develop original solution methods in the face of problems, and have spatial perception and intuitive power skills is important to improve their abilities (Chang, 1984; Goldberg, 2008; Miller 1990; Özyaprak, 2016; Sheffield, 2018; Wagner & Zimmermann, 1986; Young & Worrell, 2018).

Özdemir (2017) stated that the plans and programming of students who have special abilities in the field of mathematics should have a differentiated education and training quality that can meet their individual characteristics and needs. Differentiated instruction, which emerges at this stage, is the organization of educational experiences of individuals with different characteristics according to their learning styles to meet their learning needs (Kaplan, 2009), on the basis of their interests and academic readiness (Tomlinson, 2001). The purpose of differentiated instruction is to ensure that their academic potential is revealed at a high level by designing an appropriate education program with different content, processes, and products specific to individuals (Marsh, 2009; Powers, 2008). Differentiation in the education of gifted and talented individuals is made by studying broadly and in-depth in different subject areas (enrichment), progressing faster and at a higher level (acceleration), bringing together talented individuals with the same performance and ability levels (grouping), and using educational strategies in the light of the guidance with support of a counselor (mentoring) (VanTassel-Baska, 2000).

In this case, the importance of preparing personalized learning settings by the instructors who design the mathematics education process for individuals with different special abilities comes to the fore. For this, many scientific sources should be screened, the structure and content of the studies carried out in this field should be examined, and information should be obtained about the process (Dede, Doğan & Aslan Tutak, 2020). In this context, educators working in the field should explore the existing studies and consider the process holistically and plan the learning environments and activities in a multi-dimensional way in order to maximize the potential of the students (Karaduman & Davaslıgil, 2019). In the 21st century, where producing and owning knowledge makes a difference, determining the current situation by conducting studies in terms of various variables regarding the educating of gifted and talented students with different potentials and contributing to the process by making possible suggestions are important. In this respect, it is important to determine the subjects and scopes



of research in the field by examining the studies in the literature for gifted and talented individuals.

The Purpose and the Importance of the Research

This research was carried out in Türkiye in the field of mathematics education and for individuals diagnosed as talented, and examining postgraduate studies thematically was aimed. In this context, in the research, it is considered important to give a general idea about the studies in the field of mathematics education with gifted and talented students, to provide literature support for the studies to be carried out, to expand the subject area with studies with different content by determining the subjects and scopes that have not been researched in the field, and to reveal different research that will contribute to the literature. Within the scope of the purpose, the theses carried out at the relevant master's and doctorate level were examined in terms of different variables such as year, type, subject, approach, research design, sample, data collection tool, and data analysis techniques.

The Research Problem

The problem statement of the research is “What are the trends observed when the research on mathematics education of gifted and talented students in Türkiye are examined in various dimensions?” The sub-problems of the research to be answered in line with the purpose of the study were determined as follows:

How is the distribution of theses prepared in the field of mathematics education with gifted and talented students according to:

- (1) The types?
- (2) The years in terms of types?
- (3) The subjects?
- (4) The sample types and sample sizes?
- (5) The research approaches?
- (6) The research designs?
- (7) The data collection tools they used?
- (8) The data analysis techniques they used?

Method

Under the method title of the research, information is given about the research design, universe and sample, data collection process, and data analysis.

The Research Design

In this study, in which the qualitative research approach was preferred, thematic content analysis (meta-synthesis) that is one of the content analysis types was used. Thematic content analysis includes organizing the studies into themes or main templates, synthesizing and interpreting the data, and comparing similar or different aspects in the results. The purpose of this method is to provide a quality information to researchers from its source by a general evaluation of the research in the field (Çalık & Sözbilir, 2014).

The Universe and Sample

The universe of the study is the graduate theses that were conducted in the field of mathematics education with the gifted and talented students identified in Türkiye and published in the database of the National Thesis Center of the Council of Higher Education. In the literature, the studies in this field began to be carried out in 2009. Since theses prepared in 2021 continue to be uploaded to the system, theses prepared until 2021 were included in the study. For this reason, the sample group of the research consists of a total of 55 theses (34 master's and 21 doctoral) from 2009 to 2020, which can be accessed from the National Thesis Center of the Council of Higher Education.

Data Collection Process and Data Analysis

In order to determine the theses to be examined in the research, the database of National Thesis Center of the Council of Higher Education [CHE] was screened. While screening, the keywords “BİLSEM”, “Üstün zekâlı (gifted)”, “Üstün yetenekliler (highly talented)”, “Özel yetenekliler (talented)” and “Matematik öğretimi (mathematics education)” were searched in Turkish. The CHE database was first screened on 17.06.2021 and finally on 23.06.2021 and a total of 55 theses were reached and the studies to be included in the research were determined.

In the studies reached in line with the purpose of the research, thematic analysis was carried out over the themes such as year, type, subject, approach, research design, sample, data collection tool, and data analysis techniques. Grouped data are expressed in terms of frequency and percentage and presented in tables.

Findings

In this part of the research, the distribution of the theses prepared on mathematics education with gifted and talented students according to type and year, subject, sample type and sample size, research approach, research design, data collection tools, and data analysis techniques are presented in tables.

Distribution of Theses by Types

Table 1 shows the distribution of the theses prepared on mathematics education with gifted and talented students according to their types.

Table 1. Distribution of theses prepared on mathematics education with gifted and talented students according to their types

Type of The Theses	f	%
Master's	34	62
Doctoral	21	38
Total	55	100

In Table 1, 34 of the 55 theses (62%) conducted in the field are in the type of master's thesis and 21 of them (38%) are in the type of doctoral thesis.

Distribution of Theses by Years in Terms of Types

The distribution of the theses prepared on mathematics education with gifted and talented students according to their years in terms of types is given in Table 2.



Table 2. Distribution of theses prepared on mathematics education with gifted and talented students according to their years in terms of types

Year of Theses	Master's		Doctoral		Total	
	f	%	f	%	f	%
2020	4	11.76	0	0	4	7.27
2019	7	20.58	2	9.52	9	16.36
2018	4	11.76	2	9.52	6	10.90
2017	3	8.82	2	9.52	5	9.09
2016	1	2.94	2	9.52	3	5.45
2015	3	8.82	0	0	3	5.45
2014	3	8.82	6	28.57	9	16.36
2013	3	8.82	1	4.76	4	7.27
2012	2	5.88	5	23.81	7	12.72
2011	2	5.88	0	0	2	3.63
2010	1	2.94	1	4.76	2	3.63
2009	1	2.94	0	0	1	1.18
Total	34	100	21	100	55	100

In Table 2, the theses were prepared more than other years with a value of 16.36% in 2014 and 2019 and prepared less than other years with a value of 1.18% in 2009. Regarding the doctoral studies conducted in the subject area, more theses were published in 2014 with a value of 28.57% than in other years. No doctoral studies were found in 2009, 2011, 2015, and 2020. Regarding the master's studies conducted in the subject area, more theses were published in 2019 with a value of 20.58% than in other years. In 2009, 2010 and 2016, the master's studies conducted in the subject area were less than the other years with a value of 2.94%.

Distribution of Theses by Subjects

The distribution of the theses prepared on mathematics education with gifted and talented students according to their subjects is given in Table 3.

Table 3. Distribution of the theses prepared on mathematics education with gifted and talented students according to their subjects

Subject of Theses	f	%	Author(s)
Examining high-level thinking skills (metacognitive awareness, proportional reasoning, mathematical abstraction, Mathematical proof, mathematical ability, critical thinking, creative thinking, productivity)	13	23.64	Şimşekler (2017); Yavuz Açıl (2018); Taşkın (2016); Akgül (2014); Alkan (2014); Ayvaz (2014); Nemitlu İnanır (2019); Karaaslan (2019); Yurtkulu (2018); Kirişçi (2013); Kaygın (2012); Dinamit (2020); Altıntaş (2009)
Problem solving processes and skills	12	21.82	Dervişoğulları (2019); Öztelli Ünal (2019); Karabulut (2018); Boran (2016); Koçyiğit (2015); Durmaz (2014); Aydoğdu (2014); Yazgan Sağ (2012); Sezerel (2012); Sıdar (2011); Karabey (2010); Akkaş (2014)
Problem posing processes	3	5.45	Yılmaz (2019); Ayvaz (2019); Arıkan (2014)
Differentiated mathematics teaching	5	9.09	Özçelik (2017); Özdemir (2016); Altıntaş (2014); Karataş (2013); Özyaprak (2012)

Differentiated geometry teaching	2	3.64	Kök (2012); Karaduman (2012)
Gifted students and teachers' views on mathematics curriculum, mathematics activities, and mathematics teachers	5	9.09	Türk (2019); Saka Kılıç (2020); Aygün (2010); Susam (2012); Güler (2013)
Comparison of talented and non-talented individuals (self-regulated learning, motivational belief, mathematical anxiety, Number Sense)	4	7.27	Gürel (2011); Aksoy (2014); Dayan (2017); Tunalı (2018)
Attitudes towards mathematics and self-efficacy perceptions	2	3.64	Kocaoğlu (2020); Hızlı (2013)
Mathematics-based STEM activities	2	3.64	Külegen (2020); Akay (2018)
Spatial thinking skills of gifted students	2	3.64	Harput (2019); Sağır Gürlevik (2017)
Computer supported mathematics teaching and computational thinking skills	2	3.64	Taş (2018); Aydos (2015)
Use of concrete materials in mathematics teaching	1	1.82	Arıkan (2019)
Mathematical modeling	1	1.82	Şengil Akar (2017)
Metaphorical perceptions of the concept of mathematics	1	1.82	Satmaz (2015)
Total	55	100	

In Table 3, the subjects of the theses conducted in the field are mostly related to examining high-level thinking skills of talented individuals with 13 studies and problem solving processes and skills with 12 studies. The gifted and talented individuals have different characteristics from their peers in terms of high-level thinking skills, and the realization of studies from different perspectives on this subject constitutes an important source of information for the literature. Considering other topics, the number of studies such as differentiated mathematics teaching, STEM and modeling is low.

Distribution of Theses by Sample Types and Sample Sizes

The distribution of the theses prepared on mathematics education with gifted and talented students according to their sample types is presented in Table 4.

Table 4. Distribution of the theses prepared on mathematics education with gifted and talented students according to their sample types

Sample Type of Theses	f	%
Primary school	24	31,16
Middle school	38	49,35
High school	11	14,28
Student, Teacher, Expert	4	5,19
Total	77	100

In Table 4, 24 of the theses carried out in the field used primary school students (31.16%), 38 of them used middle school students (49.35%), 11 of them used high school students (14.28%), and 4 of them mixed students, teachers, and experts (5.19%) as the sample groups. The reason why the total number of sample type differs from the total number of theses is due to the fact that two different sample groups were used in some studies. The theses were mostly conducted with middle school students, followed by the theses with primary school students and high school students. It is noteworthy that few studies were conducted with high school students and mixed sample groups of students, teachers, and experts.

The distribution of the theses prepared on mathematics education with gifted and talented students according to their sample sizes is presented in Table 5.

Table 5. Distribution of the theses prepared on mathematics education with gifted and talented students according to their sample sizes

Sample Size of Theses	f	%
0-25	21	38,18
26-50	6	10,9
51-100	3	5,45
101-150	6	10,9
151-200	4	7,27
201-250	3	5,45
251-300	3	5,45
301 and above	9	16,36
Total	55	100

According to Table 5, the sample size of most of the theses was 0-25 people. In addition, some theses were carried out with groups with a sample size of 301 and above.

Distribution of Theses by Approaches

The distribution of the theses prepared on mathematics education with gifted and talented students according to their approaches is presented in Table 6.

Table 6. Distribution of the theses prepared on mathematics education with gifted and talented students according to their approaches

Approaches of Theses	f	%
Qualitative Approach	15	27.27
Quantitative Approach	29	52.73
Mixed Method Approach	11	20
Total	55	100

In Table 6, 15 of the 55 theses carried out since 2009 were conducted with a qualitative approach (27.27%), 29 with a quantitative approach (52.72%), and 11 with a mixed method approach (20%). In this context, studies conducted with the quantitative research approach have a higher rate than the qualitative approach and the mixed method approach.

The distribution of the theses prepared on mathematics education with gifted and talented students according to their approaches in terms of years is presented in Table 7.

Table 7. Distribution of the theses prepared on mathematics education with gifted and talented students according to their approaches in terms of years

Year of theses	Qualitative Approach		Quantitative Approach		Mixed Method Approach		Total
	f	%	f	%	f	%	
2020	3	20	0	0	1	9.09	4
2019	5	33.33	2	6.89	2	18.18	9
2018	1	6.66	2	6.89	3	27.27	6
2017	1	6.66	3	10.34	1	9.09	5
2016	2	13.33	1	3.44	0	0	3
2015	2	13.33	1	3.44	0	0	3
2014	0	0	7	24.13	3	27.27	10
2013	0	0	3	10.34	0	0	3
2012	0	0	6	20.68	1	9.09	7
2011	0	0	2	6.89	0	0	2
2010	1	6.66	1	3.44	0	0	2
2009	0	0	1	3.44	0	0	1
Total	15	100	29	100	11	100	55

In Table 7, the number of theses carried out with a qualitative research approach in 2019 were more than other years with a value of 33.33% and qualitative studies were not conducted in 2009, 2011, 2012, 2013, and 2014. The number of theses carried out with a quantitative research approach in 2014 were more than other years with a value of 24.13% and it is less than other years with a value of 3.44% in 2009, 2010, 2015, and 2016, and there is no quantitative study in 2020. The number of theses carried out with a mixed method research approach in 2014 and 2018 were more than other years with a value of 27.27% and there is no mixed method study in 2009, 2010, 2011, 2013, 2015, and 2016.

Distribution of Theses by Research Design

The distribution of the theses prepared on mathematics education with gifted and talented students according to their research designs is presented in Table 8.

Table 8. Distribution of the theses prepared on mathematics education with gifted and talented students according to their research designs

Research Designs of Theses			f	%
Qualitative Research Design	Case study		12	21.81
	Action research		1	1.82
	Phenomenology		2	3.63
	Sub Total		15	27.27
Quantitative Research Design	Experimental research		9	16.36
	Relational screening		13	23.63
	Cross-sectional study		2	3.63
	Design based research		1	1.18
	Screening model		4	7.27
	Sub Total		29	52.72
Mixed Method Research Design	Convergent parallel design		2	3.63
	Explanatory sequential design		7	12.72
	Exploratory sequential design		2	3.63
	Sub total		11	20
Total			55	100

According to Table 8, out of 55 theses conducted in the field, 13 (23.63%) used relational screening, 12 (21.81%) used case study, and 9 (16.36%) experimental research designs. Relational screening and experimental research among the quantitative research designs were mainly used in the theses, while case study among qualitative research designs and explanatory sequential design among mixed method research designs were used in the theses. This shows that the theses are progressing in a certain trend, and most theses follow the same path in terms of method and design.

Distribution of Theses by Data Collection Tools

The distribution of the theses prepared on mathematics education with gifted and talented students according to their data collection tools is presented in Table 9.

Table 9. Distribution of the theses prepared on mathematics education with gifted and talented students according to their data collection tools

Data Collection Tools	f	%
Personal information forms	17	8.76
Student logs	6	3.09
Interview/Interview forms	21	10.82
Focus group interviews	3	1.55
Observation/Observation forms/Observation charts	11	5.67
Self-evaluation forms	4	2.06
Video/ Audio Records	9	4.64
Rubrics	8	4.12
Mathematics attitude scales	10	5.15
Anxiety scales	2	1.03
Problem solving scales	10	5.15
Critical thinking scales	6	3.09
Self-efficacy scales	4	2.06
Metacognitive awareness scales	5	2.58
Mathematical creativity scales	7	3.61
Academic Self-Concept Scale	3	1.55
Other scales	5	2.58
Achievement tests	11	5.67
Problem posing/solving tests	8	4.12
Creative thinking tests	10	5.15
Raven standard progressive matrices test	2	1.03
Geometry tests	8	4.12
Mathematics aptitude tests	4	2.06
Intelligence tests	8	4.12
Other Tests	3	1.55
Metaphor questionnaire form	2	1.03
Worksheets-Teaching Materials	7	3.61
Total	194	100

In Table 9, many different data collection tools were used in the theses conducted in the field. Since more than one data collection tool was used in some studies, frequency and percentage results should be interpreted accordingly. When the data collection tools used were examined, data were collected mostly with the interview forms (10.82%). In addition, personal information forms (8.76%), achievement tests (5.67%), observation forms (5.67%), mathematics attitude scales (5.15%), critical thinking scales (5.15%), problem solving scales (5.15%), and creative thinking tests (5.15%) were the other frequently used data collection tools.

Distribution of Theses by Data Analysis Techniques

The distribution of the theses prepared on mathematics education with gifted and talented students according to their data analysis techniques is presented in Table 10.

Table 10. Distribution of the theses prepared on mathematics education with gifted and talented students according to their data analysis techniques

Data Analysis Techniques	f	%
t-test	19	17.43
Content analysis	16	14.68
Mann-Whitney U test	15	13.76
ANOVA	13	11.93
Wilcoxon signed-rank test	12	11.01
Descriptive analysis	10	9.17
Kruskal Wallis test	5	4.59
Pearson product of moments	5	4.59
Chi-square test	3	2.75
Multivariate linear regression analysis	2	1.83
Structural equation modeling (SEM) Path analysis	2	1.83
Constant comparative analysis	2	1.83
Inductive content analysis	1	0.92
Internal case and cross case analysis	1	0.92
Spearman-Brown rank-order correlation	1	0.92
AMOS	1	0.92
MANOVA	1	0.92
Total	109	100

In Table 10, different analysis techniques were used in the analysis of the data because different data collection tools were used in the theses conducted in the field. Since some studies used more than one data analysis techniques, frequency and percentage results should be interpreted accordingly. Considering the data analysis techniques used, the qualitative data analysis techniques mainly included content analysis (14.68%) and descriptive analysis (9.17%), while t-test (17.43%), Mann-Whitney U test (13.76%), ANOVA (11.93%) and Wilcoxon signed-rank test (11.01%) among the quantitative data analysis techniques were used.

Discussion and Conclusion

In this study, which was carried out to examine the theses conducted on mathematics education in terms of various variables with the gifted and talented students diagnosed in Türkiye and to guide the researchers who plan to conduct research in this field, a total of 55 theses were reached. In this part of the research, discussion and conclusion are given based on the findings obtained regarding the theses examined.

Within the scope of this research, when the theses published in the National Thesis Center of the Council of Higher Education in the field of mathematics education with gifted and talented students were examined, researchers determined that a thesis study was carried out in 2009 for the first time. As a conclusion, the number of theses prepared in the following years increased and the most studies were prepared in 2014 and the least in 2009. The increase in the number of studies conducted in recent years supports the need of research in this field.

The theses examined in the research mainly consist of master's theses. Considering that master's theses are carried out to specialize in the relevant field, and doctoral theses are carried out to contribute to qualified knowledge and the literature in the field, the studies conducted in our country were not concentrated enough to make a difference in the mathematics education literature for gifted and talented students. Güçin and Oruç (2015), who examined the academic research in the field of gifted and talented students, pointed out the importance of qualified studies that will contribute to the field by stating that doctoral theses

are few in number in their study.

When the theses conducted on mathematics education for gifted students are evaluated in terms of subject variable, researchers found that they were grouped under 14 different subjects. As a result of the examinations, the content of the studied subjects focuses on high-level thinking skills and problem-solving skills. In field studies, to develop the skills of talented individuals and to make them gain new competencies, the realization of studies on subjects such as computational thinking, proportional reasoning, abstraction, creativity, technology integration in education, STEM activities with a focus on mathematics applications, development of sample activities, and instructional designs will be beneficial for both in-service teachers and talented students who are the focus of the process. In the research conducted by Nacar (2017) in the field of mathematics education of the gifted, researcher emphasized that the studies in mathematics education are concentrated on some certain subjects and the importance of diversifying studies in different subjects in order to contribute to the field.

When the distribution of the theses conducted on mathematics education with gifted and talented students according to the approaches is examined, researchers revealed that the quantitative approach has a higher rate than the qualitative approach and the mixed method approach. Considering the number of study groups in BİLSEMs, giving more space to qualitative studies in order to have in-depth information on the researched subject will contribute to the field (Çiltaş, Güler, & Sözbilir, 2012).

When the studies carried out in the related field are examined according to the research design, in most of the quantitative studies, relational screening and experimental research design was used; while the case study design was mainly used in qualitative studies and the explanatory sequential design was used in mixed method studies. This shows that the studies are progressing in a certain trend, and most studies follow the same path in terms of method and design. Considering that the main purpose of graduate studies is to use original subjects, methods and designs, it can be said that the studies conducted in the field of mathematics education talented students do not vary in method and design dimensions. In order to make a difference in the education of talented students, especially by including experimental studies and innovative techniques and methods based on different education models, studies can be carried out, the results can be compared with each other, and suggestions for implementation can be presented. In this context, Demiroğlu, Şahin, and Dilek (2013) drew attention to the importance of including experimental studies on the education of gifted and talented students in their research.

When the thesis studies conducted were examined in terms of sample type, researchers determined that they were generally carried out with middle school and primary school students, and very few studies were carried out with high school students. When the distribution of theses according to the sample sizes applied, most of the studies were carried out with sample groups between 0-25 people. Considering that quantitative design studies are predominant in the research methods as identified previously, the numerical multiplicity of the studies conducted with a small number of samples draws attention. In the research on gifted education in Türkiye conducted by Ateş and Mazı (2017), attention was drawn to the diversity of the sample type and the importance of working with equal sample types at high school, middle school, and primary education levels was emphasized in order to develop a holistic viewpoint of the field instead of focusing on a single group.

When the distribution of the theses covered in the research according to the data collection tools was examined, researchers concluded that the most qualitative data were collected through interview/interview forms and observations. In the qualitative data collection tools used, the problem-solving scales and achievement tests were among the data collection tools used. The other data tools were mostly foreign-sourced measurement tools adapted to Turkish. Since the concept of being talented is affected by the social structure and the definition of being gifted varies in terms of structure and content according to different countries and nations, it is important for the reliability of the research that the measurement tools applied to these individuals have a national structure. In the study of Ayvacı and Bebek (2019) examining the theses conducted on the subject of special talents in Türkiye, researchers determined that the majority of the scales applied were translated from foreign sources and adapted to Turkish, and it was noted that measurement tool development studies for the field should be carried out. Also in this study, since different data collection tools were used in the theses conducted in the field, researchers concluded that different analysis techniques were used in the analysis of the data.

Suggestions

In line with the results of the study, some suggestions were presented to the researchers who are considering doing studies on mathematics education for gifted and talented individuals.

In this research, graduate theses in the database of the National Thesis Center of the Council of Higher Education [CHE] were determined as the sample group. In order to expand the content and scope of the study, articles in the field of mathematics education for talented students and in the relevant national databases can be accessed and included in the study. In addition, the data obtained in different countries can be compared with each other by accessing international graduate theses and related articles in the field. Thus, by evaluating the application examples and results in different countries, the data obtained in the mathematics education activities and programs for gifted and talented students can be used functionally.

It is inevitable that studies in different types, subjects, content, and methods for the education of gifted and talented students will support the relevant field and create a rich literature. Academic field studies that support the increase in the number of graduate theses in which the related components of the curriculum designs and practices such as education strategies and instructional designs for the talented students are handled together should be given more attention.

In the distribution of the theses conducted according to the subjects, 55 studies were carried out under 14 different headings. While most studies were concentrated on certain subjects, a small number of studies were carried out in other subjects. Studies to be carried out as multidimensional, with different perspectives, and on different subjects for talented individuals, each of whom has different special talents, will enrich the relevant field. Particularly, giving more space to scientific research in the subjects such as modeling and STEM studies, where mathematics education is organized by the interaction of different disciplines and alternative solutions are sought to real life problems, will reveal talented students' potential strengths, and contribute their skill development.

It is important to develop an educational model in the field of mathematics education for talented individuals by considering the process holistically and to determine what kind of



changes this model will cause in individuals. For this reason, it is recommended to focus on different experimental studies that include instructional designs in which there are relationships between high-level thinking skills of gifted and talented individuals such as creativity, analytical thinking, analysis-synthesis and which are supported by various activities and practices.

References

- Altun, F. (2015). *Üstün yetenekli öğrencilerin psikolojik danışma ve rehberlik ihtiyaçları, psikolojik danışma yaşantıları ve rehber öğretmenlerin üstün yeteneklilerle ilgili yeterlik düzeyleri [Psychological counseling and guidance needs of gifted students, counseling experiences, and counseling teachers' competence levels on giftedness]*. (Unpublished doctoral dissertation). Karadeniz Technical University, Trabzon.
- Ataman, A. (2004). *Üstün zekâlı ve üstün yetenekli çocuklar [Gifted and talented children]. Book of Selected Articles for Gifted Children*, İstanbul: Çocuk Vakfı Pub.
- Ataman, A., Dağlıoğlu, E., & Şahin, F. (2014). *Üstün Zekâlılar ve Üstün Yetenekliler Konusunda Bilinmesi Gerekenler [Things to Know About the Gifted and Talented]*. Ankara: Vize Pub.
- Ayvacı, H. Ş., & Bebek, G. (2019). Türkiye’de üstün zekâlılar ve özel yetenekliler konusunda yürütülmüş tezlerin tematik incelenmesine yönelik bir çalışma [A study on the thematic analysis of theses conducted on the gifted and talented in Türkiye]. *Pamukkale University Faculty of Education Journal*, 45(45), 267-292.
- Chang, L. L. (1984). Who are the Mathematically Gifted? *Exceptional Child*. 31(3), 231-235
- Callahan, C. M. (2005). Identifying gifted students from underrepresented populations. *Theory Into Practice*, 44(2), 98-104.
- Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal Of Educational Psychology*, 54(1), 1.
- Çalık, M., ve Sözbilir, M. (2014). İçerik analizinin parametreleri [Parameters of content analysis]. *Education and Science*, 39(174), 33-38. <http://dx.doi.org/10.15390/EB.2014.3412>.
- Çamdeviren, Ş. (2014). *Bilim ve sanat merkezine (BİLSEM) devam eden üstün yetenekli çocukların anne babalarının karşılaştıkları güçlükler (Sakarya ili örneği) [The difficulties faced by the parents of gifted children attending the science and art center (BİLSEM) (Sakarya province example)]*. (Master’s thesis). Sakarya University, Institute of Education Sciences, Sakarya.
- Çiltaş, A., Güler, G., & Sözbilir, M. (2012). Türkiye’de matematik eğitimi araştırmaları: Bir içerik analizi çalışması [Mathematics education research in Türkiye: A content analysis study]. *Educational Sciences in Theory and Practice*, 12(1), 565-580.
- Çitil, M. (2018). Türkiye’de üstün yeteneklilerin eğitimi politikalarının değerlendirilmesi [Evaluation of gifted education policies in Türkiye]. *Journal of National Education*, 47(Özel Sayı 1), 143-172.
- Demiroğlu, K., Şahin, F., & Dilek, F. (2013). Üstün yetenekli bireyler konusunda Türkiye’de 2000-2013 yılları arasında yapılan araştırmalar [Researches on gifted and talented individuals in Türkiye between 2000-2013]. *V. International Türkiye Educational Research Congress*, 6-9.
- Dede, Y., Doğan, M. F., & Aslan Tutak, F. (2020). Matematik eğitiminde etkinlikler ve uygulamaları. [Activities and applications in mathematics education]. *Ankara: Pegem Akademi Yayınları*.

- Güçin, G., & Oruç, Ş. (2015). Evaluation of academic studies on gifted and talented children in Türkiye in terms of various variables. *Adiyaman University Journal of Educational Science*, 5(2), 113-135.
- Gardner, R. N. (1980). *Sterling-dollar diplomacy in current perspective*. Columbia University
- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. Basicbooks, New York, Usa: 164-178 (1993).
- Goldberg, S. R. (2008). *An exploration of intellectually gifted students' conceptual views of mathematics*. (Unpublished doctorate dissertation). Columbia University, USA
- Kadioglu Ateş, H., & Mazi, M. G. (2017). Türkiye'de üstün yetenekliler eğitimi ile ilgili yapılan lisansüstü tezler genel bir bakış [An overview of postgraduate theses on gifted education in türkiye]. *Journal of Gifted Education and Creativity*, 4(3), 33-57.
- Kaplan, S. N. (2009). Layering differentiated curricula for the gifted and talented. *Methods and materials for teaching the gifted*, 107-136.
- Karaduman, G. B., & Davaslıgil, Ü. (2019). Farklılaştırılmış geometri öğretiminin üstün yetenekli öğrencilerdeki yaratıcılık, uzamsal yetenek ve erişime etkisi [The effects of differentiated geometry teaching for gifted students on creative thinking, spatial ability level and achievement]. *Necatibey Faculty of Education Journal of Electronic Science and Mathematics Education*, 13(2), 1305-1337.
- Krutetskii, V. A. (1976). *The psychology of mathematical abilities in schoolchildren*. Chicago: University of Chicago Press.
- Kurnaz, A., & Ekici, S. G. (2020). BİLSEM tanılama sürecinde kullanılan zeka testlerinin psikolojik danışmanların ve BİLSEM öğretmenlerinin görüşlerine göre değerlendirilmesi [Evaluation of intelligence tests used in the BİLSEM diagnostic process according to the opinions of psychological counselors and BİLSEM teachers]. *Child and Civilization*, 5(10), 365-399.
- MEB, (2018), Özel eğitim hakkında kanun hükmünde kararname ve özel eğitim hizmetleri yönetmeliği [Decree on special education and special education services regulation]. Ankara: Milli Eğitim Basımevi.
- MEB, (2019), T.R. Ministry of National Education Board of Education and Discipline *Science and Art Centers Directive*, Ankara. on 8 June 2021 <http://tebligeler.meb.gov.tr/index.php/tuemsayilar/viewcategory/87-2019> accessed from.
- Marsh, C. J. (2009, November). How school-based curriculum development (SBCD) can facilitate curriculum differentiation (CD). In *International Conference on Primary Education* (pp. 25-27).
- Miller, R. C. (1990). *Discovering mathematical talent*. Reston, VA: *Eric Clearinghouse on Handicapped and Gifted Children*.
- Nacar, S. (2017). 2005-2014 yılları arasında üstün yeteneklilerin matematik eğitimi üzerine yapılan çalışmalar [Studies on the mathematics education of the gifted between 2005-2014]. *İnönü University Journal of Educational Sciences Institute*, 4(8), 48-65.
- Özer, M. (2020). Türkiye'de mesleki eğitimde paradigma değişimi [Paradigm change in vocational education in Türkiye]. *Gazi University Journal of Gazi Educational Faculty (GUJGEF)*, 40(2).
- Özer, M. (2021). Türkiye'de özel yeteneklilere yetenek geliştirme desteğinde bilim ve sanat merkezleri: mevcut durum ve iyileştirme alanları [Science and art centers for talent development support in Türkiye: Current Situation and Areas for Improvement]. *OPUS International Journal of Society Studies*, 17(33), 727-749.
- Özdemir, G. (2017). *Üstün yetenekli öğrencilere yönelik zenginleştirilmiş öğretim programının bilimsel süreç becerilerine ve başarıya katkısına ilişkin eylem araştırması* [Action research on the contribution of the enriched curriculum for gifted

- students to scientific process skills and success]. (Unpublished Master Thesis), Hacettepe University, Ankara.
- Özyaprak, M. (2016). Üstün zekâlı ve yetenekli öğrenciler için matematik müfredatının farklılaştırılması [Differentiating the mathematics curriculum for gifted and talented students]. *Hasan Ali Yücel Journal of the Faculty of Education*, 13(2), 115.
- Powers, E. A. (2008). The use of independent study as a viable differentiation technique for gifted learners in the regular classroom. *Gifted Child Today*, 31(3), 57-65.
- Reis, S. M., & Callahan, C. M. (1989). Gifted females: They've come a long way or have they? *Journal for the Education of the Gifted*, 12(2), 99-117.
- Renzulli, J. S. (1985). Are teachers of the gifted specialists? A landmark decision on employment practices in special education for the gifted. *Gifted Child Quarterly*, 29(1), 24-28.
- Sak, U. (2020). Giftedness and the Turkish culture. In *Conceptions of Giftedness* (pp. 279-305). Routledge.
- Sak, U. (2008). Test of the three-mathematical minds (M3) for the identification of mathematically gifted students. *Roeper Review*, 31(1), 53-67.
- Sak, U. (2012). *Üstün zekâlılar: tanılanması, özellikleri, eğitimi [Gifted: diagnosis, characteristics, education]*. Ankara: Maya .
- Sheffield, L. J. (2018). Commentary paper: A reflection on mathematical creativity and giftedness. In F. M. Singer (Ed), *Mathematical creativity and mathematical giftedness* (pp. 405-428). Cham, Switzerland.
- Sternberg, R. J. (Ed.). (2000). *Handbook of intelligence*. Cambridge University Press.
- Sternberg, R. J., & Grigorenko, E. L. (2000). Practical intelligence and its development.
- Terman, L.M. (1916). The uses of intelligence tests. In *The Measurement of Intelligence* (pp. 3–21). Boston: Houghton, Mifflin and Company.
- Thurstone, L. L. (1931). Multiple factor analysis. *Psychological review*, 38(5), 406.
- Treffinger, D. J., & Renzulli, J. S. (1986). Giftedness as potential for creative productivity: Transcending IQ scores. *Roeper Review*, 8(3), 150-154.
- Tomlinson, C. A. (2001). *How Differentiate Instruction in Mixed-Ability Classrooms*. United States of America: Association for Supervision and Curriculum Development.
- VanTassel-Baska, J. (2000). Theory and research on curriculum development for the gifted. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Ed.). *International handbook of Giftedness and Talent* (pp. 345-365). Oxford, England: Pergamon.
- VanTassel-Baska, J. (2007). Leadership for the future in gifted education: Presidential address, NAGC 2006. *Gifted Child Quarterly*, 51(1), 5-10.
- Wagner, H. & Zimmermann, B. (1986). Identification and fostering of mathematically gifted students. In A. Copley, K. Urban, H. Wagner & W. Wiczerkowski (Eds), *Giftedness: A continuing world-wide challenge* (pp.273-287). New York: Trillium Pres.
- Young, A. E. & Worrell, F. C. (2018). Comparing metacognition assessments of mathematics in academically talented students. *The Gifted Child Quarterly*, 63(2), 259-275.

List of Theses Included in the Research

- Akay, M. (2018). *Üstün yetenekli öğrencilerin eğitiminde kullanılabilecek matematik temelli STEM etkinliklerinin geliştirilmesi [Developing mathematics-based STEM activities that can be used in the education of gifted students]*. (Unpublished master's thesis). Atatürk University, Erzurum.

- Akgül, S. (2014). *Üstün yetenekli öğrencilerin matematik yaratıcılıklarını açıklamaya yönelik bir model geliştirilmesi [Developing a model to explain the mathematical creativity of gifted students]*. (Unpublished Doctoral thesis). İstanbul University, İstanbul.
- Akkaş, E. (2014). *Farklılaştırılmış problem çözme öğretiminin üstün zekâlı ve yetenekli öğrencilerin matematik problemlerini çözmelerine, tutumlarına ve yaratıcı düşüncelerine etkileri [The effects of differentiated problem solving instruction on gifted and talented students' mathematical problem solving, attitudes and creative thinking]*. (Unpublished Doctoral thesis). Bolu Abant İzzet Baysal University, Bolu.
- Aksoy, E. (2014). *Matematik alanında üstün zekâlı ve yetenekli öğrencilerin bazı değişkenler açısından veri madenciliği ile belirlenmesi [Determination of gifted and talented students in mathematics in terms of some variables by data mining]*. (Unpublished master's thesis). Dokuz Eylül University, İzmir.
- Alkan, R. (2014). *Genel yaratıcılık, matematiksel yaratıcılık ve akademik başarı arasındaki ilişkilerin incelenmesi [Examining the relationships between general creativity, mathematical creativity and academic achievement]*. (Unpublished Doctoral thesis). Gazi University, Ankara.
- Altıntaş, E. (2009) *Purdue modeline dayalı matematik etkinliği ile öğretimin üstün yetenekli öğrencilerin başarılarına ve eleştirel düşünme düzeylerine etkisi [The effect of teaching with mathematics activity based on the purdue model on the achievement and critical thinking levels of gifted students]*. (Unpublished master's thesis). Marmara University, İstanbul.
- Altıntaş, E. (2014). *Üstün zekâlı öğrenciler için yeni bir farklılaştırma yaklaşımının geliştirilmesi ve matematik öğretiminde uygulanması [Developing a new differentiation approach for gifted students and applying it in mathematics teaching]*. (Unpublished Doctoral thesis). Marmara University, İstanbul.
- Arıkan, E. E. (2014). *Ortaokul öğrencilerinin matematik problemi çözme-kurma becerilerinin ve problem kurma ile ilgili metaforik düşüncelerinin incelenmesi [Examination of middle school students' mathematical problem solving skills and their metaphorical thoughts about problem posing]*. (Doctoral thesis). Yıldız Technical University, İstanbul.
- Arıkan, F. (2019). *Matematikte yetenekli öğrencilerin aparatlı matematik problemlerine yaklaşımları [Approaches of gifted students in mathematics to mathematical problems with apparatus]*. (Unpublished master's thesis). Dokuz Eylül University, İzmir.
- Aydoğdu, M. Z. (2014). *9. sınıf üstün zekâlı öğrencilerin geometri problem çözme stratejileri ve Van Hiele geometri düşünme düzeyleri ile ilişkilendirilmesi [Associating 9th grade gifted students with geometry problem solving strategies and Van Hiele geometry thinking levels]*. (Master's thesis). Dokuz Eylül University, İzmir.
- Aydos, M. (2015). *Matematiği GeoGebra ile öğretmenin limit ve süreklilik konularının kavramsal anlaşılmasına olan etkisi: Üstün zekâlı ve yetenekli Türk öğrencileri örneği [The effect of mathematics education with GeoGebra on the conceptual understanding of limit and continuity issues: An example of gifted and talented Turkish students]*. (Unpublished master's thesis). Bilkent University, Ankara.
- Aygün, B. (2010). *Üstün yetenekli ilköğretim ikinci kademe öğrencileri için matematik programına yönelik ihtiyaç Analizi [Needs analysis for the mathematics program for gifted primary school second level students]*. (Master's thesis). Hacettepe University, Ankara.
- Ayvaz, Ü. (2014). *6. Sınıf öğrencilerinin matematik yeteneğindeki cinsiyet farklılıkları: ÜYEP örneği [Gender differences in mathematical abilities of 6th grade students: An example of UYEP]*. (Unpublished master's thesis). Anadolu University, Eskişehir.

- Ayvaz, Ü. (2019). *Problem kurma temelli etkinliklerle özel yetenekli öğrencilerin matematiksel yaratıcılıklarının geliştirilmesi üzerine bir eylem araştırması [An action research on the development of mathematical creativity of gifted students through problem posing activities]*. (Unpublished Doctoral thesis). Bolu Abant İzzet Baysal University, Bolu.
- Boran, M. (2016). *Üstün zekâlı ve yetenekli öğrencilerin algılanan problem çözme becerilerinin üstbilişsel farkındalıkları ve eleştirel düşünme eğilimleri açısından incelenmesi [Investigation of gifted and talented students' perceived problem solving skills in terms of metacognitive awareness and critical thinking dispositions]*. (Master's thesis). Mersin University, Mersin.
- Dayan, Ş. (2017). *Üstün yetenekli ve normal öğrencilerin matematiksel örüntü başarılarının incelenmesi [Examining the mathematical pattern achievement of gifted and normal students]*. (Unpublished master's thesis). Abant İzzet Baysal University, Bolu.
- Dervişoğulları, M. (2019). *Özel yetenekli öğrencilerin problem çözme ve yaşam boyu öğrenme becerileri arasındaki ilişki [The relationship between gifted students' problem solving and lifelong learning skills]*. (Master's thesis). Sakarya University, Sakarya.
- Dinamit, D. (2020). *Üstün yetenekli öğrencilerin matematiksel ispat yapma süreçlerinin incelenmesi [Examining the mathematical proof process of gifted students]*. (Unpublished master's thesis). Adnan Menderes University, Aydın.
- Durmaz, B. (2014). *Üstün yetenekli ilköğretim öğrencilerinin problem çözme stratejilerini öğrenme düzeyleri [The level of learning problem solving strategies of gifted primary school students]*. (Unpublished Doctoral thesis). Uludağ University, Bursa.
- Gürel, R. (2011). *İlköğretim ikinci kademedeki okuyan üstün yetenekli olan ve olmayan öğrencilerin matematik kaygı düzeyleri ve bunların kaynakları [Mathematics anxiety levels of gifted and non-gifted students in secondary education and their sources]*. (Unpublished master's thesis). Hacettepe University, Ankara.
- Güler, İ. (2013). *Bilim ve sanat merkezlerinde görev yapan matematik öğretmenlerine yönelik etkinlik oluşturulması ve değerlendirilmesi [Creating and evaluating activities for mathematics teachers working in science and art centers]*. (Master's thesis). Fırat University, Elazığ.
- Harput, D. (2019). *Üstün zekâlı ve normal zekâlı ortaokul öğrencilerinin uzamsal düşünme yeteneklerinin karşılaştırmalı olarak incelenmesi [Comparative analysis of the spatial thinking abilities of gifted and normal-minded middle school students]*. (Master's thesis). Erciyes University, Kayseri.
- Hızlı, E. (2013). *Üstün zekalı ve yetenekli çocukların matematik tutumlarının çeşitli değişkenler açısından incelenmesi [Examining the mathematics attitudes of gifted and talented children in terms of various variables]*. (Unpublished master's thesis). İstanbul University, İstanbul.
- Karabulut, R. (2018). *İlkokula devam eden üstün yetenekli çocukların problem çözme becerilerine eğitiminin etkisinin incelenmesi [Investigation of the effect of education on problem solving skills of gifted children attending primary school]*. (Unpublished Doctoral thesis). Gazi University, Ankara.
- Karaduman, G. (2012). *İlköğretim 5. sınıf üstün yetenekli öğrenciler için farklılaştırılmış geometri öğretiminin yaratıcı düşünme, uzamsal yetenek düzeyi ve erişime etkisi [The effect of differentiated geometry teaching on creative thinking, spatial ability level and achievement for 5th grade gifted primary school students]*. (Unpublished Doctoral thesis). İstanbul University, İstanbul.
- Karaaslan, G. (2019). *Özel yetenekli öğrencilerin karmaşık sayılar konulu etkinlikler ile üstbilişsel bilgi ve becerilerinin incelenmesi [Investigation of metacognitive*

- knowledge and skills of gifted students with activities on complex numbers]. (Doctoral thesis). Hacettepe University, Ankara.
- Karabey, B. (2010). *İlköğretimdeki Üstün Yetenekli Öğrencilerin Yaratıcı Problem Çözmeye Yönelik Erişi Düzeylerinin ve Kritik Düşünme Becerilerinin Belirlenmesi [Determination of the Level of Access to Creative Problem Solving and Critical Thinking Skills of Gifted Students in Primary Education]*. (Doctoral thesis). Dokuz Eylül University, İzmir.
- Karataş, Y. D. (2013). *Farklılaştırılmış matematik öğretiminin üstün zekalı ve yetenekli öğrencilerde erişmeye, yaratıcılığa, tutuma ve akademik benliğe etkisi [The effect of differentiated mathematics teaching on achievement, creativity, attitude and academic self in gifted and talented students]*. (Unpublished Doctoral thesis). İstanbul University, İstanbul.
- Kaygın, B. (2012). *Matematikte gelecek vaat eden öğrencilerin düzenli sınıflarda bilişsel yeteneklerinin ve öğrenme ortamına katılımlarının incelenmesi [Examining the cognitive abilities of promising students in mathematics and their participation in the learning environment in regular classrooms]*. (Unpublished master's thesis). Erzincan University, Erzincan.
- Kirişçi, N. (2013). *Üstün ve normal zekâ düzeyindeki öğrencilerin matematikte özdüzenleyici öğrenmeleri ve motivasyonel inançları [Self-Regulatory learning in mathematics and motivational beliefs of students with gifted and normal intelligence levels]*. (Unpublished master's thesis). İstanbul University, İstanbul.
- Kök, B. (2012). *Üstün zekâlı ve yetenekli öğrencilerde farklılaştırılmış geometri öğretiminin yaratıcılığa, uzamsal yeteneğe ve başarıya etkisi [The effect of differentiated geometry teaching on creativity, spatial ability and success in gifted and talented students]*. (Unpublished Doctoral thesis). İstanbul University, İstanbul.
- Kocaoğlu, D. (2020). *Üstün yetenekli öğrencilerin matematik dersine karşı tutum ve öz yeterlilik algılarının bazı değişkenler açısından incelenmesi [Examining the attitudes and self-efficacy perceptions of gifted students towards mathematics in terms of some variables]*. (Master's thesis). Gazi University, Ankara.
- Koçyiğit, N. (2015). *Üstün zekâlı ve normal zekâlı ortaokul öğrencilerinin problem çözme yaklaşımlarının karşılaştırmalı olarak incelenmesi [Comparative analysis of problem solving approaches of gifted and normal intelligence secondary school students]*. (Master's thesis). Erciyes University, Kayseri.
- Külegen, S. (2020). *Çevre eğitime dayalı fen, teknoloji, mühendislik, matematik temelli etkinliklerin özel yetenekli öğrencilerin 21. yüzyıl becerilerini geliştirmesine yönelik araştırma [Research on environmental education-based science, technology, engineering, mathematics-based activities to improve 21st century skills of gifted students]*. (Master's thesis). Yıldız Technical University, İstanbul.
- Nemutlu İnanır, Ş. (2019). *Üstün yetenekli öğrencilerin orantısal akıl yürütme becerilerinin incelenmesi [Examining the proportional reasoning skills of gifted students]*. (Master's thesis), Necmettin Erbakan University, Konya.
- Özdemir, D. (2016). *5. ve 6. sınıf matematikte üstün yetenekli öğrenciler için farklılaştırılmış görevlerin tasarımı ve geliştirilmesi [Design and development of differentiated tasks for gifted students in 5th and 6th grade mathematics]*. (Unpublished Doctoral thesis). Orta Doğu Technical University, Ankara.
- Özçelik, T. (2017). *Üstün yetenekli öğrencilere yönelik geliştirilen farklılaştırılmış matematik dersi öğretim programının etkililiği [Effectiveness of differentiated mathematics curriculum developed for gifted students]*. (Unpublished Doctoral thesis). Hacettepe University, Ankara.

- Öztelli Ünal, D. (2019). *Matematikte üstün yetenekli Türk öğrencilerin rutin olmayan problem çözme süreçleri [Non-routine problem solving processes of gifted Turkish students in mathematics]*. (Master's thesis). Boğaziçi University, İstanbul.
- Özyaprak, M. (2012). *Üstün zekâlı ve yetenekli öğrencilere yönelik farklılaştırılmış matematik öğretiminin erişi, tutum ve yaratıcılığa etkisi [The effect of differentiated mathematics teaching for gifted and talented students on achievement, attitude and creativity]*. (Unpublished Doctoral thesis). İstanbul University, İstanbul.
- Sağır Gürlevik, T.M. (2017). *Üstün/özel yetenekli öğrencilerin geometri düzeylerinin bazı değişkenler açısından belirlenmesi [Determining the geometry levels of gifted/talented students in terms of some variables]*. (Master's thesis). Dokuz Eylül University, İzmir.
- Satmaz, İ. (2015). *Üstün yetenekli öğrencilerin BİLSEM ve matematik kavramına ait metaforik algılarının incelenmesi [Examination of gifted students' metaphorical perceptions of BİLSEM and mathematics]*. (Master's thesis). Çanakkale Onsekiz Mart University, Çanakkale.
- Saka Kılıç, Y. (2020). *Matematikte üstün yetenekli ortaokul öğrencilerinin matematik öğretmenlerine ilişkin algılarının incelenmesi [Examining the perceptions of gifted secondary school students in mathematics towards their mathematics teachers]*. (Master's thesis). Uşak University, Uşak.
- Sezerel, B. B. (2012). *Seçici problem çözme (SPÇ) tekniğinin ilköğretim 6. ve 7. sınıf öğrencilerine yönelik matematik eğitimindeki sosyal geçerliğinin değerlendirilmesi [Evaluation of the social validity of the selective problem solving (CPS) technique in mathematics education for 6th and 7th grade primary school students]*. (Doctoral thesis). Anadolu University, Eskişehir.
- Sıdar, R. (2011). *Bilim sanat merkezlerinde okuyan öğrencilerin yaratıcılıklarının problem çözme becerilerine etkisi [The effect of creativity of students studying in science and art centers on problem solving skills]*. (Master's thesis). Niğde University, Niğde.
- Susam, E. (2012). *İlköğretim 4. ve 5. sınıf fen ve teknoloji dersi ile matematik dersinde üstün zekâlı öğrencilere yönelik uygulamaların değerlendirilmesi [Evaluation of applications for gifted students in primary school 4th and 5th grade science and technology lesson and mathematics lesson]*. (Unpublished docto thesis). İnönü University, Malatya.
- Şengil Akar, Ş. (2017). *Üstün Yetenekli Öğrencilerin Matematiksel Yaratıcılıklarının Matematiksel Modelleme Sürecinde İncelenmesi [Examining the Mathematical Creativity of Gifted Students in the Process of Mathematical Modeling]*. (Unpublished Doctoral thesis). Hacettepe University, Ankara.
- Şimşekler, Z. H. (2017). *Özel yetenekli çocuklarda matematiksel soyutlama [Mathematical abstraction in gifted children]*. (Unpublished master's thesis). Uludağ University, Bursa.
- Taş, N. (2018). *Farklılaştırılmış bilgisayar destekli matematik etkinliklerinin üstün yeteneklilerin bilgi işlemsel düşünme öz yeterlikleri ve matematiğe yönelik tutumlarına etkisi [The effect of differentiated computer assisted mathematics activities on the computational thinking self-efficacy of gifted students and their attitudes towards mathematics]*. (Unpublished Doctoral thesis). Atatürk University, Erzurum.
- Taşkın, D. (2016). *Üstün yetenekli tanısı konulmuş ve konulmamış öğrencilerin matematikte yaratıcılıklarının incelenmesi: bir özel durum çalışması [Examining the creativity of gifted and non-gifted students in mathematics: a case study]*. (Unpublished Doctoral thesis). Karadeniz Technical University, Trabzon.
- Tunalı, C. (2018). *Özel yetenekli öğrencilerin sayı duygusu düzeylerinin belirlenmesi [Determination of number sense levels of gifted students]*. (Unpublished master's thesis). Dokuz Eylül University, İzmir.

- Türk, T. (2019). *Ortaokul matematik dersi öğretim programının üstün yetenekli öğrencilerin eğitimleri açısından öğretmen ve öğrenci görüşlerine göre değerlendirilmesi [Evaluation of the secondary school mathematics curriculum in terms of the education of gifted students according to the opinions of teachers and students]*. (Unpublished master's thesis). Gazi University, Ankara.
- Yavuz Açıl, F. (2018). *Üstün yetenekli öğrencilerin matematiksel üretkenlik düzeyleri ile eleştirel düşünme becerileri arasındaki ilişkinin incelenmesi [Examining the relationship between the mathematical productivity levels of gifted students and their critical thinking skills]*. (Unpublished master's thesis). Bahçeşehir University, İstanbul.
- Yazgan Sağ, G. (2012). *Üstün yetenekli ortaöğretim öğrencilerinin matematiksel problem çözme durumlarındaki öz düzenleme davranışları [Self-regulation behaviors of gifted secondary school students in mathematical problem solving situations]*. (Unpublished master's thesis). Gazi University, Ankara.
- Yılmaz, K. (2019). *Üstün yetenekli öğrencilerin matematiksel düşünme becerilerine göre problem kurma süreçlerinin incelenmesi [Examining the problem posing processes of gifted students according to their mathematical thinking skills]*. (Unpublished master's thesis). Kırşehir Ahi Evran University, Kırşehir.
- Yurtkulu, A. (2019). *Özel yetenekli öğrenciler ve akranlarının görsel okuryazarlık düzeyleri ve fen dersindeki görselliğe ilişkin görüşleri [Visual literacy levels of gifted students and their peers and their views on visuality in science lessons]*. (Unpublished master's thesis). Sakarya University, Sakarya.