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Pedagogická
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Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

21. Yüzyılda Öğretmen Yetiştirme Teacher Training in the 21st Century

UNESAK 2023 INESCR

International Necatibey Education
and Social Sciences Research
Congress

26-28
October
Ekim
2023

Uluslararası Necatibey Eğitim ve
Sosyal Bilimler Araştırmaları
Kongresi

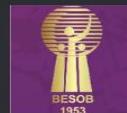
Full Text Proceedings Book
Tam Metin Bildiri Kitabı



ALTIEYLÜL
BELEDİYESİ



KARESİ
BELEDİYESİ



INESRC2023

UNESAK2023

International Necatibey Education and Social Sciences Research Congress

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Teacher Training in the 21st Century

21. Yüzyılda Öğretmen Yetiştirme

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Full Text Proceedings Book

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Prof. Dr. Saadet Maltepe

Dr. Öğr. Üyesi Dilek Tüfekçi Can

26-28 October 2023

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October 2023

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Davetli Konuşmacılar/Keynot Speakers

Prof. Dr. Kathy Cabe Trundle
 Utah Devlet Üniversitesi/Utah State University

Dr. Xiaojing Kou
 Indiana Üniversitesi/ Indiana University

Dr. Lukáš Rokos
 South Bohemia in České Budějovice Üniversitesi/ University of South Bohemia in České
 Budějovice

Prof. Dr. Erdal Toprakçı
 Ege Üniversitesi/ Ege University

Dr. Uwe Krause
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Atölye Çalışmaları/Workshops

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Doç. Dr. Yavuz Samur
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Kongre Programı/Congress Program

26.10.2023 Thursday		
Time	Activity	Location
09:00 - 10:10	Congress Opening Ceremony	Şehit Öğretmen Aybüke YALÇIN Conference Hall
10:10 - 10:30	NEF Academic Chamber Orchestra	
10:30 - 11:00	Coffee Break	The Foyer
11:00 - 11:45 Keynote Speaker	Prof. Dr. Erdal TOPRAKÇI - Teacher Education Policies in the 100 th Year of the Republic (Turkish)	Şehit Öğretmen Aybüke YALÇIN Conference Hall
11:45 - 12:30 Keynote Speaker	Dr. Lukas ROKOS - Visualizations in STEM Education: How Can We Use Drawing and Visual Models to Understand Student Ideas? (English)	
13:00 - 14:00	Lunch Break	Dining Hall
14:00 - 15:30 Workshop	Doç. Dr. Yavuz SAMUR - Game Friendly Teacher (Turkish)	Halil İnalçık Hall
14:00 - 15:30	Online Sessions	Microsoft Teams
15:30 - 16:00	Coffee Break	First Floor Hall
16:00 - 17:40	Oral Sessions	Classrooms
19:00	Gala Dinner	

27.10.2023 Friday		
Time	Activity	Location
09:00 - 10:30 Workshop	Helene CLAEYS and Corinne MANCEL - Building Bridges with eTwinning (English)	Halil İnalçık Hall
10:30 - 11:00	Coffee Break	First Floor Hall
11:00 - 12:30 Workshop	Doç. Dr. Duygu GÜNGÖR CULHA - Data Analysis through R for Educators (Turkish)	Computer LAB A
11:00 - 12:30 Workshop	Prof. Dr. İsmail KARAKAYA - Measuring the 21 st Century Skills (Turkish)	Halil İnalçık Hall
13:00 - 14:00	Lunch Break	Dining Hall
14:00 - 14:30 Keynote Speaker	Dr. Xiaojing KOU - How can ChatGPT Be Used in Language Teaching and Learning? (English)	Şehit Öğretmen Aybüke YALÇIN Conference Hall
14:30 - 15:00	Coffee Break	The Foyer
15:00 - 15:30 Keynote Speaker	Prof. Dr. Kathy Cabe TRUNDLE - Arts Integration: STEAM Learning (English)	Şehit Öğretmen Aybüke YALÇIN Conference Hall
15:30 - 16:50	Oral Sessions	Classroom
17:00	Balıkesir City Tour	NEF Courtyard

28.10.2023 Saturday		
Time	Activity	Location
09:30 - 10:30	Closing Panel	Şehit Öğretmen Aybüke YALÇIN Conference Hall
10:30 - 18:30	Trip	NEF Courtyard

Çevrimiçi Oturumlar/Online Sessions

26.10.2023 Friday Türkiye Local Time 14:00-15:20			
Chair: Petra Karvankova			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Felea, Maria Iulia M*	Universitatea, "1 Decembrie 1918" din Alba Iulia	From Classical Assessment to Formative Assessment in Academic Education
14:20 - 14:40	Karvankova, Petra*; Vondruska, Jan	Faculty of Education, University of South Bohemia	Professional Development Training for Scientists: How to Communicate Science?
14:40 - 15:00	Pečiulienė, Lina*; Šimienė, Gerda	Vilniaus kolegija/Higher Education Institution	How to Enhance Pre-Service Teachers' Engagement in The Study Process?
15:00 - 15:20	Venera Sarbassova*	Taraz Regional University named after M.Kh.Dulaty	Formation of National Self-Consciousness of Teachers in a Cross-Cultural Competence-Oriented Environment

26.10.2023 Friday Türkiye Local Time 14:00-15:20			
Chair: Filiz Tuba Dikkartın Övez			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Ceylan, Harun; Erdener, Mehmet A*	Balıkesir University	The Review of Academic Studies on Instructional Leadership Model in The Field of Educational Administration in Recent Years
14:20 - 14:40	Juškienė, Vaiva O*; Voidogaite, Viktorija	Vilniaus kolegija Higher Education Institution	The Disruptions Occurring in the Co-Operation of Teachers and Parents with ASD Children
15:00 - 15:20	Kayumova, Mehriniso*	Tashkent Şarkşinaslık State University	Some Methods Used to Teach Turkish as a Foreign Language in Uzbekistan

26.10.2023 Friday			
Türkiye Local Time 14:00-15:40			
Chair: Hülya Gür			
Online Session Hall			
Time	Authors	Affiliation	Title
14:20 - 14:40	Gür, Hülya*	Balıkesir University	Developing 21 st Century Competencies of Prospective Mathematics Teachers for Teaching Stem Contexts: Stemcraft
14:40 - 15:00	Tamer, Sevda; İzgi Onbaşılı, Ümit; Sezginsoy Şeker, Burcu*	Balıkesir University	Analyzing the Opinions of Classroom Teachers on the Contribution of eTwinning Activities to Digital Literacy Skills
15:00 - 15:20	Aktaş, Feriha Ferhan*; Yıldırım, Bilal	İstanbul Sabahattin Zaim University	The Relationship between Teachers' Lateral Thinking Tendencies and Their Adopted Style of Classroom Management
15:20 - 15:40	Kačīnaitė-Vrubliauskienė, Dalia*; Trukšinienė, Danutė	Vilniaus kolegija Higher Education Institution	Challenges Experienced by Teachers in Organizing Inclusive Education: A Case Study in Lithuanian Schools

26.10.2023 Friday			
Türkiye Local Time 14:00-15:40			
Chair: Renata Kondratavičienė			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Rafukjanovna, Dilfuza Akhmedova*	TSUOS	Online Class as One of the Forms of Distance Teaching a Foreign Language at a University
14:20 - 14:40	Bertašienė, Inga; Kondratavičienė, Renata*	Vilniaus kolegija/Higher education institution	The Analysis of Pedagogical Studies: Students' Learning Experience in a Virtual Learning Environment: The Interaction with the Tutor and Other Learners
15:00 - 15:20	Zaripova Dilduz Bakhtiyorovna*	Bukhara State University	Innovative Technologies in Language Teaching
15:20 - 15:40	Todor, Ioana *	"1 Decembrie 1918" University of Alba Iulia	An Investigation of Pre-Service Teachers' Motivations for Choosing a Teaching Career

26.10.2023 Friday			
Türkiye Local Time 14:00-15:20			
Chair: Hasene Esra Yıldırım			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Esen, Betül; Dikkartın Övez, Filiz Tuba*; Tekkalan, Okan; Yoncacı, Ayşegül	Balıkesir University	The Effect of Mötemm Project Applications on Technology Acceptance and Use of Mathematics Teachers and Teachers' Opinions
14:20 - 14:40	Durmaz, Hüsnüye*; Çelik Keser, Hande	Trakya University	The Effect of Stem Education Practices on the Awareness Towards Stem Education and Opinions of Pre-Service Science Teachers
14:40 - 15:00	Karakoç-Topal, Özlem; Yıldırım, Hasene Esra; Gülay, Buse*	Balıkesir University	The Effect of Teaching with Multiple Representations on Science Pre-Service Teachers' Cognitive Structures about Electrochemical Batteries
15:00 - 15:20	Aydar, Melike*; Uyangör, Nihat	Balıkesir University	Determining the Qualities That Faculty Members at The Faculty of Education Consider Important in Teacher Training

26.10.2023 Friday			
Türkiye Local Time 14:00-15:40			
Chair: Blazek Vojtech			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Betáková, Lucie* Dvořák, Petr; Tilp, Vojtěch; Fuka, Vojtěch	University of South Bohemia	Critical Issues in English Language Teacher Education from the Point of View of Students at Teaching Practice
14:20 - 14:40	Blažek, Vojtěch*; Karvanková, Petra; Uhlíková, Renata	Faculty of Education, University of South Bohemia	Strengthening Geographic Concepts through Geographic Information Systems
14:40 - 15:00	Blažek, Vojtěch*; Rokos, Lukáš	Faculty of Education, University of South Bohemia	Virtual Versus School Reality: A Comparison of the South Bohemia Region and Upper Austria in the Implementation of Virtual Reality
15:00 - 15:20	Nicolaeva, Prascovia Dmitrievna*	Comrat State University	Teaching English Grammar through Phraseological Units
15:20 - 15:40	İsmatullayeva, Nargiza*	Tashkent State University of Oriental Studies	Teaching Approach in Instructing Specialist Subjects within the Domain of Translation Studies: "Text Translation and Editing", "Translation of Media Texts"

26.10.2023 Friday			
Türkiye Local Time 14:00-15:20			
Chair: Semiral Öncü			
Online Session Hall			
Time	Authors	Affiliation	Title
14:00 - 14:20	Mubarakova, Dilshoda*	Tashkent University	Teacher Training Experience in the 100th Year of The Republic of Türkiye
14:20 - 14:40	Mubarakova, Dilshoda*, Yunusova, Nodira	Tashkent University	Improving the Qualifications of Teachers in the Field of Education
14:40 - 15:00	Raxmatjonova, Kamola*	Tashkent State University of Oriental Studies	The Importance of Linguistic Typology in Teaching Foreign Languages

Sözlü Oturumlar/Oral Sessions

26.10.2023			
Türkiye Local Time 16:00-17:20			
Chair: Gülcan Çetin			
Session-1 Hall-207			
Time	Authors	Affiliation	Title
16:00 - 16:20	Çopur, Ahmet*; Önal, Hakan	Balıkesir University	Investigation of the 2018 Social Studies Course Teaching Program in Terms Of 21st Century Skills And Turkish Qualifications Framework
16:20 - 16:40	Yasemin Sayan; Mahbuba Tashpulat *, Gülcan Çetin	Kazah National Women's Teacher Training University	Comparison of Classroom Teacher Training Programs in Türkiye and Kazakhstan
16:40 - 17:00	Dilrabo Elmuratova & Güliz Şahin*	Gülistan Pedagogy University	Two World Nations in Education: A Comparison of Teacher Training Programs in Uzbekistan and Türkiye
17:00 - 17:20	Tursunay Baynazarova; Mahbuba Tashpulat; Gülcan Çetin; Yasemin Sayan *	Kazakh National Women's Teacher Training University	Comparison of Preschool Teacher Training Programs in Türkiye and Kazakhstan

26.10.2023			
Türkiye Local Time 16:00-17:20			
Chair: Handan Ürek			
Session-1 Hall-208			
Time	Authors	Affiliation	Title
16:00 - 16:20	Ürek, Handan*	Balıkesir University	Determination of Argumentation Quality of Science Teacher Candidates in the Context of the Human Reproductive System Subject
16:20 - 16:40	Filiz, Ahsen*	Biruni University	Prediction of Teachers' Readiness for Change with Data Mining Algorithms
16:40 - 17:00	Matoušková, Radka*	University of South Bohemia in České Budějovice	Inter-Disciplinary Tasks in Lower-Secondary Textbooks, Their Stem-Related Classification, and the Process of Posing
17:00 - 17:20	Tuychieva, Nodira*	Tashkent Institute of Finance	Modern Approaches to Defining the Teacher's Role in Education.

26.10.2023			
Türkiye Local Time 16:00-17:20			
Chair: Güliz Gür Şahin			
Session-1 Hall-209			
Time	Authors	Affiliation	Title
16:20 - 16:40	Hastürk, Gamze*; Hastürk, Gökhan	Tokat Gaziosmanpaşa University	Socio-Scientific Issues in the Cognitive Structure of Classroom Teachers: Mind Map Example
16:40 - 17:00	Şahin, Güliz*; Erdoğan, Damla; Özdemir, Aylin	Balıkesir University	The Confluence of the Art of Thinking and Creative Skills: The Contribution of Postgraduate Theses in the Field of Philosophy for Children to 21 st Century Competencies
17:00 - 17:20	Yüksel, Muammer*	Ministry of Education	The Effect of Teachers' Characteristics in the Teaching Process on Students' 21 st Century Skills: A Review on PISA 2018 Results

26.10.2023			
Türkiye Local Time 16:00-17:40			
Chair: Hasan Hüseyin Şahan			
Session-1 Hall-210			
Time	Authors	Affiliation	Title
16:00 - 16:20	Korucu, Merve*; Şahan, Hasan Hüseyin	Mehmet Akif Ersoy University,	Investigation of Teachers' Lifelong Learning Tendencies in Terms of Different Variables
16:20 - 16:40	Ulukuş, Zeynep Ezgi*; Özen, Zeynep ; Karakoç-Topal, Özlem	Balıkesir University	Teacher Candidates' Awareness Towards Stem Activities and Their Motivations for Involving the Activities: Comparison of Preschool and Science Teacher Candidates
16:40 - 17:00	Tezcan, Fatma*	Muğla Sıtkı Koçman University	Being a Teacher in the 21 st Century: A Journey from a Changing World to a Changing Educational Approach
17:00 - 17:20	Ismoiljonov, Shukhratjon*	Namangan State Institute of Foreign Languages	Meeting the Expectations: Essential Skills for 21 st Century Teachers

27.10.2023			
Türkiye Local Time 15:30-16:50			
Chair: Nihat Uyangör			
Session-1 Hall-101			
Time	Authors	Affiliation	Title
15:30 - 15:50	Gülburnu, Mehmet*; Özcan, Umut	Mersin University	Investigation of Secondary School Mathematics Teachers' Opinions on the Questions Book Used as a Supplementary Source
15:50 - 16:10	Kırtak Ad, Nilay*; Kandemir, Buse	Balıkesir University	The Effect of History and Philosophy of Science Course Enriched with the First Scientific Physics Experiments in History on Pre-Service Teachers' Beliefs about the Nature of Science
16:10 - 16:30	Sinem Güçhan Özgül; Nazlı Ruya Taşkın Bedizel*	Balıkesir University	Exploring the Cultural Diversity Awareness of Pre-Service Teachers in a Multinational Study Group
16:30 - 16:50	Dikkartın Övez, Filiz Tuba*; Yağlı, Gizem; Mecer, Zeynep; Kesriklioğlu, Merve; Örene, Sıdika; Dalkılıç, Tugba; Deniz, Şebnem	Balıkesir University	Investigation of Pre-Service Primary School Teachers' Pedagogical Content Knowledge on Number Sense

27.10.2023
Türkiye Local Time 15:30-16:50

Chair: Gülcan Öztürk

Session-1 Hall-102

Time	Authors	Affiliation	Title
15:30 - 15:50	Tuychieva, Nodira*	Tashkent Institute of Finance	Challenges and Solutions in the Digitization of Distance Education.
15:50 - 16:10	Yüksel, Muammer*	Ministry of Education	The Effect of Gender on Teacher Candidates' Attitudes Towards Distance Education: A Meta-Analysis Study
16:10 - 16:30	Elif Kuşoğlu*; Gülcan Öztürk; Gür, Hülya	Balıkesir University	Prospective Mathematics Teachers' Technological Pedagogical Content Knowledge Competencies for 21 st Century Skills and Digital Proficiency Perceptions
16:30 - 16:50	Yünkül, Eyup*; Ahmet Melih Güneş	Balıkesir University	The Relationship Between Teachers' Self-Efficacy Towards Technology Integration and School Happiness

TABLE OF CONTENTS / İÇİNDEKİLER

DEVELOPING 21 st CENTURY COMPETENCIES OF PROSPECTIVE MATHEMATICS TEACHERS FOR TEACHING STEM CONTEXTS: STEM FRAMEWORK.....	1
TEACHER CANDIDATES' AWARENESS TOWARDS STEM ACTIVITIES AND THEIR MOTIVATIONS FOR INVOLVING THE ACTIVITIES: COMPARISON OF PRESCHOOL AND SCIENCE TEACHER CANDIDATES.....	8
BARRIERS TO COOPERATION BETWEEN TEACHERS AND PARENTS OF CHILDREN WITH AUTISM SPECTRUM DISORDER.....	21
THE IMPORTANS OF LINGUISTIC TYPOLOGY IN TEACHING FOREIGN LANGUAGES	38
PROSPECTIVE MATHEMATICS TEACHERS' TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE COMPETENCIES FOR 21 st CENTURY SKILLS AND DIGITAL PROFICIENCY PERCEPTIONS.....	40
TEACHING APPROACH IN INSTRUCTING SPECIALIST SUBJECTS WITHIN THE DOMAIN OF TRANSLATION STUDIES: "TEXT TRANSLATION AND EDITING".....	48
INVESTIGATION OF THE 2018 SOCIAL STUDIES COURSE TEACHING PROGRAM IN TERMS OF 21ST CENTURY SKILLS AND TURKISH QUALIFICATIONS FRAMEWORK	54
SOCIO-SCIENTIFIC ISSUES IN THE COGNITIVE STRUCTURE OF CLASSROOM TEACHERS: MIND MAP EXAMPLE.....	59
TEACHER EDUCATION POLICIES IN THE 100TH YEAR OF THE REPUBLIC.....	67
PREDICTION OF TEACHERS' READINESS FOR CHANGE WITH DATA MINING ALGORITHMS.....	84

DEVELOPING 21st CENTURY COMPETENCIES OF PROSPECTIVE MATHEMATICS TEACHERS FOR TEACHING STEM CONTEXTS: STEM FRAMEWORK

STEM KONULARININ ÖĞRETİMİ İÇİN MATEMATİK ÖĞRETMEN ADAYLARININ 21. YY YETERLİKLERİNİN GELİŞTİRİLMESİ: STEM ÇERÇEVESİ

Hülya Gür¹

ÖZET

21. yüzyıl yeterliklerinin öğretiminde; yaratıcılık, işbirliği, iletişim ve eleştirel düşünme temel bileşenler olarak yer almaktadır. Gelecekteki öğrencileri yetiştirecek olan matematik öğretmen adaylarının da 21. yüzyıl yeterliklerine hazır olarak yetişmeleri gerekmektedir. Ancak bu konu bugüne kadar hep ihmal edilmiştir. STEM eğitimi 2017 taslak öğretim programında ve 2018 öğretim programında yer almaktadır. Ancak öğretmenlerin stemi nasıl gerçekleştireceği, derslerine nasıl entegre edeceği konusunda yetersiz bilgiye sahiptirler (Akgündüz et. Al, 2015a, 2015b). Bu araştırmanın amacı, matematik öğretmen adaylarının 21. yüzyıl yeterliklerini geliştirmek; stem disiplinlerine uygun ders planlarını hazırlamalarını sağlamak, ve entegre stem çalışmaları için çerçeveler sunmaktır. Araştırmada hem nitel hem de nicel araştırma metotlarının kullanıldığı karma desen kullanılmıştır. Yılmaz&Alkış (2019) tarafından geliştirilen “21. Yüzyıl Yeterlilikleri Becerileri Ölçeği”; Özcan&Koca (2019) tarafından geliştirilen “STEM Tutum Ölçeği”; “yarı yapılandırılmış görüşme”; “video kayıtları” ve “oluşturulmuş olan ürünler” veri toplama aracı olarak kullanılmıştır. Veri analizinde; Ölçekten elde edilen nicel veriler için: ortalama, standart sapma, yüzde gibi betimsel istatistikler; İkili grupların karşılaştırılmasında ilişkisiz örneklem için t-testi kullanılacaktır. Nitel verilerin analizinde video analizi, betimsel ve içerik analizi kullanılmıştır. Nitel veri analizinde ise kodlama, alt tema ve temalar yoluyla veriler analiz edilmiştir. Araştırmanın örneklemini matematik öğretmenliği adaylarından oluşmuştur. Nitel veriler için amaçlı örnekleme yoluyla 8 öğrenci ile görüşme yapılmıştır. Belirtilen problem durumlarıyla ilgili; matematik öğretmen adaylarının 21.yy becerileri nasıldır?; matematik öğretmen adaylarının işbirliği ile çalışma alışkanlıkları nasıldır?; matematik öğretmen adaylarının iletişim becerileri nasıldır?; matematik öğretmen adaylarının eleştirel düşünme becerileri nasıldır?; matematik öğretmen adaylarının steme karşı tutumları nasıldır?; matematik öğretmen adaylarının hazırladıkları stem ders planlarının süreç içinde gelişimi nasıldır?; matematik öğretmen adaylarının entegre stem çalışmaları için oluşturdukları materyallerin özellikleri nelerdir? sorularının cevabı aranmıştır. Araştırma sonunda öğretmen adaylarının kendi stem planlarını hazırladıkları, 21. yy becerilerini kazandıkları, matematiğe karşı olumlu tutum geliştirdikleri, konulara göre uygun materyaller hazırladıkları, işbirliği içinde çalıştıkları akran öğrenmeyi gerçekleştirdikleri görülmüştür. Çalışma sonunda katılımcıların verileri kullanılarak örnek bir stem çerçevesi geliştirilmiştir.

Anahtar Kelimeler: STEM eğitimi, Matematik öğretmen adayları, 21. Yüzyıl yeterlikleri, 21. Yüzyıl öğrenme, STEM çerçevesi.

ABSTRACT

In teaching 21st century competencies; Creativity, collaboration, communication, and critical thinking are the basic components. Pre-service mathematics teachers who will educate future students also need to be ready for 21st century competencies. However, this issue has always been neglected until now. STEM education is included in the 2017 draft curriculum and the 2018 curriculum. However, teachers have insufficient knowledge about how to implement STEM and integrate it into their lessons. The aim of this research is to develop the 21st century competencies of prospective mathematics teachers; to enable them to prepare lesson plans appropriate to their stem disciplines, and to provide frameworks for integrated stem studies. A mixed design using both qualitative and quantitative research methods was used in the research. Developed by Yılmaz and Alkış (2019), “21st Century

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Competencies Skills Scale”; “STEM Attitude Scale” developed by Özcan&Koca (2019); “semi-structured interview”; “video recordings” and “lesson plans and material” were used as data collection tools. In data analysis; for quantitative data obtained from the scale: descriptive statistics such as mean, standard deviation, percentage; t-test for unrelated samples will be used to compare paired groups. Video analysis, descriptive and content analysis were used to analyze qualitative data. In qualitative data analysis, data was analyzed through coding, sub-themes and themes. The sample of the research consisted of mathematics teacher candidates. For qualitative data, 8 students were interviewed through purposeful sampling. Regarding the specified problem situations; What are the 21st century skills of prospective mathematics teachers? What are the collaborative working habits of prospective mathematics teachers? What are the communication skills of prospective mathematics teachers? What are the critical thinking skills of prospective mathematics teachers? What are the attitudes of mathematics teacher candidates towards STEM? How do the stem lesson plans prepared by prospective mathematics teachers develop over time? What are the characteristics of the materials created by prospective mathematics teachers for integrated stem studies? Answers to these questions have been sought. At the end of the research, it was seen that the teacher candidates prepared their own STEM plans, acquired 21st century skills, developed positive attitudes towards mathematics, prepared appropriate materials according to the subjects, worked in cooperation and carried out peer learning. At the end of the study, a sample stem framework was developed using the participants' data.

Keywords: STEM education, Mathematics teacher candidates, 21st century competencies, 21st century learning, STEMCrAfT framework.

INTRODUCTION

With the fourth industrial revolution, developments in technology have also caused changes in education and training. It is an undeniable fact that both students, teacher candidates and teachers follow these developments closely and integrate them into their lessons. Informative definition of STEM education and highlights its significance in several key aspects as given: TEM education is defined as an approach that integrates science, technology, engineering, and mathematics disciplines, presenting them together with similar educational objectives. This interdisciplinary approach is crucial for addressing complex real-world problems that often require knowledge and skills from multiple fields. STEM education is recognized as a means of equipping individuals with the knowledge and skills necessary to build the foundation for leadership in scientific and technological fields. It prepares students to take on roles that drive innovation and economic growth in modern societies. STEM education is essential for enhancing a country's global competitiveness. It implies that nations with strong STEM education programs are better positioned to lead in scientific and technological advancements, which can have a significant impact on their economic growth and development. STEM education is crucial for fostering a culture of innovation and entrepreneurship. It prepares students to make scientific and technological innovations and initiatives, which are essential for addressing contemporary challenges and seizing opportunities. References to scholarly works and studies, such as Akgündüz et al. (2015), Lacey and Wright (2009), Yıldırım and Altun (2015), and Bybee (2010a), reinforce the importance of STEM education as a subject of academic research and policymaking. Overall, the critical role of STEM education in preparing individuals for success in the 21st century, emphasizing its significance in fostering interdisciplinary thinking, global competitiveness, innovation, and addressing the challenges of our time. It also highlights the concern that educational systems must ensure that students are well-equipped to excel in STEM-related fields and initiatives. It emphasizes that in the given context, both current teachers and future teachers play significant roles and carry important responsibilities in the realm of STEM education. Especially teachers and teacher candidates who will educate the society should be able to use this technology. The new generation needs to be raised as individuals with 21st century skills (Yılmaz, Alkış, 2019). We must train our teacher candidates to be able to communicate with students in the alpha generation and prepare

them for the needs of our century. Although studies on STEM have increased in recent years, it seems that studies on prospective teachers are limited. It is thought that the findings of the study will bring a different perspective to the gap in the literature on this subject. 21st Century skills generally include; It can be grouped under the headings of Communication, Critical Thinking, Creativity and Cooperative Learning, Knowledge, Skills, Character and Meta-learning. However, in some studies, additionally; Entrepreneurship, Personal Finance, Social System, Technology-Engineering, Bioenergy, Media and Health, Leadership, Ethics, Curiosity and Awareness have been added. Skills can be expanded if desired (Abdullah et al., 2017). The rapid pace of technological advancement in the 21st century demands a workforce that is not only technologically literate but also capable of understanding and contributing to STEM-related fields. Mathematics is often the foundation for understanding and working with advanced technologies. Mathematics teachers must be prepared to teach in a way that fosters interdisciplinary thinking, as STEM subjects frequently intersect and complement each other. STEM education promotes critical thinking, problem-solving, creativity, and innovation. Mathematics teachers who can inspire and guide students in these areas contribute to a workforce that can adapt to evolving technological and scientific landscapes. Also mathematics teachers play a role in developing students' ability to critically evaluate scientific information and make informed decisions about issues with scientific relevance. Mathematics teachers and teacher trainees have insufficient knowledge about how to implement STEM and integrate it into their lessons (Yıldırım, 2018). The aim of this research is to develop the 21st century competencies of prospective mathematics teachers; To enable them to prepare lesson plans appropriate to their stem disciplines, and to provide frameworks for integrated stem studies. In summary, preparing mathematics teachers for STEM education in the 21st century is not only a response to the demands of the modern workforce but also a means to equip students with the skills and knowledge necessary to address global challenges, drive innovation, and contribute to a technologically advanced society. Mathematics is a foundational element of STEM, and mathematics teachers play a vital role in shaping the STEM education landscape.

METHOD

A mixed design using both qualitative and quantitative research methods was used in the research (Yıldırım&Şimşek, 2013; Creswell, 2014; Merriam, 2013). Developed by Yılmaz and Alkış (2019), “21st Century Competencies Skills Scale”; “STEM Attitude Scale” developed by Özcan&Koca (2019); “semi-structured interview”; “video recordings” and “lesson plans and material” were used as data collection tools. In data analysis; for quantitative data obtained from the scale: descriptive statistics such as mean, standard deviation, percentage; t-test for unrelated samples will be used to compare paired groups. Video analysis, descriptive and content analysis were used to analyze qualitative data. In qualitative data analysis, data was analyzed through coding, sub-themes and themes. The sample of the research consisted of mathematics teacher candidates. For qualitative data, 8 students were interviewed through purposeful sampling

Data Collection Tools

21st Century Proficiency Scale: 21st Century Proficiency Scale consists of 4 subscales: Knowledge, Skills, Character, and Meta-learning. Each subscale is structured so that it can be used independently of the other scales. The models determined with the fit markers of the confirmatory factor analysis in which the items related to all subscales were found to be

theoretically and statistically appropriate. As a result, it was shown that the scales developed to measure the 21st Century Qualifications of university students and over are valid and reliable and have sufficient psychometric properties.

Stem Attitude Scale

In the study, the STEM scale, developed by Friday Institute for Educational Innovation (2012) and whose validity and reliability was adapted to Turkish by Özcan&Koca, was used. It was found that the scale (37 items), as in its original form, has a four-factor structure: mathematics, science, engineering and technology, and 21st century skills. Cronbach Alpha internal consistency coefficient for the factors of the scale was calculated as .86 for the mathematics factor, .87 for the science factor, .86 for the engineering and technology factor, and .88 for the 21st Century skills factor. The Cronbach Alpha reliability coefficient calculated for the entire scale was found to be .91. The Cronbach Alpha internal consistency coefficient calculated in this study is over 0.70, indicating that the scale is reliable (Nunnally and Bernstein, 1994; Büyüköztürk, 2013). The other data collection tools; “semi-structured interview”; “video recordings” and “lesson plans and materials”. A mixed design using both qualitative and quantitative research methods was used in the research. 480 mathematics teacher candidates participated in the quantitative study. The qualitative part of the study was conducted with 8 mathematics teacher candidates.

Research questions are follows: “What are the 21st century skills of prospective mathematics teachers?”; “What are the collaborative working habits of prospective mathematics teachers?”; “What are the communication skills of prospective mathematics teachers?”; “What are the critical thinking skills of prospective mathematics teachers?”; “What are the attitudes of mathematics teacher candidates towards STEM?”; “How do the stem lesson plans prepared by prospective mathematics teachers develop over time?”; “What are the characteristics of the materials created by prospective mathematics teachers for integrated stem studies?” This study focused on creating a stem framework that blended the findings as a result of qualitative and quantitative research questions.

FINDINGS

The answers received for each research question are given below.

Findings from research question of “What are the 21st century skills of prospective mathematics teachers?”

Table 1. Frequency distributions regarding 21st-Century Skills of pre-service mathematics teachers

Skill Categories	Sub categories	f
Learning and Innovation Skills	Cognitive skills	95
	Process skills	95
	Communication and Collaboration Skills	55
	Initiative and Self-Direction Skills	55
Life and Career Skills	Attitude and Values Skills	60
	Career-Related Skills	50
Technological Skills	Technology Knowledge/Usage/ Production Skills	70
Total		480

Findings from research question of “What are the collaborative working habits of prospective mathematics teachers?” Collaborative working habits and the communication skills of prospective mathematics teachers are not sufficient. They tend to work alone. But their communication skills is much more better. Their critical thinking skills of prospective teacher had high critical thinking skills. Although the majority of the previous studies revealed that prospective teachers had high critical thinking skills (Sur, 2020; Karademir & Saracaloğlu, 2017), there are also other studies which concluded that they had moderately high critical thinking skills (Metem, 2021; Bölükbaşıoğlu, 2021). Their attitudes of mathematics teacher candidates towards STEM had more positive. They had difficulty to prepare lesson plan at first but after that they had used to it. They had also prepared lesson plan and they prepared materials related to 5E plans.

The STEM Framework is a reflective decision making tool that represents the collective thinking, expertise and experience of STEM teachers. Its development provides an opportunity to expand the individual teachers experience from the solitude of the classroom and into the teaching community. The framework aims to assist the prospective mathematics STEM teacher select resources suitable to their learning environment. It is specifically designed for rural and regional teachers whose resources are often limited. For this purpose, prospective mathematics teachers created 5e lesson plans and materials.

In this study, the STEM FRAMEWORK created by blending the qualitative and quantitative findings of the research is included. The proposed stem framework was reached using the data obtained from the study is given below.

The STEM Framework

Science	Technology	Engineering	Mathematics
STEM			
Context (curriculum)			Learning and Innovation Skills (Cognitive skills; Process skills; Communication and Collaboration Skills)
Planning (Critical thinking, connecting stem subjects)			
Preparation (5E Lesson Plans and Resources) (Defining the problem- Description of the engineering design project and learning activities; connected prior knowledge and transfer their knowledge, Clarifying the problem: Prototyping and testing)			
Implementation (inquiry based learning-active learning) (selection resources: online resources, manipulatives, software's, video, you tube, ...)			Life and Career Skills (Initiative and Self-Direction Skills; Attitude and Values Skills; Career-Related Skills)
Evaluating the implementation - (Developing possible solutions-initial modelling (3D); Predicting analysis; Selecting best solutions: Modeling: Testing: Modifying: Optimization)			
Resource usability & Support consideration (materials, IT support)			Technological Skills (Technology Knowledge/Usage/ Production Skills)
Assessment Feedback (peer support)			

RESULTS, DISCUSSIONS AND SUGGESTIONS

At the end of the research, it was seen that the teacher candidates prepared their own STEM plans, acquired 21st century skills, developed positive attitudes towards mathematics, prepared appropriate materials according to the subjects, worked in cooperation and carried out peer learning.

On the other hand, at the end of the study, a sample stem framework was developed using the participants' data. In conclusion, the STEM framework aligns with the demands and opportunities of the 21st century. It equips individuals with the knowledge, skills, and mindset needed to thrive in a rapidly changing world, contribute to scientific and technological advancements, and address global challenges. STEM education is a valuable and forward-looking approach to learning, problem-solving and societal advancement in the 21st century, positioning individuals to make meaningful contributions to scientific and technological progress and to address the pressing challenges of our time.

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TEACHER CANDIDATES' AWARENESS TOWARDS STEM ACTIVITIES AND THEIR MOTIVATIONS FOR INVOLVING THE ACTIVITIES: COMPARISON OF PRESCHOOL AND SCIENCE TEACHER CANDIDATES

ÖĞRETMEN ADAYLARININ STEM ETKİNLİKLERİNE KARŞI FARKINDALIKLARI VE ETKİNLİKLERE YER VERME MOTİVASYONLARI: OKUL ÖNCESİ VE FEN BİLGİSİ ÖĞRETMEN ADAYLARININ KARŞILAŞTIRILMASI

Zeynep Ezgi Ulukuş¹

Zeynep Özen²

Özlem Karakoç Topal³

ÖZET

Bilimsel bilgiye erişimin her geçen gün daha da kolaylaştığı günümüzde bilgiyi öğrenmek kadar, belli yaşam becerilerine sahip olmak da büyük önem taşımaktadır. Hem öğrenilen bilgilerin hayata geçirilmesi hem de 21. yüzyıl yaşam becerilerinin kazandırılmasında STEM yaklaşımı da etkili olabilmektedir. Bu noktada öğretmen eğitiminde STEM'e yönelik farkındalığın artırılması önemlidir. Bu çalışmanın amacı da temelden başlanmasına yardımcı olabilecek ve ileri kademede sürdürülebilirlik sağlayacak iki branş olan fen bilgisi eğitimi ve okul öncesi eğitiminde öğrenim gören öğretmen adaylarının STEM'e ilişkin farkındalıklarını belirlemek ve etkinliklere yansıtmadaki motivasyonlarının nelere bağlı olduğunu derinlemesine incelemektir. Çalışmanın örneklemini fen bilgisi eğitimi ve okul öncesi eğitiminde 3. ve 4.sınıfta öğrenim gören 63 öğretmen adayı oluşturmaktadır. Çalışma karma yöntem araştırma desenlerinden yakınsayan paralel desene uygun olarak tasarlanmıştır. Nicel veri toplama aracı olarak Merder (2019) tarafından geliştirilen "*STEM Farkındalık ölçeği*", nitel veri toplama aracı olarak ise araştırmacılar tarafından hazırlanan açık uçlu sorular kullanılmıştır. Nicel verilerin analizinde veriler normal dağılım göstermediğinden non-parametrik testler kullanılmış, nitel veriler ise içerik analizi ile analiz edilmiştir. Çalışmada öğretmen adaylarının branşları ile farkındalık düzeyleri arasında anlamlı bir ilişki olmadığı, ölçek maddelerinin frekanslarının 59-63 aralığında değiştiğini ve 'Bilişsel düzey becerilerini artırır.' teması dışında tüm temalar ile yüksek uyumluluk bulunduğu belirlenmiştir.

Anahtar Kelimeler: STEM, Okul Öncesi, Fen Bilgisi, 21. yüzyıl becerileri

ABSTRACT

In today's world, where access to scientific knowledge is becoming easier day by day, it is not only essential to acquire knowledge but also to have specific life skills. The STEM approach can also effectively put the learned knowledge into practice and provide 21st-century life skills. At this point, increasing awareness of STEM in teacher education is crucial. This study aims to determine the awareness of prospective teachers studying science education and pre-school education, two branches that can help them start from the basics and provide sustainability at advanced levels, regarding STEM and to examine in depth what their motivations in reflecting it on activities depend on. The study sample consists of 63 teacher candidates studying in the 3rd and 4th grades of science education and pre-school education. The study was designed following the convergent design from mixed methods research designs. The "STEM Awareness scale" developed by Merder (2019) was used as a quantitative data collection tool, and open-ended questions prepared by the researchers were used as a qualitative data collection tool. Since the data did not show a normal distribution, non-parametric tests were used to analyze quantitative data, and qualitative data were analyzed with content analysis. In the study, it was determined that there was no significant relationship between the branches of the teacher candidates and their awareness levels, the frequencies of the scale items varied between 59-63, and there was high compatibility with all themes except the theme "It increases cognitive level skills."

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Keywords: STEM, pre-school teaching, science teaching, 21st-century skills.

GİRİŞ

STEM fen, teknoloji, mühendislik ve matematiğin bir araya gelmesiyle okul öncesinden yükseköğrenime kadar disiplinler arası yaklaşımı hedefleyen bir eğitim yaklaşımıdır. Bu kavram 2001 yılında dünyada ilk defa Judith Rahmaley tarafından ortaya atılmıştır (White, 2014). Temelinin ise 19. yüzyılın ilk zamanlarına dayandığı düşünülmektedir (Ostler, 2012). Eğitimin ortaya çıkışını etkileyen faktörler arasında, öğrencilerin STEM alanlarına yönelmelerini arttırmak ve öğrencilerin günlük hayatta karşılaştıkları problemlere fen, teknoloji, mühendislik ve matematik bilgilerine dayanarak çözüm üretmelerini sağlamak gibi amaçlar bulunmaktadır.

STEM eğitiminin amaçları:

1. İş dünyası için STEM okuryazarlığına sahip olan bireyler yetiştirmek,
2. STEM alanında yetkin olabilmek
3. Ekonomiyi kalkındıracak üretimler yapabilmek
4. Geleceğin mesleklerine uyum sağlayabilmektir (Thomas, 2014).

Ülkelerin teknoloji ve bilim alanında lider rollerde olabilmesi ekonomik açıdan gücünü elinde tutan bir ülke haline gelebilmesi adına STEM eğitimi önemlidir (Lacey ve Wright, 2009). Çorlu, Capraro ve Capraro (2014)'ya göre STEM eğitimi Türkiye'nin küresel alanda ekonomik rekabet gücü için stratejik açıdan önemli bir yere sahiptir. Bu sebeple STEM eğitime önem verilmelidir.

Günümüzde ise değişen eğitim anlayışı doğrultusunda ülkelerin, eleştirel düşünebilen, problem çözme becerisine sahip, yaratıcı bireyler yetiştirme isteği ile eğitim hayatında da kendine son yıllarda yer bulmaya başlamıştır. İş dünyası ve ekonomi bağlamında itici yönde bir güç oluşturması için formal ve informal alanda bu konuda yapılan eğitimler artırılmalıdır. STEM eğitiminin bahsedilen eğitim ortamlarında uygulanmasında en önemli araç görevi gören faktörlerden biri öğretmenin kendisidir. Öğretmen, eğitim için öğrencilerin güdülenmesi konusunda hayati bir rol oynar (Yıldırım, 2020).

Millî Eğitim Bakanlığı'na ait liselerde STEM disiplinlerindeki öğretmen sayısı en çok kendini matematik, biyoloji, kimya teknolojisi, bilişim teknolojileri ve fizik branşında göstermiştir. 2017 yılında bir saha çalışması olarak düzenlenen MEB tarafından yürütücülüğü yapılan çalışmada ise Fen ve Sosyal Bilimler liseleri için %66 kadar göz ardı edilemeyen bir oranla öğretmenlerin bu konuda bilgi sahibi olmadıkları anlaşılmıştır. Bu açığı kapatmak için ise 2014 senesinde dahil olunan “Avrupa Okul Ağı” tarafından sürdürülen “Scientix Projesi” ile farkındalığın oluşması için çeşitli konferans ve çalıştayların düzenlenmesidir (Çolakoglu ve Gökben, 2017).

Öğretmenlerin eğitimin uygulamalarında yaşayacakları en büyük zorluklardan bir tanesi STEM'in disiplinlerarası olan bir yaklaşım olmasıyla nedeniyle öğretmenlerin kendi branşları dışında yeterince bilgi ve beceri olmamalarından kaynaklı yaşanacak aksaklıklardır. Çünkü örneğin bir matematik dersindeki bir sorunun çözümü için nasıl formüllerin bilinmesi ve ona göre uygulama yapılması gerekiyorsa STEM alanı içinde tam bir hakimiyet gereklidir. Pedagojik alan bilgisi ve alan uzmanlığının etkili bir şekilde öğrencilere sunulması da STEM

öğretmenlerinin yetiştirilmesi amacıyla mesleki gelişim programlarının detaylı bir şekilde hazırlanmasına öncülük etmiştir (Ejiwale, 2013).

Kısa süreli bir modelin benimsenmesinin aksine alanyazın incelendiğinde en az 80 saatlik bir eğitim süresiyle başlanması gerektiği ve öğretmenlerin sınıflarında öğrendiklerini pratiğe geçirmek adına uygulamalarına imkân verilmesi ve bu uygulamaların daha kolay bir işleyişle gerçekleşmesi adına da sürenin akademik yılın içine dahil edilerek yapılmasının önem taşıdığı bilinmektedir (Johnson ve Fargo, 2010; Supovitz ve Turner, 2000).

Fen Bilimleri Alanı, ülkelerin sosyal, kültürel ve ekonomik açıdan bakıldığında birçok konuda ileri düzeyde olmasında ve gelişmesinde kilit bir roledir. Fen eğitimi, doğayı bilen, bilimsel ve yaratıcı düşünme yetilerine sahip, eleştirme kabiliyeti yüksek, problemlere farklı pencerelerden bakabilen en genel ifadeyle 21. Yüzyıl becerilerine ve bilimsel süreç becerilerine hâkim fen konusunda okur-yazarı bireylerin yetiştirilmesini amaçlamaktadır (Hançer, Şensoy ve Yıldırım, 2003). Bu amaçla fen eğitiminde teknolojinin ve matematiğin kullanılmasıyla ve aynı zamanda mühendisliğin okullarda işlenmesiyle birlikte STEM eğitimi, fen eğitimi ile anılmaya başlamış ve kullanımı popülerleşmiştir. STEM eğitimi, öğrencilerin almış oldukları teorik bilgileri pratiğe dökmelerini sağlayarak problemlere çözüm önerisi getirmelerine imkân tanır. Fen eğitiminde de teorik bilgileri kullanarak uygulamalar yapmak önem kazanmıştır. Fen bilimleri eğitiminde STEM'e ilişkin konu/kazanımları 2018 Fen Bilimleri öğretim programında fen, mühendislik ve girişimcilik uygulamaları başlığı altında problemin belirlenmesinden ürünün sergilenmesi kadar olan tüm süreçte yapılması gerektiği vurgulanmıştır.

Okul öncesi dönemdeki çocuklar doğuştan merak duygusuna sahip olduklarından dolayı çeşitli malzemelerle çalışmalar yaparak bir şeyler denemek ve problem çözme becerileri açısından çabası bir anlayışa sahiptir (Dejarnette, 2018). STEM eğitimi tam da bu noktada çocukların tıpkı bir mühendis gibi düşünerek hareket etmesi için uygun bir ortam sunar. Erken çocukluk dönemindeki çocukların genellikle resistörler, motorlar ya da sensörlerle karşılaştığı ve çalıştığı gözlenmektedir (McClure et al., 2017). Bu anlayış çocukların derinlemesine düşünme becerilerine katkı sağlayarak araştırma temelli projelerde çalışmalarını konusunda onları motive etmektedir. 21.yüzyıl becerileri için gereken eleştirel düşünme, iş birliği, iletişim gibi temel yetkinlerle çocuğun donatılması ve çocuğun erken yaşlardan itibaren STEM eğitimi ile alakalı olması birçok faydayı da beraberinde getirmektedir. Okul öncesi eğitim programı değerler eğitimi, sağlık, çevre eğitimi gibi çok farklı boyutlarda ele alınıp değerlendirilmesine rağmen 21. yy. becerileri ve STEM eğitimine ağırlık verilmediği görülmüştür (Kardeş, 2020). Programda aktif bir şekilde bulunmayan bu disiplinlerarası yaklaşımın öğretmenden çocuklara doğru bir kaynaktan aktarılmasını sağlamak için okul öncesi öğretmen adaylarının ve öğretmenlerinin STEM eğitimi almalarına ve STEM eğitimi konusunda algılarını doğru şekilde yönlendirerek zihinlerinde yeterli bir şekilde yapılandırmalarına yönelik girişimlerde bulunulması gerekmektedir (Çiftçi ve Topçu, 2021).

Literatür taramasında elde edilen sonuçlar incelendiğinde öğretmen ve öğretmen adaylarının STEM uygulamaları ile ilgili olumlu düşünceye sahip oldukları ve faydalarını bildikleri, ancak zaman alıcılığı, malzeme eksikliği ve konu alanına yeterince hâkim olamama gibi konularda eksiklik yaşadıkları anlaşılmıştır (Siew, Amir ve Chong, 2015). Araştırmacılar bu eksikliklerin giderilebilmesi için öğretmen adaylarına ilgili eğitimlerin verilmesi ve eğitim fakültesi programlarında bu konuyu disiplinlerarası ele alan bir değişikliğe gidilmesine yönelik önerilerde bulunmuşlardır (Koyunlu ve Ünlü, 2018).

STEM eğitimiyle ilgili hedeflere ulaşmada okullarda 0-6 yaş dönemine tekabül eden okul öncesi eğitim ve diğer kademelere hizmet verecek farklı branşlardaki öğretmen adaylarının tutumları, bu etkinliklere yer verme konusunda motivasyonlarının tutarlılığı dikkate alınması gereken bir konudur. Alanyazında bu konuya ilişkin tek bir öğretmenlik grubu üzerinden yahut sadece görüşlerini belirlemeye yönelik çalışmalar vardır (Kızılay, 2018). Ancak okul öncesi ve fen bilgisi öğretmen adaylarının karşılaştırıldığı bir çalışmaya rastlanmamıştır. Araştırmanın bu boşluğu doldurması ve öğretmen adaylarının tutumlarının karşılaştırılması ve farkındalıklarını etkinliklere yansıtmadaki motivasyonlarının nelere bağlı olduğunun derinlemesine incelenmesi hedeflenmektedir. Sunulan bu bildiri öğretmen adaylarının branşları üzerinden nicel, nitel ve karma yöntem uygun olarak 3 temel problem durumunu ele almaktadır.

1. Öğretmen adaylarının demografik bilgileri farkındalık düzeylerini anlamlı bir şekilde yordamakta mıdır?
 - a. Öğretmen adaylarının farkındalık düzeylerinde cinsiyetin anlamlı bir etkisi var mıdır?
 - b. Öğretmen adaylarının sınıf düzeyi değişkenine göre farkındalık düzeyleri farklılık göstermekte midir?
 - c. Öğretmen adaylarının branşları ile farkındalık düzeyleri arasında anlamlı bir ilişki var mıdır?
2. Öğretmen adaylarının STEM etkinliklerine gelecekte yer vermesine yönelik motivasyonları nasıldır?
3. Öğretmen adaylarının STEM'e ilişkin farkındalıklarının etkinliklere yer verme motivasyonları üzerindeki etkisi nasıldır?

YÖNTEM

Araştırma Modeli

Araştırmanın deseni karma yöntem araştırmalarından yakınsayan paralel desendir. Yakınsayan paralel deseninde eşit önem verilen nitel ve nicel ait veriler eş zamanlı olarak aynı anda toplanmakla birlikte ayrı ayrı analizi gerçekleştirilir. Yorumlama kısmında ise nicel ve nitel bulgular aralarındaki benzerlik ve farklılıklar açısından kıyaslanma yapılarak araştırmanın esas amacı doğrultusunda daha iyi bir kavrayışa ulaşılmaya çalışılır (Şad, & Şahiner, 2016.)

Araştırmanın Örnekleme

Araştırmanın örneklem seçiminde ölçüt örnekleme yöntemi kullanılmıştır. Örnekleme, farklı üniversitelerin okul öncesi ve fen bilgisi eğitimi bölümlerinde öğrenim gören 3.ve 4.sınıf öğretmen adaylarından oluşturmaktadır. Öğrencilerin demografik özellikleri incelendiğinde, 3. Sınıflardan 35 kız ve 5 erkek öğretmen adayı çalışmaya katılırken, 4.sınıflardan 17 kız ve 6 erkek öğretmen adayı çalışmaya katılmıştır.

Veri Toplama Araç ve Yöntemleri

STEM'e Yönelik Farkındalık Ölçeği

Öğretmen adaylarının STEM eğitime ilişkin algılarını saptamak amacı ile Merder (2019) tarafından geliştirilmiştir. STEM farkındalık ölçeği, STEM eğitimi alan öğrencilerde gelişen çeşitli özellikleri belirlemeyi ve eğitimin getirmiş olduğu yenilikler üzerinde durmayı

hedeflemektedir. Ölçeğin uygulandığı öğretmen adaylarının verilen cevaplardan maddelere katılıp katılmama durumlarına göre STEM algılarının ve farkındalıklarının ne derecede olduğu 5li likert tipi ölçekte işaretlemeleriyle anlaşılmaktadır. Likert ölçeğine göre “Kesinlikle Katılıyorum (5) Katılıyorum (4) Kararsızım (3) Katılmıyorum (2) ve Kesinlikle Katılmıyorum (1)” şeklinde cevaplar alınacaktır. Ölçekte 32 madde vardır. Ölçekte katılımcıların STEM eğitiminin özellikleri ve yararları hakkındaki bilgilerini saptamak için konu ile ilişkin ifadeler yer almaktadır. Ölçek için toplanmış olan 575 veri SPSS programına girilerek uygun olma ve faktörleşmenin yapılabileceğini gösteren KMO ve Bartlett testleri de yapılmıştır. KMO için sonuç 0.95 Bartlett testi içinde $df=496$, $sig=0.00$ 'dır. Bu değerlere göre 32 maddelik ölçek için faktör analizinin yapılabilirliği kabul edilmiştir. Esas ölçeğin uyarlanması konusunda söz konusu araştırmacılar güvenilirlik için Cronbach's Alpha güvenilirlik katsayısına baktığında değer $.70$ 'in üzerinde çıktığı için ölçeğin ve alt boyutlarının güvenilirlik açısından yeterli düzeyde olduğu bilgisini sunmuşlardır. Ölçeğin tamamına ilişkin güvenilirlik katsayısı $.942$ olarak bulunmuştur (Merder,2019).

Nitel Sorular

Etkinliklere yer verme konusundaki motivasyonlarını değerlendirmek amacıyla ikisi fen bilgisi eğitimi ve biri de okul öncesi eğitimi alanında uzman üç kişinin uzman görüşü alınarak 12 adet açık ve kapalı uçlu soru hazırlanmıştır. Bunlar aşağıda yer aldığı şekildedir:

- 1) Lisans eğitiminiz sırasında STEM ile ilgili ders aldınız mı?
- 2) Lisans eğitiminiz sırasında derslerinizde STEM ile ilgili bilgiler aldınız mı?
- 3) STEM hangi bilim alanlarıyla (disiplinlerle) ilişkilidir?
- 4) STEM denildiğinde aklınıza neler gelmektedir?
- 5) STEM eğitiminin fen öğretimine/ okul öncesi öğretimine katkısı olduğunu düşünüyor musunuz, kısaca açıklayınız?
- 6) Lisans eğitimi sırasında alan yazında STEM ile ilgili yapılmış güncel yayınları takip ediyor musunuz?
- 7) Etkinlikleri/Dersleri işlerken STEM uygulamalarını tercih eder misiniz? Neden?
- 8) STEM etkinliklerine yer verme konusundaki motivasyonunuz ne düzeydedir?
- 9) Motivasyonunuzu etkileme noktasında daha önce bu konuda eğitim alma durumunuz bir farklılık yaratır mı?
- 10) Fen bilimleri/ okul öncesi dersinde STEM etkinlikleri yaptırmanın avantajları nelerdir?
- 11) Fen bilimleri/ okul öncesi dersinde STEM etkinlikleri yaptırmanın dezavantajları nelerdir?
- 12) Kendi branşınıza yönelik olarak motivasyon düzeyinizi diğer öğretmenlik branşlarına göre yeterli bulma durumunuz nedir?

Verilerin Analizi

Nicel veriler SPSS 27 programı kullanılarak analiz edilmiştir. Verilerin analizinde ilk adım olarak verilerin dağılımının belirlenmesi amacı ile normallik testi yapılmıştır. Analiz sonucunda elde edilen Kolmogorov-Smirnov değeri $p<0,05$ düzeyinde anlamlı bulunmadığından ve skewness ve kurtosis değerleri de ± 3 aralığında yer almadığından verilerin normal dağılım

göstermediği kabul edilmiştir. Bu nedenle non-parametrik testlerden Kruskal Wallis-H Testi ve Mann-Whitney U Testi uygulanmıştır. Geliştirilen ölçekte herhangi bir olumsuz bir madde yoktur. Bu yüzden hiçbir maddenin ters kodlanması gerekmemiştir.

Nitel verilerin analizinde öğretmen adaylarının 12 adet soruya verdikleri cevaplar içerik analizi yöntemi ile kodlanmıştır ve birbirine benzeyen cevaplar uygun temalar çerçevesinde düzenlenerek ifadelerde değişiklik yapılmaksızın doğrudan yanıtlara yer verilmiştir. Katılımcıların gizliliğine önem verilerek her bir katılımcı için branş ve sınıf düzeylerine göre 'FÖ3, FÖ4, OÖ3, OÖ4' şeklinde kodlar verilmiştir. Örnek ifadelerin kullanımında araştırmacıların daha önce STEM eğitime katılıp katılmadığına ilişkin olarak da 'Evet: E' 'Hayır:H' 'Duydum:D' şeklinde kodlar verilerek Excel tablosu üzerinden karşılık gelen numarasına göre yeni kodlar da oluşturulmuştur. (Örnek: OÖ4_53E)

BULGULAR

Nicel Bulgular

Bu bölümde “Öğretmen adaylarının demografik bilgileri farkındalık düzeylerini anlamlı bir şekilde yordamakta mıdır?” problemine ait alt problem bulguları paylaşılmıştır. Araştırmamızın birinci alt problemi olan “Öğretmen adaylarının farkındalık düzeylerinde cinsiyetin anlamlı bir etkisi var mıdır?” sorusuna ait bulgular Tablo 1’de gösterilmiştir.

Tablo 1. Öğretmen adaylarının STEM farkındalık düzeylerinin cinsiyet değişkenine göre Mann-Whitney U testi sonuçları.

Cinsiyet	N	S.T.	S.O.	U	z	p
Kadın	52	32.27	1678.00	272.000	-.254	.800
Erkek	11	30.73	338.00			
Toplam	63					

Tablo 1 incelendiğinde öğretmen adaylarının STEM farkındalık ölçeğinden almış oldukları puanların, cinsiyet değişkenine göre anlamlı bir farklılık göstermediği belirlenmiştir ($p>0.05$).

Araştırmamızın ikinci alt problemi olan “Öğretmen adaylarının sınıf düzeyi değişkenine göre farkındalık düzeyleri farklılık göstermekte midir?” problemine ait bulgular Tablo 2’de gösterilmiştir.

Tablo 2. Öğretmen adaylarının STEM farkındalık düzeylerinin sınıf düzeyi değişkenine göre Mann-Whitney U testi sonuçları.

Sınıf	N	S.T.	S.O.	U	z	p
3.sınıf	40	28,38	1135.00	315.000	-2.073	038*
4.sınıf	23	38,30	881.00			
Toplam	63					

$p<0.05$

Tablo 2 incelendiğinde öğretmen adaylarının STEM farkındalık ölçeğinden almış oldukları puanların, sınıf düzeyine göre 4. Sınıf öğrencilerinin lehine ($SO=1135.00$, $U=315.00$, $p<.05$) anlamlı bir farklılık gözlenmiştir.

Araştırmamızın üçüncü alt problemi olan “Öğretmen adaylarının branşları ile farkındalık düzeyleri arasında anlamlı bir ilişki var mıdır?” problemine ait bulgular Tablo 3’de gösterilmiştir.

Tablo 3. Öğretmen adaylarının STEM farkındalık düzeylerinin branş değişkenine göre Mann-Whitney U testi sonuçları.

Branş	N	S.T.	S.O.	U	z	p
Fen bilgisi	48	33.00	1584,00	312.000	-.776	.438
Okul öncesi	15	28.80	432,00			
Toplam	63					

Tablo 3 incelendiğinde öğretmen adaylarının STEM’e yönelik farkındalık düzeylerinin branş değişkenine göre anlamlı bir fark göstermediği belirlenmiştir.

STEM ile ilgili bir eğitim alan ya da almayan öğretmen adaylarının karşılaştırılmasına ait bulgular Tablo 4’te verilmektedir.

Tablo 4. Öğretmen adaylarının STEM’e ilişkin herhangi bir eğitim/seminer/kongre katılmalarına göre Kruskal Wallis-H Testi sonuçları.

Değişken	N	H	sd	p
Evet	17	1.419	2	.492
Hayır	39			
Duydum	7			
Toplam	63			

Öğretmen adaylarının STEM’e ilişkin bir eğitim alma durumlarına göre aralarındaki fark incelendiğinde gruplar arasında anlamlı bir farklılık bulunmadığı belirlenmiştir ($p>0.05$).

Nitel Bulgular

“STEM Öğretiminin Katkı Durumu” kategorisine ilişkin bulgular

STEM yaklaşımının öğretime olan katkıları ile ilgili bulgular Tablo 5’de verilmektedir.

Tablo 5. STEM yaklaşımının öğretime olan katkıları ile ilgili öğretmen adaylarının görüşleri

Tema	Görüldüğü Grup	Örnek İfade
Hayır	FÖ3	“Hayır” (FÖ3_11H) “Evet. Yaratıcılık özelliğine katkısı olur” (FÖ3_35D) “Evet çünkü çocukların yaratıcılıklarını geliştiriyor” (FÖ4_22H)
Evet yaratıcılığı geliştirir	FÖ3, FÖ4, OÖ3, OÖ4	“Evet bunun uygulanması yaratıcılığı ve katılımı arttıracaktır” (OÖ3_27H) “Evet düşünüyorum çocukların yaratıcı olmasını destekler” (OÖ4_40H)

Öğretmen adayları STEM eğitiminin katkı durumuna yönelik olarak ‘Hayır’ ve ‘Evet, yaratıcılığı geliştirir’ olarak iki tema ile sınırlı kalmışlardır. Evet diyenler yaratıcılığı geliştirmesine yönelik fayda sağladığıyla ilgili olarak yorumda bulunmuşlardır. FÖ3, FÖ4, OÖ3, OÖ4 olmak üzere tüm öğretmen adaylarının katılımı gerçekleşmiştir.

“STEM Uygulamalarını Tercih Durumu” kategorisine ilişkin bulgular

Çalışmanın nitel kısmında öğretmen adaylarına öğretmen olduklarında STEM etkinliklerini kullanıp kullanmayacakları sorulmuş ve elde edilen cevaplar aşağıdaki başlıklar altında toplanmıştır.

Tablo 6. Öğretmen adaylarının STEM etkinliklerini öğretimlerinde kullanma durumları ile ilgili görüşleri

Tema	Görüldüğü Grup	Örnek İfade
Evet, kalıcı öğrenmeyi sağlar	FÖ3, OÖ3, OÖ4	“Evet. Çünkü öğrencinin eğlenerek kalıcı bir şekilde konuyu öğrenmesini sağlıyor” (FÖ3_5H) “Evet öğrenmeyi kalıcılaştırdığını düşünüyorum” (OÖ3_16E) “Evet çünkü kalıcı öğrenmeyi sağlar” (OÖ4_51H)
Okul öncesinde tercih etmem	OÖ4	“Okul öncesinde tercih edeceğimi çok fazla düşünmüyorum.” (OÖ4_14H)
Zamana bağlı ederim	FÖ4	“Zamana bağlı ederim.” (FÖ4_21H)
Evet	FÖ3, FÖ4, OÖ3, OÖ4	“Evet” (FÖ3_41H, FÖ4_45H, OÖ4_H) “Evet çünkü yararlı” (OÖ3_38H)

Öğretmen adayları STEM uygulamalarına yönelik olarak farklı temalar ve farklı gruplara ayrılarak düşüncelerini belirtmişlerdir. Evet diyenlerin kalıcı öğreniminde beraber geleceğine ilişkin algıları vardır. OÖ4 grubundaki bir öğretmen adayı ise ‘Okul Öncesinde Tercih Etmem’ seçeneğinden yana bir görüşe sahiptir.

“STEM Etkinliklerine Yer Verme Konusundaki Motivasyon” kategorisine ilişkin bulgular

Öğretmen adaylarının STEM etkinliklerini kullanmaya dönük motivasyon düzeyleri ile ilgili soruya verdikleri cevapların analizi Tablo 7’de verilmektedir.

Tablo 7. Öğretmen adaylarının STEM etkinliklerini kullanmaya dönük motivasyon düzeyleri ile ilgili bulgular

Tema	Görüldüğü Grup	Örnek İfade
Orta	FÖ3, FÖ4, OÖ3	“Orta” (FÖ3_7H, FÖ4_22H, OÖ3_16E)
Yüksek	FÖ3, FÖ4, OÖ3	“Yüksek düzeydedir” (FÖ3_62E, FÖ4_9H, OÖ3_17H)
Yok	FÖ3	“Yok” (FÖ3_4H)

OÖ4 öğretmen adaylarının ortak tema altında bir cevapları bulunamamıştır. FÖ3, FÖ4 olarak belirlenen iki grubun ise cevapları ise “Yüksek” ve “Orta” olarak sınırlı kalmıştır.

“Eğitim Alma Durumu Farklılık Yaratma” kategorisine ilişkin bulgular

Öğretmen adaylarının STEM’e dönük eğitim almalarının yaklaşımı öğretimlerine kullanmalarına dönük nasıl bir etkiye sahip olabileceği ile ilgili görüşleri Tablo 8’de verilmektedir.

Tablo 8. Öğretmen adaylarının STEM’e dönük eğitim alma ile ilgili görüşleri

Tema	Görüldüğü Grup	Örnek İfade
Evet	FÖ3, FÖ4, OÖ3, OÖ4	“Evet” (FÖ3_48D, FÖ4_29E) “Evet. Konuya daha hâkim olurum” (OÖ3_31E) “Evet yaratır daha çok bilirim daha rahat uygulama yaparım.” (OÖ4_52E)
Hayır	FÖ3	“Hayır” (FÖ3_42E)
Belki	FÖ3	“Belki. Cesaretlenebilirim.” (FÖ3_60H)

STEM eğitimine ilişkin olarak eğitim alma durumlarının farklılık yaratmasına ilişkin olarak ise okul öncesi öğretmen adayları ‘Evet’ cevabında birleşmişlerdir. ‘Hayır’ veya kararsızlıklarını işaret eden ‘Belki’ seçeneğinde yorumları bulunmamaktadır.

“STEM Etkinlikleri Yaptırmanın Avantajları” kategorisine ilişkin bulgular

Öğretmen adaylarının STEM etkinliklerini yaptırmanın avantajları ile ilgili görüşleri Tablo 9’da verilmektedir.

Tablo 9. Öğretmen adaylarının öğretimde STEM etkinliklerini kullanmanın avantajları ile ilgili görüşleri

Tema	Görüldüğü Grup	Örnek İfade
Gündelik yaşamla ilişkilendirmede katkı sağlar	FÖ3, FÖ4, OÖ3, OÖ4	<p>“Çocuklar günlük hayatla bağdaştırdıkları her şeyi daha kolay ve güzel öğrenir.” (FÖ3_58H) ‘Çocuklar günlük hayat problemlerine daha farkındalıklı olacaktır.’ (FÖ4_23E)</p> <p>“Yaparak yaşayarak öğrenme imkânı sağlar üst düzey düşünme becerilerini geliştirir” (OÖ3_16E)</p> <p>“Öğrencilerin hayatlarında kullanabilecekleri bilgi ve uygulamaları sunarak anlamlı bir öğrenme amaçlar.” (OÖ4_18H)</p>
Kalıcılık Sağlar	FÖ3, FÖ4, OÖ3, OÖ4	<p>“Çok öğrenmeyi kalıcı hale getirir” (FÖ3_56H)</p> <p>“Konunun kalıcılığı artar. Eğlenerek öğrenilir” (FÖ4_8H)</p> <p>“Daha etkili öğrenme.” (OÖ3_19H)</p> <p>“Erken yaşlarda ilgilerini çekebilir. Öğrenmelerini daha kalıcı hale getirir.” (OÖ4_40H)</p>
Yaratıcılık Sağlar	FÖ3, FÖ4, OÖ4	<p>“Yaratıcılık gelişir. Problem çözme becerileri gelişir grup çalışmaları yapılabilir.” (FÖ3_35D)</p> <p>“Öğrencilerin yaratıcılıkları gelişir” (FÖ4_45H)</p> <p>“Çocukların teknik yeterliliğini geliştirir hayal gücünü artırır” (OÖ4_51H)</p>
Özgüveni arttırır.	FÖ3, FÖ4	<p>“Öğrencilerin özgüvenini ve derse ilgisini arttırır.” (FÖ3_2H)</p> <p>“Öğrencilerin özgüveni gelişir. Bir şeyler başardıklarını, ortaya koydukları ürünleri veya fikirleri görmek onları öğrenmeye motive eder. Derse olan ilgi ve alakaları artar.” (FÖ4_55H)</p>
İş birliğini arttırır.	FÖ3, FÖ4	<p>“Birbirleriyle etkileşimli olmalarını sağlayabilir.” (FÖ3_42E)</p> <p>“3D materyal hazırlamak gereken konularda sınıfta gruplar halinde Stem etkinliği yaptırmak daha iyi öğrenmeyi sağlar.” (FÖ4_20E)</p>
Bilişsel düzey becerilerini arttırır.	FÖ3, FÖ4, OÖ4	<p>“Öğrencinin bilişsel düzey becerileri artıyor” (FÖ3_46H)</p> <p>“Etkili düşünme becerileri geliştirmesini sağlar” (FÖ4_25E)</p> <p>“Bilgilerini analiz ederek ürün oluşturup bilişsellik katar.” (OÖ4_53E)</p>

STEM etkinliklerinin avantajları ile ilgili olarak öğretmen adaylarının katılım düzeyleri oldukça yüksektir. Her grup belirli temalar altında eşleşerek avantajları konusunda oldukça güçlü bulgular edinilmesini sağlamıştır. Avantajları ile ilgili olarak 6 tema oluşturulmuştur. Bu temalar incelendiğinde öğretmen adaylarının STEM etkinliklerinin bilişsel beceriler, kalıcı öğrenme ve bilgileri günlük yaşamla ilişkilendirme gibi bilişsel özelliklerin yanısıra, işbirliği, özgüven ve yaratıcılık gibi 21. Yüzyıl becerilerinin gelişimine de katkı sağladığının bilincinde oldukları görülmektedir.

“Branşa Yönelik Motivasyon Düzeyi” kategorisine ilişkin bulgular

Öğretmen adaylarının branşlarının STEM etkinliğine uygunluğu ve uygulanabilirliği ile ilgili motivasyon düzeylerini gösteren ifadeleri Tablo 10’da verilmektedir.

Tablo 10. Öğretmen adaylarının branşlarının STEM etkinliklerine yönelik uygunluğu ile ilgili görüşleri

Tema	Görüldüğü Grup	Örnek İfade
Fen Konularına Uygun	FÖ3, FÖ4	“Fen konularına daha uygun olduğunu düşünüyorum” (FÖ3_33H) “Bence fen bilimleri Stem eğitiminin en etkili kullanılacağı alandır çünkü fen hayatın kendisidir hayatın mantıklı açıklamasıdır.” (FÖ4_23E)
Yetersiz	FÖ3, OÖ3	“Yetersiz” (FÖ3_64H) “Şuan pek yeterli bulamıyorum.” (OÖ3_19H)
Yüksek. Okul öncesinde diğer branşlara göre daha şanslıyız.	OÖ3, OÖ4	“Okul Öncesi eğitimi her yerde olabilir. Bu yüzden diğer branşlara nazaran çok şanslı olduğumuzu düşünüyorum.” (OÖ3_15D) “Yüksek. Okul Öncesi candır” (OÖ4_40H)
%80	FÖ4	“%80” (FÖ4_9H)
Motive Artabilir.	FÖ3	“Motive daha da artabilir diye düşünüyorum” (FÖ3_43H)
Yeterli	FÖ3, OÖ3, OÖ4	“Yeterli” (FÖ3_56H) “Orta düzeyde yeterli buluyorum” (OÖ3_17H) “Yeterli olduğunu düşünüyorum” (OÖ4_14H)
Fen olarak diğer branşlara göre avantajlıyız.	FÖ3	“Fen bilgisi öğretmenliğini çok daha yeterli buluyorum. Gündelik yaşama uygun olması eğlenceli yanı” (FÖ3_62E)

Araştırmanın esas noktalarından birini oluşturan motivasyon sorusu ile ilgili olarak 7 tema karşımıza çıkmaktadır. Fen bilgisi eğitimi öğretmen adaylarından FÖ3 grubu kendi branşlarını avantajlı sayarken OÖ3 ve OÖ4 grubu ise okul öncesinin şanslı olduğunu belirtmişlerdir. FÖ4 grubu sayısal bir veri kullanarak %80 oranında motive olduğunu belirtmiştir.

Nicel ve Nitel Verilerin Birleştirilmesi

Veri birleştirme aşamasında nicel ölçek maddelerine verilen cevapların frekans ve yüzde değerleri bulunmuş ve benzer nitelikte nitel bulgu olup olmadığı değerlendirilmiştir. Elde edilen birleştirme tablosu Tablo 11’de verilmektedir.

Tablo 11. Nitel ve nicel verilerin birleştirildiği ortak gösterim tablosu

Kategori	Nicel Bulgu		Nitел Bulgu
	Ölçek maddesi	f %	
Gündelik yaşamla ilişkilendirmede katkı sağlar.	STEM eğitimi derste, gerçek yaşam ile içerik arasında ilişki kurulmasını sağlar	62 98.41	“Çocuklar günlük hayatla bağdaştırdıkları her şeyi daha kolay ve güzel öğrenir.” (FÖ3_58H)
	STEM eğitimi öğrencilere öğrendiklerini uygulama ve günlük yaşamda kullanma fırsatı verir	62 98.41	

Kalıcılık sağlar.	STEM eğitimi, öğrenilen bilgilerin kalıcı olmasını sağlar.	62	98.41	<i>“Daha etkili öğrenme.”</i> (OÖ3_19H)
Yaratıcılık sağlar.	STEM eğitimi öğrencilerin teknoloji alanındaki yaratıcılıklarını geliştirir.	63	100	
	STEM uygulamaları öğrencilerde hayal gücünü artırır.	60	95.23	<i>“Çocukların teknik yeterliliğini geliştirir hayal gücünü artırır.”</i> (OÖ4_51H)
	STEM eğitimi problemlere yaratıcı çözümler üretilmesini amaçlar.	59	93.65	
Özgüvenini artırır.	STEM uygulamaları öğrencinin özgüvenini artırır.	60	95.23	<i>“Öğrencilerin özgüvenini ve derse ilgisini artırır.”</i> (FÖ3_2H)
İş birliğini artırır.	STEM eğitiminde öğretmen iş birliğine açık olmalıdır.	60	95.23	<i>“3D materyal hazırlamak gereken konularda sınıfta gruplar halinde Stem etkinliği yaptırmak daha iyi öğrenmeyi sağlar.”</i> (FÖ4_20E)

Nitel ve nitel verilerin karma yöntemle uygun olarak birleştirilmesi noktasında görüşme formunda öğretmen adaylarının avantajları kısmında cevap vermiş olduğu cevaplara ait temalar ile ölçekte buna karşılık gelen maddelerin frekans ve yüzdeleri hesaplanmıştır. Nitel bulgulara da örnek verilen tablo da ölçğe ait frekans değerleri 59-63 aralığında değişmektedir. Temalar ile ölçek maddeleri arasında uyumluluk bulunmaktadır. Verilen cevaplar birbirini desteklemektedir.

SONUÇ, TARTIŞMA VE ÖNERİLER

Fen bilgisi eğitimi ve Okul öncesi eğitimi öğretmen adaylarının STEM'e ilişkin farkındalıklarının değerlendirilmesi ve motivasyonlarının incelenmesi için yapılan bu çalışmada bazı sınırlılıklar da mevcuttur. Bu sınırlılıklar online olarak yapılan ve Google Forms olarak sunulan veri toplama aracına olan katılımın 63 kişi ile tamamlanması ve okul öncesi öğretmen adaylarının formları doldurma konusunda yeteri kadar gönüllü olmamasıdır. Bu duruma rağmen çalışma sonunda öğretmen adaylarının STEM yaklaşımını doğru bir şekilde tanımlayabildikleri belirlenmiştir. Fen bilgisi öğretmen adayları ile gerçekleştirilen bir çalışmada da öğretmen adaylarının yaklaşımı doğru bir şekilde tanımlayabildikleri belirlenmiştir (Ekici, 2022). Okul öncesi öğretmen adaylarının konuyla ilgili zihinsel modelleri incelendiğinde de yine STEM yaklaşımına dahil olabilecek tüm bileşenlere sahip oldukları görülmektedir. Bu yönüyle çalışma literatürle uyum göstermektedir.

Bunun yanı sıra her iki branştaki öğretmen adaylarının da benzer bir farkındalık düzeylerine sahip oldukları, ancak sınıf seviyelerine göre ise 4. sınıfların farkındalıklarının daha yüksek olduğu belirlenmiştir. Fen Bilgisi ve matematik öğretmen adaylarının STEM farkındalık düzeylerinin karşılaştırıldığı başka bir çalışmada da branşa göre bir farklılık olmadığı belirlenmiştir (Er & Acar, 2020). Bununla birlikte Er ve Acar (2020) dört sınıf düzeyinde de çalışmış ve 3 ve 4. sınıf düzeylerinde bir farklılık olmadığını, 3 ve 4. sınıfların 1 ve 2. sınıflarla aralarında bir fark olduğunu belirlemişlerdir. Bu farklılığın en önemli nedeni örneklem

büyüklerindeki farklılıklar olabilir. Öğretmen adaylarının görüşleri ile farkındalıkları karşılaştırıldığında birbiri ile tutarlı sonuçlar elde edildiği belirlenmiştir.

Çalışmanın bulguları ve sonuçlarına ilişkin olarak fen bilgisi öğretmen adaylarının kendilerini geliştirme ve pratik kazanarak motivasyonlarını arttırmak için güncel yayınları daha sık takip ederek ulusal ve uluslararası projelere katılması önerilmektedir. Okul öncesi öğretmen adaylarına yönelik olarak ise farkındalıklarını ileri düzeye taşımak için müfredatlarına ‘Okul Öncesi Eğitimde STEM’ dersi eklenmeli ve belirli aralıklarla konuya ilişkin seminer ve konferanslar düzenlenmelidir.

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BARRIERS TO COOPERATION BETWEEN TEACHERS AND PARENTS OF CHILDREN WITH AUTISM SPECTRUM DISORDER

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ANNOTATION

This paper explores the barriers to collaboration between educators and parents of children with autism spectrum disorder (ASD). The child's engagement in education and further social life depends on the cooperation between the child's parents and the kindergarten teacher. However, this fundamental cooperation is hampered by the difficult working conditions of the teacher. Another obstacle is the stress experienced by the parents of a child with ASD. In order to describe and investigate the experiences of pre-school teachers in the face of an ASD child's tantrum, a phenomenological research was conducted. The research aimed to 'capture' the phenomenon in the 'here and now', asking what it means for an educator to experience a rage attack in the presence of a child. The question allows us to discover what an educator experiences when confronted with a child's behaviour that harms himself or others? These questions were inspired by a review of research literature and sources, which shows that the main barriers to collaboration between educators and parents of a pre-school child with ASD are (a) the lack of preparation of educators for working with a child with ASD.

The findings of the research reveal that the cooperation between educators and parents is stagnating due to the difficult working conditions of the educator: the educator is working alone with an overcrowded group, does not receive financial support to ensure adequate competence, does not have the necessary assistant, does not have the competence to cooperate with parents of a child with ASD, and is working contact time with the children overtime, which makes him/her incapable of establishing a cooperative relationship with the parents of the children. Another barrier to parent-teacher collaboration is the apparent lack of preparation of teachers to work with children with ASD and their families. Despite the recent renewal of the curricula for pre-school and pre-primary education in higher education institutions, more emphasis has been placed on knowledge of ASD, the specificities of educating children with ASD, and strengthening competences in working with the family.

The phenomenological research on the experiences of the under-blanket revealed that (a) the participants experienced a loss of power (susitisation), often saying that they could not do anything, that they did not know how to act in this situation. Also common to the stories is that the children's fit of rage starts suddenly, unexpectedly, and the educator was unable to take any action for a few moments; (b) sensory fear and insecurity is revealed when, after the stagnation (shock), the educator's actions are directed towards defending the children around him/her and him/her. The participants in the research also experience insecurity because they are practically unprepared to deal with children's sudden fits of rage.

Keywords: ASD child, educator, parents, interference, inclusive education, tantrum.

INTRODUCTION

Relevance

According to the World Health Organisation's public health monitoring, the number of people with ASD "has increased up to 10-fold in some countries over the past 15 years" (Diržytė, Mikulėnaitė, Kalvaitis, 2016, p. 4). For example, in the United States, one in fifty children was born with an ASD in 2018 (Kogan, Vladutiu et al., 2018). Lithuania has also seen an increase in the number of children with ASD: in 2011-2015 alone, "the number of all types of autism

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spectrum disorders has increased (in some cases, more than doubled or tripled)" (Diržytė, Mikulėnaitė, Kalvaitis, 2016).

Pre-school and pre-primary education institutions have the first and greatest responsibility for the education of children with ASD. According to S. Baron-Cohen (2016, p. 2), one way to reduce the symptoms of ASD is through early intervention and child education. Early intervention takes place when the child attends special therapy, while inclusive education takes place in the kindergarten in a normal development peer group.

Inclusive education for children with ASD in pre-school and pre-primary mainstream education poses challenges for educators, as early childhood education is different for every child with ASD. The area and degree of developmental disability is unique in each case, and the disorder may be accompanied by different mental and physical disabilities. The educator is therefore confronted with a wide range of manifestations of the disorder. This means that the inclusion of each child with ASD in a mainstream group requires specific pedagogical knowledge (for example, how to manage children's temper tantrums) and the ability to adapt the educational environment and personalise the educational process.

There is no doubt that cooperation between parents and educators of ASD children is crucial if the common goal is to develop a person who can live with others and be independent. "Perhaps through joint interaction there will be a realisation that we can no longer impose the attitudes and rules of a world that no longer exists, but that we must learn to be together and to create a shared world", as L. Duoblienė states (2018, p. 319)

Parents know the most subtle situations in a child's life and their reactions to them. Cooperation between parents and teachers is therefore essential for the child's development. So it becomes important not only to educate the child, but to educate him not in any way, not by indoctrination, but by creating and maintaining a dialogical education. It is impossible to expect successful child-centred education without dialogicity, i.e. activities based on mutual trust, respect and support, communication and cooperation. It is therefore essential to have a unified approach and a unified goal: to optimise cooperation between parents and pre-school and pre-primary teachers and the organisation of the educational process.

The article uses the terms *inclusion*, *inclusive education*, *inclusion*. This is in line with the EU translators' preference for translating the term 'inclusive' as 'inclusion' in the official keyword glossary (ESIUA, 2014, p. 53), and for translating other education-related terms, such as 'inclusive education' and 'inclusive education setting' as 'inclusive education' and 'inclusive educational environment', respectively (ibid). This article therefore uses both terms interchangeably:

- a. synonymously, for example, when a verb or adjective will be needed to denote "inclusion" (i.e. "to include" or "after inclusion");
- b. Chapter 2, when I name the broad phenomenon ("inclusion" and its derivatives), and when I mark the stages, parts, development or becoming of inclusion ("inclusive", "inclusiveness", "inclusiveness", "inclusiveness" and their derivatives).

Novelty

The problem of autism in children has been widely researched in sociological (Ainscow, 2005, Sebba, 2009), biomedical (Lesinskienė, Pūras et al. 2001, Tantam, 2009, Bauminger-Zviely,

2014), and pedagogical (Kondratavičienė, 2018) aspects. In education, research focuses more on special-intervention education of children with ASD (Steponienienė, 2019), adaptation difficulties (Bankauskienė, Jegelvičienė, 2006), educational challenges (Tamašiūnienė, Mikulėnaitė, Petrulytė, Rastenskis, Juocevičius, 2012). There is research on cooperation between educators and parents in the education of children with ASD. These are often contextual, but there is still little research on educator-parent collaboration in the education of preschool and pre-school children with ASD.

In Lithuania, the 2019 Action Plan for Supporting Children Diagnosed with Autism or Other Developmental Disorder 2019-2020 (Order V-499), approved by the Ministers of Health, Education, Science and Sport, Social Security and Labour, reveals that schools and kindergartens have been selected to have separate groups for children with ASD. The separate groups are composed only of children with ASD, which means that the proposed model is not inclusive. This is confirmed by the European Agency for the Development of Special and Inclusive Education, which clearly defines: 'Inclusive education is a systemic approach as opposed to *patching holes*' (2013, p. 77). Inclusive education is understood as "a means to increase the achievement of all learners through presence (access to education), participation (quality of learning) and achievement (learning processes and outcomes)" (European Agency for the Development of Special and Inclusive Education, 2014b, p. 11).

The right of a child with ASD to belong to society is guaranteed by the United Nations Convention on the Rights of the Child (Article 23) and the right to inclusive education is protected by the Convention on the Rights of Persons with Disabilities (Article 24). However, autism spectrum disorder, often accompanied by comorbidities (Gillberg, Billstedt, 2000, p. 321), encourages parents, doctors and educators to make a demanding assessment of a child's ability to attend a mainstream group in kindergarten.

According to the ICD-10 diagnostic criteria, childhood autism includes both severe autism and the relatively mild Asperger's syndrome. In the case of mild to moderate autism spectrum disorder, the child can attend mainstream pre-school and pre-primary education and may be assigned to a support group (a teacher or a child's assistant/assistant). Inclusive education can therefore be implemented to a high standard for a child with ASD, taking into account the expectations of the child, "his/her parents/guardians, the specificities of his/her developmental needs, and the needs for assistance and services, while preventing drop-outs from the education system" (Inclusive Education Development Plan, 2014, No 17).

The dilemma of collaboration between educators and parents of a child with ASD

According to S.E. Bryson, S.J. Rogers, E. Fombonne (2003), it is now possible to diagnose an ASD in a child as young as 18-24 months. Prompt diagnosis of ASD helps parents and educators to focus and act in a purposeful way in the child's education. In Lithuania, the diagnosis of ASD in children was (until the end of 2019) delayed: the Ministry of Health of the Republic of Lithuania "did not review and update the list of diagnostic tests to be used for childhood developmental disorders for more than 15 years (until 2019)" (State Audit Office, 2016, p.6). As a result, when children were admitted to pre-school institutions and educators were confronted with behavioural problems (including sudden fits of rage), educators recommended testing for possible developmental disorders, but ASD diagnosis was based on outdated tests, and the insufficient number of specialists and facilities at the Child Development Centre (ibid., 2016, p. 6) slowed down the diagnosis process. As a result, the majority of children with ASD were

diagnosed late in life, and were usually diagnosed by a paediatrician in pre-school or school-age children. Of course, until the diagnosis was made, there were no educational guidelines and recommendations for the educator from the Child Development Centre; and until there were educational guidelines, the educator could not tailor an appropriate education for the child, synchronised with other developmentally appropriate therapies for the child (outside of the pre-school). For the same reason, cooperation between educators and parents was not developed. Parents often did not inform the educational establishment about the child's educational peculiarities, and educators, when confronted with children with ASD, did not know how to work with such children, and moreover did not know how to communicate with the child's parents, especially on the subject of the child's tantrums.

From 2020, the diagnosis of ASD in children is being accelerated, which could immediately enable targeted collaboration between parents and the child's teacher, but the preamble to such education - the collaboration between the pre-school teacher and the parents of the child with ASD - is stuck.

Disturbances to teachers' working conditions

According to the State Audit Report "Are we making the most of pre-school education to ensure a more successful future for children" (State Audit Office 2018, p. 4), about one third (32%) of the audited institutions in Lithuania do not comply with hygiene norms - groups are overcrowded. One pre-school teacher usually has to work with 20 or more children at a time. The norm stipulates that teachers must work 33 contact and 3 non-contact hours per week. If an establishment is short of teachers, the 3 non-contact hours are not available, and the teachers do their preparation work after working hours. The legislation states (ibid., p. 4) that more than one third of the establishments have not been able to provide the necessary competency development for pre-school teachers, and as a result, the teachers do not have the opportunity to improve their skills in working with children with special needs.

The audit also found that "Children with special educational needs received a 35% increase in the pupil basket for 4 hours of education per day. A child with such needs may spend about 10 hours a day in a pre-school institution and needs the support of an education support specialist" (State Audit Office, 2018, p. 3). Such funding does not encourage the development of inclusive education. As many as "74% of children in pre-school education have special educational needs", but "only 2 out of 50 institutions had teacher assistants and only in special groups" (State Audit Office, 2018, p. 3). Although early intervention and support for children with special educational needs is most effective, if special educational needs are not identified in a timely manner, or if specialists are not available to meet these needs, children with special educational needs do not receive all the help they need.

It is obvious that a teacher working alone with an overcrowded group, who does not have the time and the financial support of the institution to ensure competence (State Audit Office 2018, p. 4), who works with an overcrowded group for 36 contact hours a week and who does not have a teaching assistant to ensure that the children's special needs are met is not in a position to establish an appropriate cooperative relationship with the parents of the children. Serious challenges in the education of a child with ASD (e.g. sudden fits of rage) remain unaddressed, misunderstood and unresolved.

Disruption due to teacher unpreparedness

Five colleges and four universities in Lithuania train pre-school teachers. There is widespread awareness of the problems that educators face when working with children with ASD. Teacher preparation is identified as one of the reasons for the quality and success of teachers' work with children with ASD.

In writing the article, it was important to review the curricula that train pre-school teachers, paying attention to whether and how much attention is paid to the development of teachers' competences in cooperation with parents. This is an issue worthy of further investigation, but the authors did not intend to carry out a detailed contingent analysis of the curricula. The only information reviewed was that which is freely available to the public on the websites of higher education institutions and on the Open Information Consultancy System (AIKOS).

The special competences that a future teacher acquires are clearly identified by the colleges, such as one college's statement: 'Respects the individuality of the child. Recognise and take into account children's individual needs, help them overcome educational difficulties, refer parents/guardians for counselling and pedagogical support, and cooperate with educational support specialists'¹. The same, more modestly, is stated by another college: "Will understand the educational context of children with special educational needs (inclusive education) and gifted children."²

One university offers a special module for early childhood educators that includes as many as 10 credits³ "Developing social inclusion skills". Another university trains pre-school and primary education specialists and provides 5 credits⁴ to equip future teachers with competences in special education.

Institutions that train pre-school teachers declare that graduates will be able to "work with children with special needs" after completing the programme⁵. It is clear from reading the teacher education programmes that students are introduced to special needs, but there is no specific focus on working with parents of children with special educational needs, let alone on working with parents of children with ASD. Even if the higher education institution organises a practice to learn about special educational needs, students have virtually no targeted contact with parents of children with special educational needs. One university module description specifies the following learning outcome: 'Able to create a collaborative pre-school environment with the family', which is achieved through the following method: 'Lecture, discussion, reading of articles, discussion-reflection'.⁶ It is clear that this method does not create contact with parents of children with special educational needs.

Thus, although higher education institutions pay adequate attention to the presentation and theoretical knowledge of inclusive education when preparing students, and in recent years they have updated the content of research programmes with a separate focus on the knowledge and

¹ https://www.viko.lt/media/uploads/sites/3/2014/07/Vaikystes_pedagogika_Aprastas_LT_2017_inetui.pdf

² https://www.aikos.smm.lt/studijuoti/_layouts/15/Asw.Aikos.RegisterSearch/ObjectFormResult.aspx?o=LO&f=MokGal&key=10809_2017&pt=of&ctx_sr=8Gzz1EUgIeKfy0cWNVrrVdABKo0%3d

³ <http://www.vdu.lt/wp-content/uploads/2018/02/Ikimokyklin%C4%97s-ir-prie%C5%A1mokyklin%C4%97s-pedagogikos-programme-study%C5%B3-plan.pdf>

⁴ http://su.lt/images/Stojantiesiems/2016_Priemimas/SP_dalykai_2016/PUPIK_2016_B_NL.pdf

⁵ <https://www.vdu.lt/lt/study/subject/9182/>

⁶ http://su.lt/images/Stojantiesiems/2016_Priemimas/SP_dalykai_2016/PUPIK_2016_B_NL.pdf

educational peculiarities of children with ASD, educators are practically unprepared to work with a child with ASD (Steponienienė, 2019, p. 1). One of the reasons for the stagnation of cooperation between parents of children with ASD and pre-school teachers is that higher education institutions training pre-school teachers do not develop this cooperation competence in practice, but it is mostly limited to the theoretical level. It is likely that by training teachers in the updated research programmes (it is particularly encouraging that one of the universities is starting to train pre-school teachers from this year, who will have the opportunity to choose a specialisation in special education or a specialisation in social pedagogy:¹), in 3-4 years' time, higher education establishments will have trained teachers who are not only theoretically, but also practically prepared to work with children with ASD, but the majority of teachers will not be ready for this challenge. What will they survive? This is what the authors' research has been about.

Stress on parents

According to Farrugia (2009, p. 1011), children diagnosed with ASD consistently break social norms, do not make personal contact, have language problems, behave in an antisocial, aggressive and self-stimulating way, etc. This gives parents feelings of humiliation, exclusion and isolation.

It is evident from Gray's (1994, p. 6) research that, when faced with fearful societal attitudes, parents lack a pre-existing openness to joint action on behalf of the child. ASD affects family life in such a way that, due to persistent misunderstandings, the family does not expect to cooperate in good faith with pre-school teachers.

Another source of stress is the financial inability to pay for the education of children with ASD. Supporting a child and meeting his/her basic needs takes up all of one parent's - and sometimes both parents' - time, making the financial situation of such families difficult. Studies have shown that financial instability is the biggest stressor. According to a research by B. Benson and D. Dewey (2015), parents are the most likely to lack financial support, followed by the need for professional help and cooperation. As a result, the education of the child may not be a priority option and a non-cooperative pre-school may not be able to help the family.

Inclusive education and teachers' experiences are a must

In 2020, the Seimas of the Republic of Lithuania adopted amendments to the Law on Education, which provide that a pupil with special educational needs, if his/her parents (guardians, custodians) wish, shall be allowed to be educated in a pre-school, general education school or vocational training institution closer to his/her place of residence (Law on Education, Article 34). This removes the discriminatory provisions that existed in relation to the education of children with disabilities and special educational needs. The new provisions of the Education Law are being implemented gradually and will finally enter into force on 1 September 2024.

The role of teachers is particularly important in preparing for the transition to compulsory inclusive education. Because a strategy for compulsory inclusive education takes shape when a particular teacher meets particular children. It is reasonable to wonder whether inclusive education will only be effective on the pages of the documents that govern it. How will the universal model of inclusive education play out in Lithuanian schools' educational strategies,

¹ <https://www.vdu.lt/wp-content/uploads/2020/02/IPP-tinklelis-su-specializacijomis-nuo-2020-m..pdf>

curricula, lessons, and pupil-teacher relationships? According to A. Galkienė (2018, p. 79), "In inclusive education environments, the problem of equal and active participation of each student in the educational process is a constant challenge when educating students with different needs. The concept of inclusive education is synonymous with the notion of an educational environment that is conducive to the success of each student". Do teachers have enough tools to create supportive learning environments? After all, schools' and teachers' aspirations and definitions of creating a supportive learning environment differ (Geležinienė, Vasiliauskienė, Vyšniauskienė, 2011). Will there be enough time to gradually move towards equal and active participation of every student in the educational process? These questions are particularly relevant in the context of inclusion of children with ASD.

It is noted that already nowadays in educational institutions there is a need for proper preparation of the environment and knowledge of ASD, understanding of appropriate adaptation (Galkienė, Puskorienė, 2020). In a classroom where bullying prevention is practiced, non-violent physical contact between children is defined and where children respect each other's space (Carver-Aker, 2013, pp. 39-41), a child with ASD feels freer and more confident to engage in shared activities. In such an environment, tantrums are particularly rare in the ASD child¹. When the educator is able to recognise a child with ASD's outbursts of rage and is able to control them before they start (Colvin, Sheehan, 2012, p. 3), all children in the group feel safe. Of course, such proactive action requires adequate preparation and even closer cooperation with the parents of the child with ASD. Otherwise, uncontrollable fits of rage will still occur.

The empirical research analysed what the teachers experienced during the child's rage.

Research methodology

The research does not try to formulate a problem to be solved or to count the number of such experiences, but "captures" the phenomenon "here and now", asking what it means for an educator to experience a fit of rage in the child next to him. The question allows us to discover what an educator experiences when confronted with a child's behaviour that harms himself or others? These questions were inspired by reviews of scientific literature and sources, which show that the main barriers to cooperation between educators and parents of a pre-school child with ASD are the inadequate preparation of educators for working with a child with ASD.

Aim of the research

To investigate the experiences of teachers when they are confronted with a tantrum in a child with ASD.

Methodological provisions

The hermeneutic methodology of phenomenology is a tool that gives the researcher a free and creative impulse, but requires care, time and patience in the face of constant doubts. As van Manen (2016b, p. 2) observes, 'hermeneutic phenomenology and the human sciences find themselves on opposing sides of conventional research'. This occurs because the human sciences (i.e. including pedagogy) are a field of practical activity, which "is a field of practice

¹ A tantrum is an aggressive reaction to stress in which a child starts to harm himself, others or the environment (Mazefsky, Handen, 2011).

due to the practical workings of *human science pedagogy* and its desire to make an impact" (van Manen, 2016b, p. 3).

Preparing for the research

The research was organised in accordance with strict research ethics, so the names and descriptive place names of all the participants and persons mentioned have been changed.

The in-depth interview question was created in November 2019. The main research interviews were conducted in October-December 2019. Nine people's experiences were listened to and recorded (two descriptions of the experiences are presented in the paper). Before each interview, research participants were spoken to informally to make them aware that phenomenological research can dispense with self-reflection, but that it is necessary to return to a moment of the phenomenon that does not need to be interpreted and explained.

The hermeneutic methodology of phenomenology is a tool that gives the researcher a free and creative impulse, but requires care, time and patience in the face of constant doubt. As van Manen (2016c, p. 2) observes, 'hermeneutic phenomenology and human sciences are on opposite sides of the conventional research'. This occurs because the human sciences (i.e. including pedagogy) are a field of practical activity that is "historically alien to the tradition of *hermeneutic phenomenology* (German and Dutch), precisely because of the practical workings of *human science pedagogy* and its desire to make an impact" (van Manen, 2016a, p. 3).

In practical phenomenological research, the text is written and rewritten until it leaves no room for "hypocrisy", which means that some of the texts have been rewritten up to (even) 10 times. In writing the text, a way was sought that would put the experience of the phenomenon into words. The same (imperfect human language) words used by the natural sciences to explain the natural phenomenon had to be formulated in such a way that the concrete human experience was "not only explained but also understood" (van Manen, 2016a, p. 4).

Participants in the research

The empirical research was conducted with teachers who have a teaching qualification and have worked with children with ASD in mainstream pre-school/pre-primary education groups. The following individuals were selected for the research on the assumption that they understood the specificity of working with a child with ASD, but had no (professional) experience of working with such children at the time of their first encounter with a child with ASD. The age of the participants ranged from 23 to 45 years.

All participants were working with preschool and pre-school children (3-7 years old) at the time. All are preschool or pre-primary educators (hereafter, the term *educator* is sometimes used instead of *teacher/educator*).

Survey data collection

The data were collected through individual in-depth interviews. All participants volunteered to take part in the research. Therefore, the interviews took place in an atmosphere of trusting and participatory atmosphere. The participants were asked to tell how they had encountered a child with ASD in their own group. In no way were those sharing their experiences accompanied by a story of a fit of rage. Two of the nine participants in the research had already experienced self-injurious or self-injurious behaviour in their first encounter with a child with ASD. The recording, analysis and interpretation of these stories became the focus of this research.

Writing short stories

The data collected during the interviews became the source of the short stories (hereafter referred to as stories). The stories were written in several stages. First, the audio recording of (each) interview was transcribed. The transcribed text (script) was then read several times in order to get a clearer picture of the essential, most intense moment of the experience. The script was then transcribed into the first draft of the story. The story should be short and reveal the concentrated content of the transcribed text, conveying the experience and the message (van Manen, 1999 p. 80). The story tells through concrete experiences what is significant not only for the individual, but also for each reader (van Manen, 1998, pp. 246-247). A story starts with events very close to the main event/thought, then the story reaches a peak after which it stops (van Manen, 1999, p.80).

Story themes

The short stories were analysed by themes and interpreted according to the principles of van Manen's (2016a) hermeneutic phenomenology. At the same time, these interpretations in the text bring into discussion texts by researchers who have identified similar themes in other patities.

Rock was lying on the carpet and shouting, but we didn't meet

I remember it was 2008. I was doing my teaching practice at the time. I was a stranger as a teacher, a stranger to children. It was early in the morning, a little after nine. It was the very beginning of my practice. I was sitting in a circle with the children on a brown carpet. There were about 20 children. The little ones were given the task of putting their scarf, shoes and gloves in front of them.

One child, about five years old, was tiptoeing in the middle of the group (away from our carpet). I asked the teacher sitting nearby (on a chair, not in the circle of children) what the boy's name was. She said quietly, barely audibly: "Rock." I sat in the circle and called him by name, asking: "Rokas, sit in the circle." Then I looked at the teacher and nodded my head to Rock to help me. I wanted her to tell me why he wasn't answering, or to call on him. I looked into the group teacher's eyes, they looked sad to me, but her lips were smiling. I looked at the boy again. The other children were getting noisy and impatient: they were picking up the things that had been prepared for the Morning Circle and asking what we were going to do with them now. Rock continued to tiptoe in the middle of the group. The children called him by name. He did not come. The teacher got up from her chair, walked over to Rokas, grabbed him by the armpits and forcefully carried him to the children's circle. The boy was crying, thrashing, shouting loudly, and fell on the carpet when she carried him. I asked the teacher not to touch him, and she backed away about two metres and smiled again. The boy was lying there, writhing and screaming: "Not good, not good!" I remember that my heart started beating loudly and my palms were sweating and my mouth was dry. I tried to involve the other children in the autumn clothes game. I tried to say clearly: "PUT ON", "TIE", "PUT ON". And Rock was lying there on the carpet, screaming. I felt fear and that now I couldn't play with the children and I couldn't help Rok. My stomach started to hurt. The teacher sat down next to the child and kept quiet. She swayed a little from side to side. This went on for a few minutes. Then the boy calmed down. He stood up and on tiptoe went behind the cupboard in the group, as if to hide in a corner. I didn't see him again.

Ronja, 24 years old

This experience of a child's fit of rage leaves Ronja on the verge of meeting Roku. While the teacher's experiences described in the story were profound and devastating, Rocco's experiences remained unconnected to her personally. *I sat in the circle and called him by name, asking him: "Rok, sit in the circle"*. Rokas did not respond and did not show any sign that he heard the invitation. Ronja tries to invite Rok to join *her* circle. It is possible that Rokas heard her but did not pay attention. He did not answer her or look at her. Not knowing what to do next, she looks to the teacher next to her to explain why *the boy is not answering*. So she looks for another way (through intermediaries of 'insiders' who respond to her, look at her and talk to her) to find commonality and create the possibility of communication with Roku.

A collision where the other "doesn't hear", "doesn't see", "doesn't respond", and at the same time *is lying on the carpet and shouting: "No good, no good!"*, the experience makes you feel like you are losing strength, losing touch with your own abilities (*now I can't play with the kids and I can't help Rokas*). Not being able to find a common plane of relationship with the other (*I can't help Rokas because he can't hear, see or feel me*), not being able to act with "my own" (*now I can't play with the children*) and not being able to connect with them. The second prerequisite (the ability to communicate) and thus part of the teacher's own self are almost gone.

This fracturing of relationships is also evidenced by Ronja's bodily sensory experiences. Sensory experiences, "despite operating in an impersonal mode, are neither chaotic nor meaningless", says N. Keršytė (2006, p. 18), who sums up Merleau-Ponty's statements. In this situation, the teacher's sensory experiences express intense fear (*my heart started beating loudly and my palms were sweating, my mouth was dry; my stomach started to hurt*). Fear, according to Schmitz et al. (2011), is an experience that is a liminal experience between presence and absence. The boundary between encounter and non-encounter, the boundary between possibility and impossibility, the boundary between connection with the environment and the absence of connection (relationship), the boundary between action and inaction (ibid.).

The experience of the liminal experience in the body and the experience of the loss of power to act in the consciousness led to an unconscious moment (*I asked him not to touch it*). In that moment, the whole environment loses its power and Ronja almost demands to give up that power: *I asked the teacher not to touch him, she backed away about two metres and I try to get the other children to join in the game, to put on their shoes, tie their scarf and put on their gloves as soon as possible. I try to say clearly: "PUT ON", "TIE", "PUT ON"*. In this way, the experience of strangeness remained *non-self*, Ronja surrendered, accepted the demand of the ASD-positive Kit (Rock) not to meet. This moment (*he fell on the carpet, I asked him not to touch it*) is the *punctum* of the story, which brings the (non-)encounter between the "own" and the "not-own" to a climax (*it lasted for a few minutes. Then the boy calmed down*).

The boundary between meeting and not meeting is shocking, but this boundary opens up another significant moment: the resignation of the whole group of "insiders". This resignation is a *surrender to the power of the other's disability*: Roja experiences a loss of power, she surrenders; the teacher also surrenders (*she sits down next to the child and is silent. She sways a little from side to side*), the children of the group stop inviting Roja to their circle of friends (*he was invited by name, he didn't come*). Everyone is shocked and gives in to Rock's wish not to participate.

The fidgeting on the carpet lasted several minutes. Then the boy calmed down. He stood up and tiptoed around the corner of the group. I did not see him again. Ronja (didn't) meet Roku because he didn't want to, but the teacher was going through a shocking resignation. Merleau-Ponty describes being in the world as "the power to do certain things", as taking over the world (Gutauskas, 2009, p.115). Rock's complacency when the environment has resigned and retreated, as well as his own retreat to a place where he is invisible, out of the space of adults and their 'own'. These experiences reveal that the usual tools that a student of pedagogy brings to practice, that which empowers educational action, are not appropriate when confronted with a fit of rage in a child with ASD.

Suddenly he took a pair of scissors and began to

It was morning time, when the children work on their individual crafts. We were in a good mood, and I could feel that the group had a happy and cheerful atmosphere. All this was happening within a one-metre radius of me. I was standing next to the table where my smiling son Matas was working and Kajus was drawing nearby. Kajus was drawing next to me, in a really good mood. Caius was happy with the work he had just finished and was carrying the scissors. And suddenly he took the scissors in his other hand and stabbed Matthias in the neck. Then he threw the scissors away, he didn't intend to continue the action, he just did it, he did it and that's it, he didn't need the object any more. I was very shocked, because it was completely unpredicted, unexpected - no premonition or intuition helps here, because anyway you feel the mood of the child, you see it and you concentrate on it. I felt very insecure, both as an educator and as a mother, very insecure, because I realised that I was powerless. I cannot predict, stop, contain, help this situation, I can only accept it. I looked at Kai and I realised very clearly that this child did not intend to offend, he did not have that intention. I looked him in the eye, and it did not seem to me that he was angry or afraid of the consequences of his behaviour. His shoulders were slumped, his arms were relaxed: he did not look tense. As a result, it seemed to me that he did not understand what he had done.

Kotryna, 37 years old

Catherine is a kindergarten teacher. She tells me about a tantrum in the group. Catherine is standing next to her son, Matthew. Matas works at the same table as Kajis. Caius is doing his hair, which is his job. The teacher watches the children working, feels their mood (*Caius was happy with the work he had just finished and was carrying the scissors*). The whole story fits into a one-metre radius. The teacher is close to the children, she feels them and is present with them in a working and serene atmosphere: *we were in a good mood, I felt that the group had a working and serene atmosphere.*

Suddenly, the situation changes: something the teacher doesn't expect happens: suddenly, he takes the scissors in his other hand and stabs Matas in the neck. Then he threw the scissors away, he didn't want to continue the action, he just did it, he did it and that's it, he doesn't need the object any more. Caius stabbing Matthias in the neck with the scissors is the punctum of this story.

The situation develops in a matter of seconds, and Catherine says: *"I was shocked because it was completely unpredicted, unexpected, and neither intuition nor hunches help, because you can still feel the child's mood, you can see it, and you concentrate on it. I felt very insecure, both as an educator and as a mother, because I realised that I was powerless. I can't anticipate,*

stop, contain this situation . Anticipating the continuity of the chain of events in the environment is a condition of *life*; breaking that continuity, i.e. the shocking unexpected, opens the door to *existence* (Bitbol, 2019 p. 9) . Catherine feels powerless: she cannot foresee, foresee, stop such situations. The shocking unexpectedness causes a shock of a few moments, which opens up a significant experience: *I cannot foresee this situation, stop it, contain it*. Catherine emphasises not the helpless resignation but the realisation that Caius did not intend to offend anyone: *I looked him in the eye, he didn't seem angry or afraid of the consequences of his behaviour. His shoulders were slumped, his arms relaxed: he didn't seem tense. As a result, it seemed to me that he did not understand what he had done*.

Catherine experienced a real surprise (Bitbol, 2019, p. 2), shock, helplessness and awareness of the situation of a child with ASD. She accepted that the chain of predictable events could be interrupted at any time, she accepted and opened herself to situations where the doors of existence open. Human existence "is not something that can be isolated from the world, nor does it close in on itself with the world, but by its very nature is always open to something" (Volpi, 2010, p. 59). Catherine remains open to the traits of a child with ASD, she does not close herself off from Kai, she accepts this situation (*I can only accept this*) and all that she will not be able to predict and stop: *I can't predict this situation, stop it, contain it, help it, I can only accept it* .

This story can be an encouragement for educators who are faced with a tantrum from a child with ASD. An educator who continuously develops his or her ability to anticipate events can also be open to the unexpected, which grows him or her, and takes education to a new level of openness to existence.

Discussion

Children with ASD have the right (United Nations Convention on the Rights of the Child, Article 23) to belong to society, to grow, learn and flourish. Therefore, on the one hand, educational institutions do not have the right to discriminate against, refuse to accept or exclude such children (CRPD, Article 24). On the other hand, autism is graded according to the severity of the disorder (Ulevičiūtė, Gaigalienė, 2008, p. 249) and for this grading, according to S. Lėinskienė, E. Vilūnaitė (2002, p. 405), a single autism spectrum concept is used, taking into account the different severity of the autism features. In the case of severe autism, which is accompanied by complex comorbid mental and physical disorders, the general education institution is unable to ensure that the educational needs of such children are met (Vėlavičienė, 2020, p. 3) and that they interact safely and harmoniously with their peers.

A phenomenological research of educators' lived experiences revealed that pre-school and pre-primary education centres do not provide adequate facilities for meeting a child with ASD. The usual tools for interacting with the child are not effective. Also, the behaviour of a child with ASD, which is dissonant with the environment, is observed by the educator as insecure. These insights may explain the conclusion of a research conducted by A. Ališauskas, S. Ališauskienė and others (2011, p. 158) that every second teacher in Lithuania is characterised by segregationist attitudes towards children with special educational needs, and "a tendency to normalise behaviour through formal, restrictive methods".

Research into the experiences of educators has revealed that the specific characteristics of children with ASD are not immediately apparent and that meeting a child with ASD requires

openness to the child's unpredictable behaviour (or even tantrums). This openness takes the educator's openness to a new (existential) level. This adds to the insights of T. Grandin (2011, pp. 44-45) and A. Feinstein (2011, p.316) about the openness and flexibility of educators in understanding how a child with ASD feels, sees and thinks about the world.

Conclusions

1. Despite changing attitudes towards the education of children with ASD, there are still obstacles that prevent a fully inclusive education. Communication and interaction between parents and teachers, which is crucial for the child's engagement in education and later social life, is still insufficient. However, this fundamental cooperation is hampered by the teacher's difficult working conditions: the teacher works alone with an overcrowded group, does not receive the financial support needed to ensure adequate competence, does not have the necessary assistant, does not have the expertise to cooperate with the parents of a child with an ASD, and does not work overtime in terms of contact time with the children, which makes him/her incapable of building a cooperative relationship with the parents.

2. Another barrier to parent-teacher collaboration is the apparent lack of preparation of teachers to work with children with ASD and their families. Despite the fact that higher education institutions have recently updated their curricula for pre-school and pre-primary education, with a greater focus on knowledge of ASD, the specificities of educating children with ASD, and the strengthening of competences in working with families, the amendment to the Law on Education of the Republic of Lithuania on Inclusive Education coming into force on 1 September 2024, will leave the majority of teachers ill-prepared to deal with children and their families with ASD.

3. A research of educators' experiences of being confronted with an ASD child's rage attack reveals a part of the educators' home world. The educators' experiences revealed what is essential in the encounter with a sudden fit of rage. It revealed what every educator can benefit from when confronted with a fit of rage in a child with ASD. The experiences of educators in the research focused on themes of loss of power and insecurity:

- ◁ The participants in the research experienced a loss of power (siting), often saying that they could not do anything and did not know what to do in such a situation. The stories also have in common that the children's rage attack starts suddenly, unexpectedly, and the teacher was unable to take any action for several moments;
- ◁ Sensory fear and insecurity are revealed when, after the stagnation (shock) has passed, the educator's actions are directed towards defending the children and himself. The participants in the research also experience insecurity because they are practically unprepared to deal with children's sudden fits of rage.

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THE IMPORTANS OF LINGUISTIC TYPOLOGY IN TEACHING FOREIGN LANGUAGES

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ABSTRACT

The article considers of the role of linguistic typology in linguistics, its interrelationship with other disciplines, and the importance of typology of modern languages. Also, theories about the study of common and specific features of languages in linguistic typology, the main methods in linguistic typology are presented. The main problems encountered in the typological analysis of foreign languages and their solutions are presented.

Keywords: Linguistic typology, diachronic, synchronic, comparative-historical method, primary language, morphological, genetic.

INTRODUCTION

Modern linguistic literature shows that linguistic typology began in the West with the works of F. Schlegel. Then A.V. Shlegel, V. Humboldt, H. Shteintal, A. Shleicher, E. Sepir, V. Skalichka, A. Martine, F. F. Fortunatov, I. I. Meshchaninov, B. Uspensky, Yu. V. Rozhdestvensky, V. N.Yartseva and others conducted research². However, when the views of Eastern scientists on linguistics were studied, a large amount of scientific-linguistic information related to linguistic typology was observed in production works. In particular, the early forms of comparative-historical linguistics can be seen in the works of Mahmud Kashgari, Alisher Navoi, Zahiriddin Muhammad Babur.

In the years of independence in Uzbekistan A. Abduazizov, J. Boronov, Q. Scientists such as Toymetov, M.Iriskulov were engaged in issues of typology³. Boronov J. Comparative grammar of English and Uzbek languages. - T.: Teacher, 1973. - B.283.

Cross-language learning aims to study translation, linguo-philosophical, linguo-didactic and theoretical issues.

METHODS

Linguistic typology is the analysis, comparison, and classification of [languages](#) according to their common structural features and forms. This is also called *cross-linguistic typology*. “The branch of [linguistics](#) that studies the structural similarities between languages, regardless of their history, as part of an attempt to establish a satisfactory classification, or typology, of languages” is known as *typological linguistics*.

Studying the typological theory of languages is a complex process. For this, a linguist needs strong skills and a good theoretical mastery of several languages. A characteristic feature of linguistic typology is that languages belonging to two systems are intermixed at all levels. Specific characteristics of languages and signs of convergence of languages are determined.

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² Boronov J. Comparative grammar of English and Uzbek languages. – T.: Teacher, 1973. – B.283, Yartseva V.N. Hierarchy grammaticheskikh kategoriya i tipologicheskaya kharakistika yazykov.V.kn.: Tipologiya grammaticheskikh kategoriya. - Moscow, Meshchaninovskie chteniya. 1975.

³ Boronov J. Comparative grammar of English and Uzbek languages. - T.: Teacher, 1973. - B.283.

The typological study of foreign languages with the native language is one of the relatively new fields in linguistics. Cross-typological study of languages is to determine the similarities and differences between selected languages regardless of whether they belong to the same type or not according to their origin and development, structural, semantic and functional status. In cross-typological linguistics, similarities and differences between languages do not depend on whether they belong to the same type or not.

CONCLUSION

Studying foreign languages typologically is a somewhat more complicated hybrid process. In such a case, the learner of an oriental language must first of all determine the linguistic features of the mother tongue, its unique aspects, as well as the universals of the language from the point of view of general linguistics. As a result of mixing in such a process, the private and general nature of languages is clearly visible. This situation helps to students to learn the foreign language.

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**PROSPECTIVE MATHEMATICS TEACHERS' TECHNOLOGICAL
PEDAGOGICAL CONTENT KNOWLEDGE COMPETENCIES FOR 21ST CENTURY
SKILLS AND DIGITAL PROFICIENCY PERCEPTIONS**

**MATEMATİK ÖĞRETMEN ADAYLARININ 21. YÜZYIL BECERİLERİ
KAPSAMINDA TEKNOLOJİK PEDAGOJİK ALAN BİLGİSİ YETERLİKLERİ VE
DİJİTAL YETERLİK ALGILARI**

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ÖZET

Bu araştırmada, matematik öğretmen adaylarının 21. yüzyıl becerileri kapsamında teknolojik pedagojik alan bilgisi yeterlikleri ve dijital yeterlik algılarını ve bu değişkenler arasındaki ilişkiyi incelemeyi amaçladık. Araştırmayı açıklayıcı korelasyonel araştırma modelinde yürüttük. Araştırmada örnekleme uygun örnekleme yöntemi ile belirledik. Örnekleme Türkiye'nin batısındaki bir üniversitenin eğitim fakültesinden 178 matematik öğretmen adayı bulunmaktadır. Veri toplamak için "21.yüzyıl Becerileri Kapsamında Teknolojik Pedagojik Alan Bilgisi Ölçeği" ile "Öğretmen Adayı Dijital Yeterlik Algısı Ölçeği" kullandık. Araştırma sonucunda matematik öğretmen adaylarının 21.yüzyıl becerileri kapsamında teknolojik pedagojik alan bilgisi yeterliklerinin orta düzeyde ve dijital yeterlik algılarının yüksek düzeyde olduğunu bulduk. Katılımcıların 21.yüzyıl becerileri kapsamında teknolojik pedagojik alan bilgisi yeterlikleri ile dijital yeterlik algıları arasında pozitif yönlü orta düzeyde ilişki olduğunu bulduk.

Anahtar Kelimeler: matematik öğretmen adayı, teknolojik pedagojik alan bilgisi yeterliği, 21.yüzyıl becerileri, dijital yeterlik algısı

ABSTRACT

We aimed to examine prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions and the relationship between these variables in this research. We conducted the research in an explanatory correlational research model. We determined the sample using the convenience sampling method. The sample included 178 prospective mathematics teachers from a faculty of education at an university in the west of Turkey. We used the "Technological Pedagogical Content Knowledge Scale for 21st Century Skills" and the "Teacher Candidate Digital Proficiency Perception Scale" to collect data. As a result of the research, we found that prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills were at a medium level and their digital proficiency perceptions were at a high level. We found that there was a moderate positive relationship between the participants' technological pedagogical content knowledge competencies for 21st century skills and their digital competence perceptions.

Keywords: prospective mathematics teacher, technological pedagogical content knowledge competency, 21st century skills, digital proficiency perception.

INTRODUCTION

Technology is developing at a great pace and is included in our working environments. These developments in technology also present their effects in the field of mathematics education. Thanks to the use of technology, students' attention is drawn and they are motivated. The age

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we are in is the age of technology and 21st century individuals are expected to have the requirements of the age. Considering that technology is a tool, teachers who can use this tool effectively will be able to introduce students to technology correctly and effectively by incorporating 21st century skills into their education programs (Önal, 2020). The use of technology in mathematics education is of great importance, but the efficient use of technology is one of the issues that need attention. Teachers' technological pedagogical content knowledge competencies and digital proficiencies are essential for student development. Usta and Korkmaz (2010) stated that as the level of technology use of teachers increases, student achievement also increases. In addition, Özpınar (2020) stated that the use of technology develops teachers professionally and contributes to students not only in cognitive but also in affective sense. Teachers' 21st century skills, technological pedagogical content knowledge competencies and digital competencies are very important for student progress. Considering that technology is a tool, teachers who can use this tool effectively will be able to introduce children to technology in a correct and effective way by including 21st century skills in their education programs (Önal, 2020).

21st century skills have been described by different institutions and organizations under various titles ranging from skills for using information and communication technologies to social life skills, from thinking-problem solving skills to learning skills (Organisation for Economic Cooperation and Development [OECD], 2005; Partnership for 21st Century Skills [P21]). Although there are different classifications for the learning of 21st century individuals, the common purpose of gaining these skills is to prepare individuals for the future. Individuals, who are part of the society in which they live, need to have a number of competencies in order to keep up with the requirements of the changing age (Atalay, 2015). Competencies are classified in different ways, but common skills are creativity, critical thinking, problem solving and collaborative work.

One of the main studies on teaching knowledge is the 1986 study by Lee Shulman in which he initiated a new way of thinking about the knowledge teachers need called "pedagogical content knowledge" (Niess, 2011). Pedagogical content knowledge was expressed as a combination of pedagogical knowledge and content knowledge. Today, the use of technology has become widespread in many fields, including education. In parallel with today's technological developments, the concept of "technological pedagogical content knowledge" was introduced by integrating technology knowledge into the concept of "pedagogical content knowledge" (Mishra & Koehler, 2006). Technological pedagogical content knowledge is a type of knowledge that emerged as a result of the interaction of field, pedagogy and technology factors in the development of effective teaching with the help of technology (Mishra & Koehler, 2006).

The concept of digital competence generally refers to the effective and accurate use of digital technologies for communicating, accessing information and dealing with problems (European Council, 2006). Digital competence is the good organization and successful management of different devices and software to use technology for educational and proper purposes (Amhag et al., 2019). Digital competence includes the critical, conscious and creative use of technology with all its components (Gallego-Arrufat et al., 2019).

Today, the use of technology has become widespread in the field of education. The age we are in is the age of technology and 21st century individuals are expected to have the requirements of the age. In this study, we aimed to examine the relationship between prospective

mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions. The use of technology in mathematics education is of great importance, but the efficient use of technology is one of the issues to be considered. The use of technology not only increases the student's attitude towards the subject but also increases his/her engagement. It is stated that the use of information and communication technologies in the classroom increases student engagement or contributes to the development of student engagement (Günüç, 2013). Teachers' technological competencies as well as their content and pedagogical knowledge positively affect the educational process. Thanks to technological pedagogical content knowledge, teachers can provide quality learning with good integration (Schmidt et al., 2009). It can be stated that teachers' technological pedagogical content knowledge is expected to reach the required level and the course contents that teachers will prepare with technology are related to their digital competencies. Teachers can create more useful course content if they have these competencies. Critical thinking and problem solving skills are important in mathematics education. 21st century skills emphasize creativity, critical thinking, collaborative work and problem solving (Aygün et al., 2016). Considering that prospective teachers' possession of 21st century skills is an indicator that their understanding of education and training will be shaped in accordance with the age, we can state that this research is important in terms of blending prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions. By determining prospective teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions in line with the scales and associating them with each other, it is possible to have an idea about the development of prospective teachers and support their development. The widespread use of such studies can contribute to the integration of prospective teachers' use of technology into their fields and the creation of useful content.

In this study, we aimed to examine prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions and the relationship between these variables. In line with this purpose, the research problems are as follows:

1. What is the level of prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions?
2. What is the relationship between prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions?

METHOD

Research model

We conducted the study in an explanatory correlational research model. The exploratory correlational research model is a research model in which the relationship between two or more variables is examined without intervening in these variables and is used to try to understand an important concept by analyzing the relationships between variables (Büyüköztürk et al., 2009; Neuman, 2006).

Participants

In the study, we determined the sample with convenience sampling method. The sample included 178 prospective mathematics teachers from the faculty of education of a university in western Turkey.

Data Collection

We used an online form consisting of three parts to collect the data of the study. The first part of the form includes the information form that we formed to reach the demographic information of the prospective teachers.

The second part of the form includes the "Technological Pedagogical Content Knowledge Scale for 21st Century Skills (TPACK-21)" developed by Valtonen et al. (2017) and adapted into Turkish by Alpaslan et al. (2021). TPACK-21 is a six-point Likert-type scale consisting of 38 items. The scale includes six options: I need a lot of additional knowledge (1), I need additional knowledge (2), I need some additional knowledge (3), I have some knowledge (4), I have good knowledge (5), I have very good knowledge (6). The lowest score is 38 and the highest score is 228. Alpaslan et al. (2021) found the item reliability coefficient of the scale to be .91. With the data of this study, we calculated the Cronbach's alpha reliability coefficient of TPACK-21 as .98.

The third part of the form includes the "Teacher Candidate Digital Proficiency Perception Scale (TCDPPS)" developed by Karakuş et al. (2022). TCDPPS is a five-point Likert-type scale consisting of 26 items. The scale includes five options: not at all appropriate (1), not appropriate (2), partially appropriate (3), appropriate (4), completely appropriate (5). A minimum score of 26 and a maximum score of 130 can be obtained from the scale. Karakuş et al. (2022) found Cronbach's Alpha coefficients between .88 and .90 for the sub-dimensions of the scale. With the data of this study, we calculated the Cronbach's alpha reliability coefficient of TCDPPS as .97. Cronbach's alpha reliability coefficients of .70 and above indicate that the scales are reliable (Büyüköztürk, 2020).

Data Analysis

We used the statistical analysis package program (SPSS 24) to analyze the data. We calculated descriptive statistics (minimum and maximum scores, mean, standard deviation) to determine the distribution of scale scores. In order to determine which of the parametric or nonparametric tests to use in the analysis of the data, we calculated the scores of the participants from the scales and examined the kurtosis and skewness values to determine whether the scores were normally distributed according to the independent variables. We found that the kurtosis and skewness values of the data were in the range of -1.5 and +1.5 and we decided that the data were normally distributed (Büyüköztürk, 2020).

After conducting normality tests, we determined the relationship between participants' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions with Pearson correlation coefficient.

FINDINGS

To answer the first research problem, we calculated the descriptive statistics of the scale scores obtained from the participants' responses to the scale items. The descriptive statistics are shown in Table 1.

Table 1. Descriptive Statistics of TPACK-21 ve TCDPPS Scores

Scales	N	Minimum	Maximum	\bar{x}	S
TPACK-21	178	76	228	149.24	31.55
TCDPPS	178	57	130	107.72	16.37

In Table 1, it can be seen that the mean score on the TPACK-21 is $\bar{x}=149.24$. According to this score, we interpreted that prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills are at a moderate level. Similarly, Table 1 demonstrates that the mean score on the TCDPPS is $\bar{x}=107.72$. According to this score, we interpreted that prospective mathematics teachers' digital proficiency perceptions are at a high level.

To answer the second research problem, we calculated the Pearson correlation coefficient between the participants' TPACK-21 scores and TCDPPS scores. The correlation analysis is shown in Table 2.

Table 2. Correlation Analysis of TPACK-21 score and TCDPPS score

Variables	N	p	r
TPACK-21 score* TCDPPS score	178	.000	.527

We found that there was a positive and moderately significant relationship between the TPACK-21 scores of the participants and their TCDPPS scores, $r=.527$, $p<.05$ (Table 2).

CONCLUSION, DISCUSSION, AND RECOMMENDATIONS

As a result of the research, we found that prospective mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills were at medium level and digital proficiency perceptions were at high level. Unlike the results of this study, Kozikoğlu and Altunova (2018) concluded that prospective teachers' perceptions of 21st century skills were at a high level; Donmuş Kaya and Akpunar (2018) concluded that prospective teachers' 21st century skills were at a high level. Bağcı (2019) concluded that prospective mathematics teachers have high level technopedagogical education competencies; Kabakçı Yurdakul (2011) concluded that prospective teachers generally have high level technopedagogical education competencies.

Unlike the result obtained in this study, Kaya (2020) concluded that prospective teachers' digital proficiency levels were at a medium level. Kaya and Uyangör (2020) concluded that the prospective teachers' technology integration self-efficacy perceptions were high. According to Erten (2019), the 21st Century Learning Partnership advocates the need to raise academic and productive individuals in order to prepare individuals for the 21st century. Erdoğan and Şahin (2010) concluded that as the knowledge of prospective teachers increases, their professional self-efficacy also increases, and emphasized that an education using technological pedagogical content knowledge will have positive effects on prospective teachers. Since different results were found from the studies in literature, it can be concluded that different studies should be conducted on this subject.

We found that there was a positive moderate relationship between the participants' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions. Similarly, Yılmaz Özden and Ünveren Bilgiç (2023) found that there was a moderate positive relationship between prospective teachers' technological pedagogical content

knowledge and 21st century skills. By determining prospective teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions in line with the scales and associating them with each other, researchers can have an idea about the individual development of prospective teachers and their individual development can be supported. The widespread use of such studies can contribute to the integration of prospective teachers' use of technology into their fields and the creation of useful content.

This research is limited to 178 prospective mathematics teachers studying at a university in western Turkey. In the study, the relationship between pre-service mathematics teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions was examined. Future studies can be conducted with prospective teachers studying in various education programs. Prospective teachers' technological pedagogical content knowledge competencies for 21st century skills and digital proficiency perceptions can be examined according to variables such as gender, year of university education, type of program they study

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TEACHING APPROACH IN INSTRUCTING SPECIALIST SUBJECTS WITHIN THE DOMAIN OF TRANSLATION STUDIES: “TEXT TRANSLATION AND EDITING”

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ABSTRACT

This article focuses on the pedagogical approaches employed in teaching compulsory and optional courses pertaining to translation practice within the master’s programs of “Comparative Linguistics, Linguistic Translation Studies” and “Synchronous Translation”. The article dealt with the investigation of two subjects’ teaching methods within the curriculum of the Department of Translation Studies and International Journalism at the Tashkent State University of Oriental Studies. Specifically, the compulsory subject “Text Translation and Editing” was examined, which has been a part of the curriculum for a duration of 7 years. This article provides an overview of the theoretical and practical aspects related to the organization of translation and editing instruction. Furthermore, this study examines the teaching approach employed in translation sessions and emphasizes the need to cultivate student evaluation standards. Based on pedagogical scholars’ research and experiences it provides systematic recommendations. The study examined the incorporation of theoretical and practical instruction, efficacious modes of self-directed learning, and outcomes of the course. The research included descriptive and observational studies.

Keywords: translation studies, text translation, editing, media text, translator competence, teaching method, self-directed learning.

INTRODUCTION

Checking the translated text (monolingual editing) and comparing the translation to the original text (bilingual editing or comparative editing) are two types of editing. Another distinction between editing and proofreading is that the editor informs the translator of faults and modifications to the translation, as well as leaving comments for the translator. Editing is an excellent tool for improving translation quality: as a result of the comments received, the translator tries not to repeat the mistakes made in previous works, allowing him to gain experience and skills while reducing the time and resources spent on the translation process.

The integration of practical instruction in translating, editing, and proofreading concerns is of utmost significance. The inclusion of the subject “Text translation and editing” in the educational curriculum holds significant importance due to this reason.

The primary terminological framework of the field of study known as "Text Translation and Editing" is encompassed by the following:

Translated text. The text acquired subsequent to the process of translation.

Editing. To enhance the quality of a written piece, one must engage in the process of revising and correcting errors. The act of writing and creating.

Editor. An editor is a someone employed to revise and modify a specific text through a variety of methods, with the purpose of preparing it for publication in a reputable publishing house or other credible medium. 2. An individual responsible for overseeing many press groups.

Text. The text can be understood as a multifaceted entity comprising both form and content. Its capacity for effective communication extends beyond the mere sum of its constituent sentences. The translator must possess the capacity to discern the coherence of the source text and guarantee the entirety of the target text being produced.

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V. Vinogradov posits the existence of six primary functional and stylistic classifications for writings. 1) Colloquial texts, namely colloquial-domestic and colloquial-formal, serve the purpose of facilitating communication and manifest in the medium of oral dialogue. and will be guided towards a designated channel of contact; 2) The primary purpose of official papers, such as those pertaining to state affairs, politics, diplomacy, commerce, law, and related fields, is to convey a message. These documents are typically presented in written form and often adhere to specific guidelines and regulations, particularly in certain document categories. 3) Social-informative text encompasses a range of messages disseminated by mass media platforms such as newspapers, magazines, Internet resources, radio, and television. Its primary purpose is to shape public opinion by conveying information. 4) In scientific discourse, it is customary to prioritize a coherent, objective, and rational articulation of the purpose and substance of the message. 5) In the realm of artistic expression, encompassing fiction, literary criticism, and journalism, the interplay of text creation assumes a synthesized form and assumes an additional aesthetic function. Religious texts encompass a wide range of sacred literature, including holy books, narratives about revered saints and prophets, and sermons delivered within religious contexts.

Within the realm of translation theory, A. Fyodorov presents a typology of texts that encompasses many categories. These categories include newspaper-informational and special scientific texts, socio-political and journalistic materials, as well as speeches, and artistic texts.

METHODOLOGY

The curriculum primarily comprises practical exercises, typically involving one text per two-hour session. These exercises involve translating passages from Chinese to the students' native language or vice versa. Additionally, students are provided with texts accompanied by translations or analysis, which they are expected to edit or interpret. Longer texts are assigned over multiple lessons.

RESULTS AND DISCUSSION

The knowledge, abilities, and qualifications of master's students in the field of "Text translation and editing" are subject to the following standards. The curriculum for graduate students encompasses the examination of the structure and composition of artistic, scientific, and journalistic texts over the course of three semesters. This includes a comprehensive exploration of various aspects of artistic, scientific, and journalistic styles, as well as the theoretical and methodological foundations underlying the process of working on these texts. Additionally, students will gain insight into editorial activity and the associated editorial rights, developing an understanding of text editing and the identification of different types of errors. The technique of translating artistic, scientific, and journalistic texts will also be covered, along with a focus on the specific features of editorial analysis and the rationale behind the editing process. Acquire proficiency in the assessment criteria of editing and develop the capacity to differentiate texts based on their respective genres. Examining and contrasting translated texts; The process of translating from an Eastern language into a Western language, and vice versa. Revise the translated text by enhancing its lexicon, refining syntactic constructs, and possessing the necessary skills to rectify any semantic problems.

The translation process consists of two stages: understanding and translation, that is, creating a text in another language. It is possible to highlight the third stage of editing (final grading of the translated text).

A translator is usually required to have a deeper understanding of the original text than a native speaker of the original language. This is due to the need to make final conclusions on the content of the text and adhere to language standards at the editing stage.

At the editing stage, translation analysis is based on the process of identifying and classifying errors in the translation (inconsistencies in the content of the original text).

During the course of the lesson, undergraduates perform Editing exercises. They work on a completed translation of the Chinese story into Uzbek. Then they determine the type of errors in the parts edited in the text of the translation. They tabulate errors and shortcomings and offer another translation option.

№	Sample	Type of the error	Original translated option	Edited option
1.		Stylistic error	(Ilon) Jangning burun teshigiga tilini sanchibdi.	Jangning burnini chaqib olibdi.
2.		Grammatic error	Biz hayron qoldik. Xona bo‘m-bo‘sh.	Uyning bo‘m-bo‘sh ekanligi bizni ajablantirdi.
3.			

One of the prevalent issues encountered in translation pertains to stylistic shortcomings which necessitate the attention of an editor. During the course of “Text translating and editing” the students are provided with information regarding various types of translation errors and are expected to rectify them during the editing process of the translated text.

1) The sentence has improper conjunctions resulting from an inappropriate word order.

One of the most significant stylistic flaws that renders the writing challenging to comprehend is the issue at hand. The presence of words in close proximity might lead to a misleading semantic connection, potentially resulting in a misinterpretation of the sentence by the reader.

- “...bir vaqtning o‘zida **bemor** atrofida aylanib, uning ish tezligini ikki baravar oshiruvchi tasvirlash tizimlari bilan jihozlangan tomografdan foydalaniladi”.
- “**Ishonch telefoni** orqali kompaniyaga **xizmat ko‘rsatish** uchun arizani joylashtirish”.

2) The absence of semantic coherence resulting from an erroneous phrase form.

Sentence fragments that have similar meanings are distinguished from one another through the utilization of subordinate clauses.

- “**ABCga o‘tish** bizning yuqori sifatli operatsiyalarimiz uchun asos yaratdi va biznesimizni kengaytirar ekanmiz, bizga zarur **ko‘makni taqdim etdi**...”.
- “**Asosiy kitobdan** bir pozitsiyali indekslarda bo‘lmagan **maydonlar uchun ma'lumotlarni tanlash**”.

3) Associating concepts with different meanings and employing an incorrect word.

“Belgilar ekrani bilan ishlash grafik displeyga **o‘xshaydi**”.

“**Paketli ma'lumotlardan foydalanish orqali** tarmoq ulanishini **optimallashtirish**”.

4) Using the translation method of Calque.

The act of copying is permissible under specific circumstances, such as when it is unfeasible to locate an equivalent term in the target language during the process of translation. Alternatively, such a situation could potentially result in misinterpretation or misrepresentation of the intended definition of the aforementioned phrase. *“Tizim apgreydi”* (“tizimni yaxshilash”, “Treninglar”, “Biznes rejalashtirish” (“biznesni olib borishni rejalashtirish”), “Biznes modeli” (“biznesni olib borish modeli”), “Biznes strategiyasi” (“biznesni olib borish strategiyasi”).

5) Harmony or tautology of words located close to each other

- *“Texnik xizmatga xizmat uchun murojaat qiling...”*,
- *“Foydalanuvchi uchun foydalanishdan foyda olish ...”*.

6) Mixing text styles

- Use of vocabulary and terminology that does not correspond to the style of the document:

For example, in business, scientific and technical documents it is not possible to use emotional and figurative vocabulary:

- *“Qattiq ozuqa muhitida o‘sgan fotobakteriyalar koloniyalari sovuq yashil tusda bo‘lib, ayoqli oydin tunda qor bilan qoplangan dalalarning ziyosi yohud miltillagan yulduzli osmonni eslatadi”*.

- Using colloquial and slang expressions:

- *“O‘rnatilgan sensor orqa bilan to‘xtashni osonlashtiradi”*,
- *“Agar batareya quvvati o‘tirib qolsa”*,
- *“Telefonda kutish vaqti”*.

- Using words in the source language instead of translated equivalents:

- *“IT-strategiya”*,
- *“E-pochta manzili”*.

7) Using of similar words together

- *“Sensor datchik”* (“datchik”),
- *“Ishlab chiqarish tsexi”* (“tsex”),
- *“Oldindan ogohlantirish”* (“ogohlantirish”).

8) Filling the text with “redundant” words that do not have a meaningful meaning

- *“Vaqt bo‘yicha kechikishi bilan”* (“kechikish bilan”),
- *“Muayyan muammo nuqtalari”* (“muayyan muammolar”),
- *“Dasturlash masalalari uchun mas‘ul”* (“Dasturlash uchun mas‘ul”).

9) The existence of a common subordinate word in different management

- “*Barcha ishlarni muvofiqlashtirish va boshqarish*” (“*barcha ishlarni muvofiqlashtirish va ularni boshqarish*”),
- “*Murakkab tizimlarni integratsiyalash va boshqarish*” (“*Murakkab tizimlarni birlashtirish va ularni boshqarish*”),
- “*Butun trafikni o‘rganish va ta’sir qilish*” (“*Butun trafikni o‘rganish va unga ta’sir qilish*”).

10) Incorrect use of singular or plural

There are often problems with using singular or plural.

If a whole is meant, then the singular is used, and if individual elements are to be emphasized, the plural is used.

- “*10 ta o‘qituvchilar*” (“*10 ta o‘qituvchi*”)
- “*kitoblar va lug‘atlar*” (“*kitob va lug‘atlar*”).


CONCLUSION

It is becoming evident that the editing step is an essential component of the new quality standard, ensuring the high quality of the translation. The concept of editing is inextricably linked to the concept of translation quality evaluation. During the editing phase, the editor checks and analyzes the translation’s quality. Thus, the key steps of the translation process are: pre-translation analysis, direct translation of the text, and post-translation analysis (control, proofreading, and editing). As a result, the editing stage is directly integrated into the translation process as a separate unit.

In short, it can be asserted, that to reach “Text translating and editing” subject’s objective, subject enacts the methodological approach to theoretical knowledge, practical skills, and translation processes of undergraduates, as well as the formation of a scientific worldview. We should point out that the teaching approach of this subject emphasizes the need to cultivate student evaluation standards.

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INVESTIGATION OF THE 2018 SOCIAL STUDIES COURSE TEACHING PROGRAM IN TERMS OF 21ST CENTURY SKILLS AND TURKISH QUALIFICATIONS FRAMEWORK

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ÖZET

Ülkeler de değişen dünya şartlarına göre eğitim sistemlerini gözden geçirerek ve eğitim programlarını güncelleyerek nitelikli insan gücünü artırmayı hedeflemektedir. T.C. Millî Eğitim Bakanlığı, Türk Millî Eğitimi'nin genel amaçlarını tanımlarken, 21. Yüzyıl becerileri ile uyumlu olarak değerler ve yetkinliklerle donatılmış bilgi, beceri ve davranışlara sahip bireyler yetiştirmek şeklinde ifade kullanmıştır. Bu bağlamda çalışmada 2018 Sosyal Bilgiler Dersi Öğretim Programı'nda (SBDÖP) yer alan becerilerin Türkiye Yeterlilikler Çerçevesindeki (TYÇ) anahtar yetkinlik alanlarına göre sınıflanması amaçlanmaktadır. Araştırma nitel araştırma yöntemlerinden doküman incelemesi temelinde yürütülmüştür. Bu kapsamda 2018 Sosyal Bilgiler Dersi Öğretim Programı incelenmiştir. Elde edilen veriler betimsel analiz ile çözümlenmiştir. Araştırma sonuçlarına göre, 2018 Sosyal Bilgiler Dersi Öğretim Programında yer alan becerilerin anahtar yetkinliklerin bir veya birkaçı ile uyumlu olduğu görülmektedir. Becerilerin en fazla Sosyal ve vatandaşlıkla ilgili yetkinlikler (on), Matematiksel yetkinlik ve bilim ve teknolojiye temel yetkinlikler (altı) ve inisiyatif alma-girişimcilik (dört) yetkinlikleri ile ilişkili olduğu; yabancı dillerde iletişim yetkinliğine ilişkin herhangi bir beceriye doğrudan yer verilmediği tespit edilmiştir. Bu bulgulardan hareketle Türkiye Yeterlilikler Çerçevesindeki anahtar yetkinliklere 2018 Sosyal Bilgiler Dersi Öğretim Programının öğretim programlarının perspektifi bölümünde yer verilmiş olmasına ve becerilerin bu yetkinlikler çerçevesinde belirlendiğinin ifade edilmesine karşın hangi becerinin hangi yetkinlik alanı temel alınarak belirlendiğine yer verilmesi önerilmektedir.

Anahtar Kelimeler: Beceri, sosyal bilgiler, yeterlik

ABSTRACT

Countries also aim to increase qualified manpower by reviewing their education systems and updating their education programs according to changing world conditions. The Ministry of National Education of the Republic of Turkey, while defining the general objectives of Turkish National Education, 21. It is expressed as raising individuals with knowledge, skills and behaviors equipped with values and competencies in accordance with the skills of the century. In this context, the aim of the study is to classify the skills in the 2018 Social Studies Curriculum (SBDÖP) according to the key competency areas in the Turkish Qualifications Framework (TQF). The research was carried out on the basis of document analysis, which is one of the qualitative research methods. In this context, the 2018 Social Studies Course Curriculum was examined. The obtained data were analyzed by descriptive analysis. According to the results of the research, it is seen that the skills in the 2018 Social Studies Curriculum are compatible with one or more of the key competencies. The skills were most associated with social and citizenship-related competencies (ten), Mathematical competencies and core competencies in science and technology (six) and initiative-entrepreneurship (four) competencies; It has been determined that no skills related to communication competence in foreign languages are directly included. Based on these findings, although the key competencies in the Turkish Competencies Framework are included in the perspective section of the curriculum of the 2018 Social Studies Course Curriculum and it is stated that the skills are determined within the framework of these competencies, it is recommended to include which skill is determined on the basis of which competency area.

Keywords: Competence, skills, social studies

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GİRİŞ

Fiziki ve beşerî çevresini verimli kullanmak ve birikimlerini gelecek kuşaklara sağlıklı aktarma ihtiyacı bireyi ve toplumu eğitim ile buluşturan amaçlardan birisidir. Ülkeler de değişen dünya şartlarına göre eğitim sistemlerini gözden geçirerek ve eğitim programlarını güncelleyerek nitelikli insan gücünü artırmayı hedeflemektedir. T.C. Milli Eğitim Bakanlığı (MEB, 2018), Türk Milli Eğitimi'nin genel amaçlarını tanımlarken, 21. Yüzyıl becerileri ile uyumlu olarak değerler ve yetkinliklerle donatılmış bilgi, beceri ve davranışlara sahip bireyler yetiştirmek şeklinde ifade kullanmıştır. Bu amaçtan da anlaşılacağı üzere eğitimin temel amacı cümlenin içerisinde apaçık verilen beceri kelimesidir. Beceri kelimesi altında sıralanabilecek olan eğitimler için de bunların nihai hedeflerini ve sonucunu gösteren yeterlikler belirlenmektedir. Bu yeterlilikler için referans nokta ise Avrupa Birliği (AB) üyesi olan ülkeler, aday ülkeler ve Avrupa'da olup da AB üyesi olmayan ülkelere ilişkin bir danışma grubunun birlikte çalışmaları sonucu 2008 yılında ortaya çıkarılan Avrupa Yeterlilikler Çerçevesi (AYÇ)'dir. Türkiye, bu danışma kurulunda Mesleki Yeterlilik Kurumu (MYK) ile temsil edilmektedir.

AYÇ kapsamında her ülke kendi Ulusal Yeterliliklerini belirlemiş, bu doğrultuda Türkiye'de de 2015 yılında Türkiye Yeterlilikler Çerçevesi (TYÇ) hazırlanmıştır. Türkiye'deki Ulusal Yeterlilikler belirlenirken, dünyadaki güncel gelişmeler ve değişimlere uygun, istihdam amaçlı ve doğru beceri ve yetkinlikleri içeren anahtar yetkinlikler sekiz başlık altında güncellenerek yayınlanmıştır (Tablo 1). Bilgi, beceri ve tutumların bileşkesi olarak tanımlanan bu yetkinlikler, AYÇ ile uyumlu olacak şekilde tasarlanan, ilk, orta ve yükseköğretim dâhil, mesleki, genel ve akademik eğitim ve öğretim programları ve diğer öğrenme yollarıyla kazanılan tüm yeterlilik esaslarını gösteren ulusal yeterlilikler çerçevesidir (MYK, 2018).

Kazanım, etkinlik ve beceri terimlerinin arasındaki ilişkiye göre tasarlanan öğretim programlarıyla bilgi, beceri ve davranışların kazandırılması amaçlanırken değerler ve yetkinlikler bu bilgi, beceri ve davranışların arasındaki bütünlüğü sağlayan bağlantı ve ufuk işlevi görmektedir. Öğrencilerin hem ulusal hem de uluslararası düzeyde; kişisel, sosyal, akademik ve iş hayatlarında ihtiyaç duyacakları beceri yelpazeleri olan yetkinlikler de yine TYÇ'de belirlenmiştir. T.C. MEB tarafından yayımlanan tüm öğretim programlarında olduğu gibi Sosyal Bilgiler Dersi Öğretim Programı'nda (SBDÖP), TYÇ ile de uyumlu olarak hazırlanmıştır ve programda bu yeterliliklere uygun 27 beceri (Tablo 1) yer almaktadır ve yeterlilikler program tarafından "bireylere aktarılması gereken eylemsel bütünlükler" olarak da tanımlanır (MEB, 2018).

Sorumluluk sahibi ve aktif vatandaşlar yetiştirmeyi de amaçlayan sosyal bilgiler dersinin öğretim programı, Karatekin'e (2021) göre eşit ve demokratik bir toplumun ortaya çıkması açısından da önemli olduğundan, TYÇ kapsamındaki sekiz anahtar yetkinliği de içermelidir. Bu hususta TYÇ kapsamındaki anahtar yetkinlikler ile öğretim programları arasında önemli bir ilişki olduğu görülmektedir. Nitekim sosyal bilgiler dersi öğretim programı ile TYÇ arasındaki ilişkiyi inceleyen birtakım çalışmalara literatürde rastlanılmaktadır (Aksoy ve Taşkın, 2019; Demirbaş ve Demir, 2022; Karatekin, 2021; Otuz, Kayabaşı ve Ekici, 2018; Pala, 2020; Sözen ve Ada, 2018; Temur, 2022). Bu çalışmalarda, SBDÖP'nin eski ve yeni sürümlerinin yetkinlikler açısından karşılaştırılması, programda yetkinliklere yapılan vurgular ve kazanımlar üzerinde durulduğu görülmüştür.

Yapılan bu çalışmada da Türkiye Yeterlilikler Çerçevesi kapsamında verilerin sekiz anahtar yetkinlik ile sosyal bilgiler dersi öğretim programı içerisindeki beceriler karşılaştırılmış ve

hangi yetkinlik kapsamında hangi becerilere yer verilmiş olduğu tespit edilmeye çalışılmıştır. Bu doğrultuda, çalışmanın problem cümlesi de “2018 SBDÖP’de yer alan becerilerin Türkiye Yeterlikleri Çerçevesindeki yetkinlik alanlarına uygunluk durumu nedir?” sorusudur.

YÖNTEM

Çalışmanın verileri nitel bir veri toplama tekniği olan doküman incelemesi yoluyla elde edilmiştir. Elektronik ve/veya basılı materyallerin analizi ve değerlendirilmesi aşamasında gerçekleşen işlemler dizisi (Bowen, 2009) olarak tanımlanan doküman incelemesi, belli bir amaca yönelik kaynakları araştırma, ortaya çıkarma, okuma ve değerlendirme aşamalarını içermektedir (Karasar, 2005).

Çalışmada veriler, araştırmacılar tarafından geliştirilen, “Sosyal Bilgiler Dersi Öğretim Programı Beceri Sınıflandırma Çizelgesi” aracılığıyla toplanmıştır. Çizelgenin geliştirme aşamasında dil ve içerik açılarından uzman görüşüne başvurulmuştur. Elde edilen görüşler ışığında form güncellenmiştir. Araştırmada analiz yöntemi olarak betimsel analiz kullanılmıştır. Analiz birimi olarak da beceriler belirlenmiştir. Bu bağlamda TYÇ’de belirlenen sekiz anahtar yetkinlik alanı temaları oluşturmuştur.

BULGULAR ve YORUM

2018 SBDÖP’de yer alan becerilerin Türkiye Yeterlikleri Çerçevesindeki yetkinlik alanlarına uygunluk durumu incelenerek becerilerin TYÇ’ye uygunluğu ortaya konulmaya çalışılmıştır. Elde edilen bulgular Tablo 1’de verilerek devamında yorumlanmıştır.

Tablo 1. Becerilerin TYÇ’ye Uygunluğu

Yetkinlik (Tema)	Beceri
1 Anadilde iletişim	Türkçeyi doğru, güzel ve etkili kullanma İletişim
2 Dijital yetkinlik	Dijital okuryazarlık Finansal okuryazarlık
3 İnisiyatif alma-Girişimcilik	Girişimcilik Karar verme Yenilikçi düşünme Araştırma
4 Matematiksel yetkinlik ve Bilim ve teknolojide temel yetkinlikler	Gözlem Kanıt kullanma Konum analizi Problem çözme
5 Matematiksel yetkinlik ve Bilim ve teknolojide temel yetkinlikler/Sosyal ve Vatandaşlıkla ilgili yetkinlikler	Harita okuryazarlığı
6 Öğrenmeyi öğrenme	Mekânı algılama Tablo, grafik ve diyagram çizme ve yorumlama
7 Sosyal ve Vatandaşlıkla ilgili yetkinlikler	Zaman ve kronolojiyi algılama Çevre okuryazarlığı

	Değişim ve sürekliliği algılama
	Eleştirel düşünme
	Empati
	Hukuk okuryazarlığı
	İş birliği
	Kalıp yargı ve önyargıyı fark etme
	Öz denetim
	Politik okuryazarlık
	Sosyal katılım
Sosyal ve Vatandaşlıkla ilgili 8 yetkinlikler/Öğrenmeyi öğrenme/Kültürel farkındalık ve ifade	Medya okuryazarlığı

Tablo 1’de yer alan bulguları göre, SBDÖP’de yer alan becerilerin anahtar yetkinliklerin bir veya birkaçı ile uyumlu olduğu görülmektedir. Becerilerin en fazla Sosyal ve vatandaşlıkla ilgili yetkinlikler (10), Matematiksel yetkinlik ve bilim ve teknolojide temel yetkinlikler (6) ve inisiyatif alma-girişimcilik (4) yetkinlikleri ile ilişkili olduğu; yabancı dillerde iletişim yetkinliğine ilişkin herhangi bir beceriye doğrudan yer verilmediği tespit edilmiştir.

SONUÇ ve ÖNERİLER

Araştırma sonuçlarına göre, SBDÖP’de yer alan becerilerin anahtar yetkinliklerin bir veya birkaçı ile uyumlu olduğu görülmektedir. Becerilerin en fazla Sosyal ve vatandaşlıkla ilgili yetkinlikler (10), Matematiksel yetkinlik ve bilim ve teknolojide temel yetkinlikler (6) ve inisiyatif alma-girişimcilik (4) yetkinlikleri ile ilişkili olduğu; yabancı dillerde iletişim yetkinliğine ilişkin herhangi bir beceriye doğrudan yer verilmediği tespit edilmiştir.

Bu bulgulardan hareketle TYÇ’deki anahtar yetkinliklere 2018 SBDÖP’nin öğretim programlarının perspektifi bölümünde yer verilmiş olmasına ve becerilerin bu yetkinlikler çerçevesinde belirlendiğinin ifade edilmesine karşın hangi becerinin hangi yetkinlik alanı temel alınarak belirlendiğine yer verilmesi önerilmektedir.

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SOCIO-SCIENTIFIC ISSUES IN THE COGNITIVE STRUCTURE OF CLASSROOM TEACHERS: MIND MAP EXAMPLE

SINIF ÖĞRETMENLERİNİN BİLİŞSEL YAPISINDA SOSYO-BİLİMSEL KONULAR: ZİHİN HARİTASI ÖRNEĞİ

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Gökhan Hastürk²

ÖZET

Sosyo-bilimsel konular karmaşık, çelişkili, tek bir cevabı olmayan, tartışmaya açık ve çoğu zaman sonuçsuz olarak nitelendirilmektedir. Bu bağlamda; yapay zeka, kök hücre, klonlama, genetiği değiştirilmiş organizmalar, nükleer santraller, biyoteknoloji, küresel ısınma, hidroelektrik santraller, aşılama, küresel ısınma, ötenazi, taşıyıcı annelik ve organ nakli sosyobilimsel konular (SBK) olarak nitelendirilmektedir. Bu çalışmada sınıf öğretmenlerinin sosyobilimsel konularla ilgili bilişsel yapılarını, kavramlarını, kavramlar arası bağlantılarını yani bilgi ağlarını ortaya çıkarmak amaçlanmıştır. Araştırmanın çalışma grubunu 2022-2023 eğitim-öğretim yılında Orta Karadeniz bölgesinde bir il merkezinde görev yapan 26 sınıf öğretmeni oluşturmaktadır. Çalışmada nitel araştırma desenlerinden fenomenoloji deseni benimsenmiştir. Çalışmanın problem cümlesi "Öğretmenlerin sosyobilimsel konulara ilişkin zihinsel yapıları nasıldır?" olarak belirlenmiştir. Elde edilen veriler içerik analizi yöntemi ile analiz edilmiş, ifadeler kodlanmış, benzer ifadeler ve kategoriler tespit edilmiştir. Çalışma sonucunda öğretmenlerin SBK hakkında geniş bir bilgi yelpazesine sahip oldukları ve SBK'yı olumlu ve olumsuz açılardan analiz edebildikleri sonucuna ulaşılmıştır. Ayrıca öğretmenlerin SBK'yı yapay zeka, genetiği değiştirilmiş organizmalar, taşıyıcı annelik, klonlama, nükleer santraller gibi çok önemli ve birbiriyle ilişkili konularla ilişkilendirdikleri tespit edilmiştir. Bu çalışmada, SBK'nın alt boyutları, olumlu ve olumsuz yönleri analiz edilerek öğretmenlerin bilişsel yapısı ortaya konulmuştur.

Anahtar Kelimeler: Sosyo-bilimsel konular, Zihin Haritası, Sınıf öğretmenleri

ABSTRACT

Socio-scientific issues are characterized as complex, contradictory, without a single answer, open to debate and often inconclusive. In this context; artificial intelligence, stem cells, cloning, genetically modified organisms, nuclear power plants, biotechnology, global warming, hydroelectric power plants, vaccination, global warming, euthanasia, surrogate motherhood and organ transplantation are socioscientific issues (SSI). In this study, it was aimed to reveal the cognitive structure, concepts, connections between concepts, i.e. the knowledge network of classroom teachers about socioscientific issues. The study group of the research consists of 26 classroom teachers working in a city center in the Central Black Sea region in the 2022-2023 academic year. Phenomenology design, one of the qualitative research designs, was adopted in the study. The problem statement of the study was determined as "How are teachers' mental structures about socioscientific issues?". The data obtained were analyzed by content analysis method, expressions were coded, similar expressions and categories were identified. As a result of the study, it was concluded that teachers have a wide range of knowledge about SSI and can analyze SSI from positive and negative perspectives. In addition, it was determined that teachers associated SSI with very important and interrelated issues such as artificial intelligence, genetically modified organisms, surrogate motherhood, cloning, nuclear power plants. In this study, the cognitive structure of teachers was revealed by analyzing the sub-dimensions, positive and negative aspects of SSI.

Keywords: Socio-scientific issues, Mind Map, Classroom teachers

INTRODUCTION

In recent years, scientific and technological studies and the possible risks of these studies have necessitated the use of socioscientific issues in education. Socioscientific issues are described

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as dilemmas related to the environment, health, science and technology, which are related to daily life, which people need to make decisions, which concern society and science, which involve moral and ethical concerns (Sadler, 2004). For an issue to be a socioscientific issue, at least two important criteria must be met.

- i. That the topic is related to science,
- ii. It should be a socially important issue (Eastwood, Sadler, Zeidler, Lewis, Amiri, & Applebaum, 2012).

These topics address complex and often controversial issues by examining the interactions of science, technology and society. Socioscientific issues help students develop scientific literacy and critical thinking skills, as well as encourage them to become informed and responsible citizens with regard to societal decisions. Socioscientific issues include stem cells, cloning, genetically modified organisms, nuclear power plants, euthanasia, surrogacy and vaccines. Examining, researching and discussing these issues in educational settings is very important for individuals to establish the link between science and society.

Socioscientific topics include climate change, the use of genetically modified organisms, vaccines, nuclear energy, biological weapons, medical ethics, man-made intelligence and many more. These topics are of great interest because they often affect the lives of people and societies, the environment, the economy and health.

Discussing and studying such issues can help raise public awareness, improve policy-making and help individuals make more informed decisions. Discussions on socioscientific issues can increase science literacy and help society better understand scientific and ethical issues.

In conclusion, socioscientific issues provide an important framework for examining the complex relationships between science and society and how these issues affect people's everyday lives. As knowledge and awareness of such issues increases, societies can make better-informed and informed decisions.

Teaching socioscientific topics aims to develop in students the ability to understand and evaluate scientific knowledge in social, ethical and environmental contexts. Such topics are important because they address the complex interactions between science and society. Teaching socioscientific topics can help to develop students as active, critical and informed citizens. Students interested in such topics can better understand and contribute to societal issues. Therefore, it is important to adapt socioscientific issues to educational environments and to diversify activities.

When the related literature was examined, it was found that socioscientific issues were taught to higher education (Arslan & Atabey, 2018; Eş, Işık Mercan, & Ayas, 2016; Harman & Çökelez, 2017; Yeniceli & Hastürk, 2021), secondary education (Lee et al., 2020; Ko et al., 2022; Wu & Tsai, 2011; Çetin & Harman, 2012) and middle school students (Çavuş, 2013; Hastürk & Ökkeşoğulları, 2022; Topçu & Atabey, 2017).

Most of the studies conducted are at the undergraduate level, but no study has been found that aims to reveal the current situation in their mental structures. For this reason, it is thought that the study will contribute to the literature.

Purpose of the Study

This study, which was designed to examine the cognitive domain of individuals regarding SBK, aims to contribute to the literature in terms of addressing more than one socioscientific issue at the same time, sample group and determination of mental structures. Based on the aforementioned features, the main purpose of the study is to examine the mental structures of classroom teachers towards socioscientific issues.

The problem statement of the study was determined as "How are teachers' mental structures about socioscientific issues?".

In this context, in the research i) Under which categories can the most common socioscientific issues reflected in the mind maps created by the teachers be grouped? and ii) Under which categories are the positive and negative aspects of SBK reflected in the mind maps created by the teachers grouped? The data obtained were analyzed by content analysis method, expressions were coded, similar expressions and categories were identified.

METHOD

Research Model

In this study, which aims to examine the mental structures of classroom teachers regarding socioscientific issues, a case study, one of the qualitative data collection and analysis methods, was used. A case study is conducted in an environment such as a person, a school, a place, an environment. The reason for the situation. The environment or processes are investigated holistically and are based on "why" and "how" questions. A situation that allows the researcher to examine in depth a phenomenon or event over which the researcher has no control. study method is also known as a case study (Yıldırım & Şimşek, 2016).

Sample

The sample of the study consists of 25 classroom teachers working in a provincial center in the Central Black Sea region. The sample was selected through convenience sampling method. Convenience sampling brought speed and practicality to the research. As it is known, in this method, the researcher chooses a situation that is close to him/her and easy to reach (Yıldırım & Şimşek, 2016). The reason for choosing the relevant province is that it is where the researcher works as an academician.

Data Collection Tools and Data Collection Process

Mind maps were used as a data collection tool in the study. Mind maps were developed by Tony Buzan as a note-taking technique in the late 1960s and in recent years they have become prominent visual tools with different features such as creativity, increasing retention, enabling effective learning and helping students to reveal their prior knowledge. According to Mueller, Johnston, and Bligh (2002) and Wickramasingh et al. (2008), a mind map is a visual representation of the relationships between concepts and ideas related to the central idea. Figure 1 below shows a sample mind map of the participants.



Figure 1. Mind map drawn by the teacher coded T7 in the study

Mind maps are "a creativity-based technique that aims to use the brain as a whole in the assimilation of old and new information by establishing connections between ideas and concepts, where keywords are supported by colors, pictures and symbols" (Şeyihoğlu, Akbaş, & Kartal, 2012: 62).

If we make a general definition, mind mapping is a fun and effective technique that activates all functions of the brain and mental creativity in order to reveal the basic ideas and sub-ideas related to a subject or a concept, where organized information is reflected in a visual scheme, and enables individuals to reveal their mental structure concretely.

Data Collection Process

During the research process, various applications were made on how to prepare mind maps. The application of the technique was also shown on simple examples. Thus, the teachers' previous knowledge about the use of the mind map technique was refreshed. Finally, enough materials (A3 size drawing paper, markers, etc.) to be used in the realization of the application and sufficient for the use of the participants were distributed to the teachers. Thus, the necessary infrastructure was prepared for the implementation of the application. After the necessary preliminary preparations were made for the implementation of the application to be carried out smoothly, the applications were started.

Data Analysis

In qualitative research, data analysis implies diversity, creativity and flexibility. Each qualitative research carries different types of characteristics and requires different new approaches to data analysis.

Therefore, in this study, "content analysis was used among the two data analysis processes (descriptive and content analysis) suggested by Strauss and Corbin (1990)" (Yıldırım & Şimşek, 2005: 221). Yıldırım and Şimşek (2005: 228) stated that content analysis to be used in the processing of qualitative research data collected through interviews, observations or documents can be carried out in four stages. These stages are listed as follows:

1. Coding the data
2. Finding themes/categories

3. Organization of codes and themes

4. Description and interpretation of findings

For this reason, while conducting content analysis in the study, the expressions obtained from the mind maps drawn by the pre-service teachers were coded and similar expressions and categories were identified. An expert review was conducted with a field educator working in the same faculty in order to determine whether the codes and categories agreed upon for the reliability of the research, that is, whether the problems expressed represent the categories in question. Then, the matchings made by the expert and the categories created by the researcher were compared. The reliability of the study was calculated using Miles and Huberman's (1994: 64) formula ($\text{Agreement} / (\text{Agreement} + \text{Disagreement}) \times 100$) by determining the numbers of agreement and disagreement in the comparisons.

In the study, the agreement between the expert and researcher evaluations was found to be 0.93.

In qualitative research, a desired level of reliability is achieved when the agreement between expert and researcher evaluations is 90% and above (Saban, 2009).

FINDINGS

The main problem of the research is "Which are the most common socio-scientific issues reflected in the mind maps of classroom teachers?"

In this respect, firstly, the most common SSI reflected in the mind maps created by the classroom teachers were identified and then the identified SSI were categorized in terms of their common characteristics.

Table 1 shows the frequencies and percentages of the most common SSI reflected in the mind maps drawn by the classroom teachers participating in the study.

Table 1. Frequencies and percentages of SSIs expressed in classroom teachers' mind maps

Socio-scientific issues	f	%	Total
Nuclear Power Plants	23	92	25
Artificial Intelligence	17	68	25
Organ Transplant	10	40	25
Genetically Modified Organisms	8	32	25
Vaccine	5	20	25
Cloning	5	20	25
Surrogate Motherhood	3	12	25
Euthanasia	3	12	25
Zero waste	1	8	25
Abortion	1	8	25
Hydroelectric power plant	1	8	25

When Table 1 is analyzed, it can be seen that a total of 11 different SSIs were expressed in the mind maps created by the teachers participating in the study. It is seen that the most frequently

used SSI in the mind maps drawn by the teachers are "nuclear power plants" and artificial intelligence. This is followed by organ transplantation and genetically modified organisms.

The findings related to the other sub-problem of the study, "Under which categories are the positive and negative aspects of the SSI in the mind maps created by the teachers grouped?" are presented in Table 2.

Table 2. Teachers' Positive Understanding of artificial intelligence

Theme	Code	f
Education	Meeting student needs	15
	Meeting the need for teachers	11
	Ease of accessing and sharing information	7
	Distance education opportunity	6
Health	Rapid diagnosis of diseases	9
	Identification of health problems	7
	Medication and treatment	7
Economy	Increased efficiency (energy)	16
	Manpower savings	14
	Saving time	11
Technology	Smart design and machines	9
	Intelligent robots for security	5
Society	Making life easier	19

When Table 2 is examined, it is seen that teachers gathered the positive aspects of the socioscientific topic of artificial intelligence under the themes of education, health, economy, technology and society and analyzed them in multiple ways.

CONCLUSION AND SUGGESTIONS

As a result of the study, there are a total of 11 SSIs in teachers' mind maps. The most important SSI in teachers' mind maps is nuclear power plants. Artificial intelligence, organ transplantation and cloning are the next most important SSI topics. Teachers expressed their understanding of artificial intelligence by including different dimensions in their socio-scientific models. In this context, the cognitive structure of the teachers was revealed by analyzing the sub-dimensions, positive and negative aspects of SSI.

For example, teachers expressed their understanding by including different dimensions in their socio-scientific models about artificial intelligence. The teachers participating in the study explained each dimension of the subject with justifications, and many of them expressed it using scientific concepts. It was determined that most of the teachers made explanations about the positive aspects of artificial intelligence through education and health dimensions.

In the education dimension, pre-service teachers expressed reasons such as meeting the needs of students and teachers, accessing and sharing information, and in the health dimension, they stated reasons such as detecting health problems, increasing medicine and treatment opportunities.

Then, pre-service teachers, who evaluated the positive aspects of artificial intelligence with the dimensions of economy, technology, society, communication and politics respectively, were able to establish relationships between the dimensions, albeit limited. As a matter of fact, pre-service teachers develop socio-scientific models not only to make sense of scientific phenomena, but more importantly to establish meaningful connections between science and society by establishing relationships with other dimensions (Lee & et al., 2013).

Utilizing the mind mapping technique in teaching SBK contributes significantly to individuals' realizing and understanding the interaction between science and society, developing an understanding of the content of science and how science works as a scientist, understanding social problems in the context of daily life problems, concretizing ideas or abstract concepts, developing expression skills and understanding the nature of science, and developing science literacy (Gobert & Buckley, 2000; Hazen & Trefil, 2009; Lehrer & Schauble, 2006).

Based on the mentioned characteristics, teaching socioscientific issues in educational environments with different methods and techniques contributes to the development of many skills expected from 21st century individuals.

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TEACHER EDUCATION POLICIES IN THE 100TH YEAR OF THE REPUBLIC

Erdal Toprakçı¹

INTRODUCTION

It is not easy to travel through the history of education in Turkey and the world in general and teacher training in particular. Because it is obvious that the human element can be approached to the truth at the rate of preserving the evidence. In this context, just as it is possible to take education back to the times before the invention of writing, on the basis of the ages of historical science, it is equally possible to explain how teaching has evolved in this process. Accordingly, it can be said that when human beings started to live as at least two people, teaching was born at that time. Then, with the first child born, if the mother is alive, it can be said that the first teacher is the mother and the father and others take elective courses. In parallel with the gender of the child, for example, if it is a boy, it can be said that the knowledge of life is given to the boy on the basis of the father's branch teaching at the end of primary school and until high school, and if it is a girl, it can be said that the mother is the branch teacher and the father or mother takes elective courses according to the situation. Then the population will become crowded and the teacher will be sought as a master. Then it will become more crowded and it will be understood who is the master (teacher) not by rumours but by documents (diplomas), and the schools of the medieval society in the form of tribes, clans, beys, churches, etc. will emerge. On the basis of states shaped by people coming together as larger communities in order to protect themselves in the face of new inventions, discoveries and wars, it is possible to encounter schools shaped in the modern (new age) sense and teachers close to today's meaning. In this study, it has been tried to touch upon the dimension of teacher and teacher training from the end of the schools (Ottoman) to the schools and up to today in the Turkish society-oriented part of the said evolution.

1. TEACHER TRAINING POLICY IN THE PRE-REPUBLICAN PERIOD

It is possible to read the initiation of innovation efforts in the field of education and training by removing the teacher-student relationship from the master-apprentice relationship in the theocratic educational institutions of the Ottoman Empire through the Maarif Councils (Meclis-i Maarif-i Muvakkat and Meclis-i Maarif-i Umumiye) established immediately after the Tanzimat Edict (Lewis, 1988). It can be said that the necessity to move from the education of an elite and few to the education of a large number of people, and the birth of an education system based on the relationship between a teacher and many students from the education system based on the one-to-one relationship between teacher and student (Tekeli, 1985). Darülmualimin-i Rüştî, which was opened in 1848 following the establishment of the Maarif Councils, was a first in terms of showing that modern education and training should be provided not by people who were bound to the madrasa tradition, but by those who could fulfil the requirements of the profession (Kodaman, 1988). Although the first teaching staff of Darülmualimin-i Rüştî were from the madrasa, in the following years officer teachers were also assigned, especially for science courses (Öztürk, 1996). In 1868, Darülmualimin-i Sıbyan was opened in order to train teachers for sanatoriums. In 1869, with the Maarif-i Umumiye

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Nizamnamesi published in 1869, it was decided to establish Dârümuallimat (girls' teacher) schools in Istanbul (Sakaoğlu, 1991). Since the opening of the girls' teacher training schools, "strange" things are also dealt with due to the suspicion that bigotry may occur under simple pretexts; the teachers appointed to the girls' teacher training schools are made to be ugly, old and tough, the principal is forbidden to enter the main building where the female students are, and the male teachers and principals have to live in the small building (outbuildings) next to the school (Sakaoğlu, 1991).

The Teacher Training Institute (Darümuallimin-i Aliye), which was opened to train teachers for the expanding high schools (Sultani) and provided a 4-year education after secondary school, was one of the first teacher training institutions to approach modern education (Akdemir, 2013). In the early 1900s, there were 17 teacher training schools and one teacher training school in 13 regions in the Ottoman Empire. In order to meet the increasing need for primary school teacher training, their number increased to 31 in 1911 (Karagözoğlu, Arıcı, Bülbül, & Çoker, 1995). Again in this period, provincial Darümuallimin and Darümuallimat were opened. One of these is the Karesi Darümuallimini in Balıkesir, the building where this congress was held, which also educated intellectuals such as Sabahattin Ali, and whose present name is Necatibey Faculty of Education. In this schooling and upbringing move, the priority was to raise a Muslim elite and entrepreneurs (Bora, 2021). After the defeat in the Balkan War in 1912, it can be said that national education came to the agenda. In 1916, some regulations were made in teacher training schools and "Darümuallimin and Darümuallimin-i İbtidaiye Talimatnamesi" was announced. Until the proclamation of the Second Constitutional Monarchy, the main objective of all teacher training school programmes, "the development of Ottoman consciousness", was replaced by the principle of "the development of Turkish consciousness" in parallel with the political, social and cultural policy of the Committee of Union and Progress (Öztürk, 1996). In 1912, Gaspıralı İsmail wrote in *Türk Yurdu* about the ideology in which teachers should be educated; the veterans and soldiers of the Turkish army would be "national teachers", chief leaders, and experts of *usul-i tedris*, which facilitates teaching and learning (Belge, 2012). At the beginning of the 1923-1924 academic year, there were thirteen teacher schools in Turkey, including Istanbul Darümuallimin. With a law enacted in 1923, the expenses and salaries of all schools began to be covered from the budget of the Ministry of Education, and then teacher training was subject to new principles (Öztürk, 1993).

2. TEACHER TRAINING POLICY DURING THE REPUBLIC OF TURKEY

2.1. Early Republican Period (Atatürk's Years)

During the reign of Hamdullah Suphi Bey, Minister of National Education, the Education Congress convened in Ankara on 15 July 1921 under the auspices of Mustafa Kemal Pasha. The Maarif Congress is extremely important both in terms of showing the importance Mustafa Kemal Pasha attached to education and that the real struggle after the victory would be against ignorance, and in terms of initiating the education and training mobilisation of the new Turkish state. On the other hand, the following moment also gives an idea about how the teacher of the new republic should be: When the Education Congress was convened in Ankara, fierce battles were going on in front of Kütahya. The participation of women teachers in the congress disturbed the turbaned deputies of the parliament. They went to Atatürk to complain to those responsible for this situation, which they considered to be against religion. And then the events unfolded as follows (Ünsay, 2017): After listening to the complaint, Atatürk summoned Mazhar

Müfit Bey, President of the Education Society. "What have you done at the teachers' meeting? What a shameful thing!" The complainants are in high spirits. Atatürk continues in the same tone: "It's not right, it's not right!" Mazhar Müfit, at a loss for what to say, tries to defend himself. Atatürk: "Let it go, let it go, I know all about it, you invited the female teachers to the meeting. But why did you make them sit in separate rows? Do you have no confidence in yourself or in the virtue of Turkish women? Let me never see such separation again..."

On 15 July 1923, at the First Council of Sciences meeting, the regulations and programmes of teacher schools were evaluated and it was decided that Darülmualimin-i Aliye would be renamed as Higher Teacher Training School, the education period of Darülmualimin and Darülmualimat would be increased to five years, and exams for teaching and assistant teaching would continue during the holidays (Elçiçeği & Yılmaz, 2020). The Law on the Unity of Education, adopted by the Grand National Assembly of Turkey on 3 March 1924, stipulated that all educational institutions in the country would be affiliated to the Ministry of Education (Ministry of National Education of the Republic of Turkey). According to Article 1 of the Law on Secondary Education dated 13 March 1924, "teaching is defined as a profession that takes on the duty of instruction and training from the public services of the State and is divided into independent classes and grades (Üstüner, 2004). In the meeting of the Second Council of Sciences held on 22 April 1924, decisions were taken on issues such as the duration of primary education, secondary education and Teacher Training Schools and the printing of textbooks; however, religious education was almost never included among the issues discussed (Yavaş, 2003). On the other hand, the duration of Teacher Training Schools was increased to five years and important changes were made in the curriculum. With these changes, religious courses were significantly reduced (Öztürk, 1996).

At the Turkish Teachers' Union Congress in Ankara (25 August 1924), Mustafa Kemal Atatürk said, "Teachers! You, the devoted teachers and educators of the Republic, will raise the new generation; the new generation will be your work. The value of the work will be proportional to the degree of your skill and sacrifice. The Republic requires intellectually, scientifically, scientifically, physically strong and high characterised guards! It is in your hands to raise the new generation with these qualities and abilities. Our national morality must be developed and reinforced by civilised principles and free ideas. The Republic demands from you 'generations whose minds are free, whose consciences are free'", each of which can be regarded as aphoristic, expressing his expectations from teachers.

In the Third Heyet-i İlmiye (27 December 1925), issues such as the more beneficial use of the budget allocated to national education, the reorganisation of high schools and the gathering of vocational high schools in certain centres were discussed (Yavaş, 2003). In this meeting, the issue of teacher training, which was emphasised by the Minister of National Education Mustafa Necati, was also discussed and the policy of expanding and developing teacher schools was put into practice (Öztürk, 1996). Mustafa Necati, who came to the ministry as the president of the teachers' organisation, was also important in terms of teacher training policies. Among his actions were the following (İnan, 1980): To increase the prestige and quality of teachers and teaching, to have educational laws and regulations enacted rapidly, to institutionalise the functioning of the educational organisation, to reconstruct the philosophical foundations of Turkish education, to bring in foreign experts in order to make use of science (John Dewey, etc.) and to have them prepare research reports, to introduce vocational and technical education (John Dewey, etc.), to regulate vocational and technical education, to ensure that the Saniyi-i

Nefise (Fine Arts) programme and physical education programmes were reconsidered, to generalise primary education, to train inspectors, to ensure the establishment of Gazi Teachers' School, to establish the Language Committee and the Department of Education and Training within the ministry, to establish the Maarif Emini administrations, to establish the Public Education Unit, and to ensure the opening of two village teachers' schools, the precursors of the Village Institutes. According to Mustafa Necati, the aim of education was to prepare the new generation physically and intellectually, as well as in terms of character and national enthusiasm, for the new life and the requirements of democracy. With regard to the development of teachers, Mustafa Necati, for example, learnt that the majority of teachers could not read professional publications and had publications prepared and delivered to teachers to help them improve themselves. Mustafa Necati, who was well aware of the importance of self-improvement in teaching, said: "A teacher who does not read more than he/she teaches wears out quickly, becomes old and tiresome. A white-haired teacher who is fond of research and scrutiny is always vigorous and young." Mustafa Necati emphasised the importance of teachers' self-improvement. For this purpose, a travelling teacher's library was established within the "School Museum", which consisted of teaching tools and equipment. He sent the books requested by teachers to them by post (Akyüz, 1999).

During Mustafa Necati's ministry, "Millet Mektepleri" were established in late 1928 to teach the public how to read and write after the adoption of Latin letters, and were crowned with the personal participation of Atatürk. On 11 November 1928, Mustafa Kemal Atatürk took the pen in his hand and set to work to teach the new Turkish letters to the public and on that day Mustafa Kemal Atatürk was given the title of "Head Teacher". Mustafa Kemal accepted the title of "Head Teacher" on 24 November 1928. Much later (1981), the Ministry of National Education declared 24 November, the date Mustafa Kemal Atatürk accepted the title of Head Teacher in 1928, as "Teachers' Day".

In the 1930s, efforts to train teachers for the village and vocational high school teachers were emphasised. The first Vocational Teacher Training School for girls' vocational schools starts to operate in 1934 at İsmet Paşa Girls' Institute in Ankara. In 1936, the Male Technical Teacher Training School is opened in Ankara to train blacksmithing and woodworking teachers and this school is renamed as the Male Vocational Teacher Training School in 1937. Graduates of the 3-year programme of the Girls' Vocational Teacher Training School were assigned to Girls' Technical Education Institutions, and graduates of the 2-year programme were assigned to secondary schools (teachers of needlework) (Sakaoğlu, 2002).

The Village Teacher Training Schools established in 1926 were closed down in 1932 due to insufficient efficiency and different methods were sought to train village teachers (Akyüz, 1985). The Village Institutes were implemented as a revolutionary teacher training project, the spark of which belonged to Atatürk, under the auspices of the then President İsmet İnönü, with the efforts of Hasan Ali Yücel, Minister of National Education, and İsmail Hakkı Tonguç, Director General of Primary Education. A law was passed in 1937 to send sergeant instructors to 35 thousand villages that lacked schools and teachers. From 1937 onwards, Village Instructor Courses are opened. These courses are later connected to the village institute in that region with the establishment of Village Institutes (Erdem, 2008). It can be said that village schools were concerned with ensuring the penetration of "national culture and ideals" into the village during the last periods of the Ottoman Empire and the Republic (Bora, 2021). The Village Institutes project was based on the "technical" aim of urgently raising the minimum level of education of

the peasant population (Bora, 2021). According to the Regulations of the Village Institutes, students were to have republican and national feelings, to serve for the realisation of national ideals and aims in the village, and to work as men of culture for the progress and development of the Turkish nation as a whole, which was formed from various professions and classes (Kaplan, 1999). Tonguç (2009) summarises the aim of the Institutes, which trained thousands of teachers, as "to train men who will take the great revolutions we have made in our social life to the villages". In 1939, in line with the decisions of the First National Education Council (MoNE, 2023a), village schools with three grades were increased to five grades (which was the decision that laid the foundation of the Village Institutes), a uniform book system (state book) was introduced, and colleges and faculties were affiliated to the Ministry of National Education. However, the conditions of the time in the context of other countries (World War II, Marshall Aid, the footsteps of the transition to a multiparty system) led to a strong social opposition and despite the resistance of İsmet İnönü, the de facto founder of the village institutes, the courses and curricula of these schools were changed in 1947, again with the approval of İsmet İnönü himself, and in 1953 they were transformed into Primary Teacher Schools. Toprakçı's (2011) identification of Atatürk's philosophy of education as 'Reconstructionism' in the light of what he said and wrote may express the transformation from a society with a king to a republican society constructed through education. On the other hand, Toprakçı and Yılmaz's (2015) finding the philosophy of education in the light of İnönü's words and writings as predominantly 'Progressivist' can be seen as an endeavour to make the new republic last forever, including not involving the country in World War II.

2.2. From the Transition to Multi-Party Political Life to the 27 May Coup

With the decisions of the Second National Education Council (MEB, 2023a) convened on 15-21 February 1943, it is seen that the importance of morality, national history and Turkish language are emphasised and nationalism in education is brought to the forefront and implicitly the village institutes are terminated. The decisions of the Third National Education Council held on 2-10 December 1946 (MEB, 2023a), signed by the Minister of National Education Reşat Şemsettin Sirer, were related to the organisation, programmes and regulations of vocational and technical education institutions. The decisions of the Fourth National Education Council (MEB, 2023a), convened between 22-31 August 1949, with Dr. Tahsin Banguoğlu as the Minister of National Education, emphasised that the ideal of democracy should be the ideal of education and decided that "the organisation of educational institutes and higher teacher schools that train teachers for secondary and high schools should be arranged according to the needs". The discourse that the Village Institutes trained "communist" students and that communist professors gave lectures in these institutes spread in the political arena and some accusations were made, which were effective in the process of closure. Tevfik İleri, who was appointed as the Minister of National Education by the government after the new political organisation came to power in 1950, stated in his speech on teacher training that the teachers with "communist imagination" were teachers who could not be considered as teachers and that the necessary purges would be made in this regard (Aksoy, 1977, p: 105). The new political structure did not neglect to make statements about education in the party programme published in 1946. In this programme (Vatan Gazetesi, 9.1.1946) is one of the six most important points in terms of education; The six most important points of this programme (Vatan Gazetesi, 9.1.1946) in terms of education are the statements that the party was committed to a nationalism based on the unity of culture and ideals created by a common history among citizens and rejecting all kinds of

discriminatory tendencies, that education and training institutions had a duty in the realisation of such a nationalism ideal, the necessity of education and training to take part in economic development, the importance of educational unity, opposition to the Village Institutes, the establishment of institutions to train clergy, and finally, that universities should have scientific and administrative autonomy. Following the new political movement and with the public's support for this movement, the CHP's party programmes and congresses included some changes in decisions related to education and differentiated the laws. The CHP's decisions regarding the closure of the village institutes can also be considered in this context.

In the decisions of the Fifth National Education Council held on 04-14 February 1953 (MoNE, 2023a), with the signature of Minister Tevfik İleri, it was decided that "From now on, village institutes will receive primary school graduates from villages and individuals in a certain proportion and will teach for six years (as opposed to the previous five years); teacher schools will receive secondary school graduates and will teach for three years (as before)". The decisions of the Sixth National Education Council, which convened on 18-23 March 1957 (MoNE, 2023a), show a characteristic towards the dissemination of foreign languages in education. In the period between 1950 and 1960, Gazi and Istanbul Education Institutes, Ankara and Istanbul Universities, State Conservatories, Istanbul Technical University, Higher Schools of Economics and Commerce trained teachers for secondary schools (Maaske, 1955). In the 1950s, teachers of technical courses for girls' technical institutes and boys' art schools were trained at girls' and boys' Higher Technical Institutes (Maaske, 1955). In 1954, village institutes were closed down and transformed into primary-teacher schools and two different types of schools emerged; 3-year teacher schools accepting secondary school graduates and 6-year teacher schools accepting primary school graduates (Kaya, 1972). Higher Teacher Schools were also opened during this period. In 1959, the first Higher Islamic Institute was opened in Istanbul to train vocational teachers for imam hatip schools and religion teachers for secondary schools. Different methods, including shortterm teacher training practices, were also tried in order to fill the increasing teacher shortage. The reason for the suppression of the need to train teachers for the village by the new political structure can be attributed to the transformation of the agricultural structure in Turkey in the 1950s, the rural-urban migration brought about by the capitalistisation process, the labourisation process including the dispossession process and the squatting policies (Yıldırım, 2023). The 1950s saw the rise of nationalist-conservative populism and the reawakening of Islamism. This period, which aimed to appeal to and gain political support from the "burnt Anatolian children" against elitism (Bora, 2021), necessitated the bending of education policies, especially with the increase in young people migrating from rural to urban areas.

2.3. From 27 May Coup to 12 March Coup

The period that started with the military coup of 27 May 1960, continued with the interim military coup of 12 March 1971 and ended with the military coup of 12 September 1980 is distinguished by the rise of democratic and socialist thought currents in the fields of politics and culture and the impact of this rise on all areas of social life. The strengthening of trade union and political organisation of workers, the increase in youth movements, the mobilisation of the peasantry, the activism of public employees and the movements of teachers' organisations led to a deep political and social crisis in the country (Kaplan, 1999). This crisis and search resulted in turbulence in educational policies and especially in teacher training strategies, and unplanned and unprogrammed teacher training policies on the basis of the penetration of the

current government ideology into education. In the 1961 "Teacher Training Committee Report and 10-Year Plan" (MEB, 1961), it was stated that graduates of girls' institutes should be subjected to a one-year pedagogical formation in order to train kindergarten teachers, public education courses should be included among the courses taught in primary teacher schools and public educators should be trained, In order to train reserve officer teachers, it was decided that high school graduates should be subjected to teaching courses and perform their military service as teachers in the villages, primary teacher schools should be encouraged to be completed from outside, and courses to train temporary teachers should be opened (1961). On 5 January 1961, with the Law on Primary Education and Training, graduates of secondary school equivalents were made primary school teachers through courses. In these circumstances, the Seventh National Education Council (5-15 February 1962) convened under the chairmanship of the then Minister of National Education Hilmi İncesulu (MEB, 2023a) and took decisions on primary education, secondary education, technical education for girls and boys, measurement and evaluation of trade education, maturity examinations, higher education, private schools, foreign cultural relations, education and training related to religion, physical education and health, education and training related to national defence and educational foundations. On the basis of these decisions, the content of the council is very comprehensive; for the first time, the basic principles of national education, imam hatip high schools, maturity examinations, teacher training and making the teaching profession attractive, and the Higher Institute of Educational Sciences (it is deemed appropriate to establish it by a special law, first outside the university and affiliated to the Ministry of National Education, and after the establishment is completed, to seek ways and means to join the university as a faculty of education) are mentioned and resolved.

In 1963, a law enacted in 1963 allowed reserve officer teachers to become permanent teachers (Özoğlu, 2010). After the establishment of Ankara University Faculty of Educational Sciences in 1965, some universities started to establish schools of education to provide teaching certificate programmes based on 7-8 teaching method courses (Okçabol, 2005). These certificate programmes were generally aimed at undergraduate students in faculties of science and literature. In this period, Menderes's national voluntarism was continued by the Demirel administration and developmentalism and welfare were emphasised politically. It will be seen that the right-wing parties, which met under the umbrella of the government in the 1960s, evolved into different, independent movements and formations in the 1970s. In 1969, the Islamist political movement gained a significant representation, and the fact that they addressed industrial development and spiritual development together can be said to reflect the spirit of the period. In this period, foreign experts were invited and their opinions were also taken in matters related to education. Marım and Sam (2017), in their analysis of American expert reports between 1950-1960, made an important observation about teachers. Accordingly, in foreign reports, it was emphasised that in order to ensure that teachers embrace their profession, practices such as increasing their salaries, being appreciated, being rewarded, participating in decisions about themselves and the programme, and encouraging them to higher education should be applied.

2.4. From the 12 March Memorandum to the 12 September Coup

From 1960 to the early 1970s, the populist, anti-elitist political model was strengthened and the society was divided into two as the wise and the rest (Özdemir, 2021, p: 331). This course of events did not please some people, which was followed by the 12 March Memorandum. In the

1970s, Süleyman Demirel, who came to power after the memorandum, moved far away from his liberal democratic attitude and twice assumed the presidency of anti-communist governments that included Islamist and nationalist parties under the roof under the name of "Nationalist Front". The "Turkish-Islamic Synthesis" idea, which developed around the Intellectuals' Quarry founded in the mid-1970s, also emerged in these years. The Eighth National Education Council (28 September-3 October 1970), held under the ministry of Prof. Dr. Orhan Oğuz in the shadow of the March 12 Coup d'état, can be remembered for the decisions detailing the current framework of the education system, especially higher education. The Ninth National Education Council (24 June-4 July 1974), held under the ministry of Mustafa Üstündağ, is a continuation of the previous council, but it is seen that the details of today's education system were drawn, especially the Objectives and Basic Principles of National Education, which were shaped as the articles of the Law No. 1739, were determined and the decisions were taken that "teacher training institutions will be reorganised in accordance with the principles in the Basic Law on National Education and the provisions of the Law on Higher Education Schools to be issued next year" (MEB, 2023a).

The educational institutions of the Turkish society, which was experiencing political turmoil, were also affected by these turmoil and teacher training policies were also affected by this turmoil, and the way to become a teacher was reorganised in such a way that it could be achieved with "short-term efforts". As of the 1973-1974 academic year, high school programmes started to be implemented in teacher training schools and they were renamed as teacher high schools (Ataunal, 1987). The practice of Teacher Training by Letter was put into effect in 1974-1975 in order to prevent overcrowding in universities and to meet the need for teachers; through the "Higher Education Centre by Letter", a large number of teachers were trained with short-term courses of a few weeks in the summer months (Akyüz, 2001). In the 1974-1975 academic year, some of the first teacher schools lost their teacher training function and were transformed into three-year teacher high schools. In line with the Law No. 1739's provision that teachers at all levels should be trained through higher education, Two-Year Training Institutes were opened in the 1974-75 academic year. As a result of problems such as lack of teaching staff, political events and pressures between 1975-1980, the Two-Year Training Institutes were forced to train teachers through accelerated education outside the normal programme and on 20 July 1982 these institutes were brought under the roof of universities under the name of education colleges (YÖK, 1998). Until the Law No. 1739 (Article 43) stipulated that teachers should have "field knowledge, professional formation and general culture" (between 1923 and 1973), the uncertainties in forming teacher cadres continued; unfortunately, after 1973, the institutions that would train teachers as defined by the Basic Law on National Education disappeared within the Higher Education Institutions (Sakaoğlu, 2002).

The 1973 Basic Law on National Education's demands to extend primary education to 8 years and to train teachers accordingly led to the establishment of 3-year Education Institutes as a result of the political developments of 1974 and the following years. The First Nationalist Front Government, which was active between 1975-1977, decided that the compulsory ethics courses taught in primary and secondary education should be taught by appropriate teachers and that these should be provided by graduates of the Faculty of Theology, Faculty of Islamic Sciences, Higher Islamic Institute and Imam Hatip Schools (Dağlı and Aktürk, 1988). The Second Nationalist Front Government, which was active between 1977-1978, stated that the Islamic Institutes would be transformed into academies and that graduates of these institutions would

be assigned as teachers of philosophy, ethics, sociology and psychology in high schools, and that graduates of İmam Hatip high schools would be assigned as teachers of religion and ethics in primary schools (Dağlı and Aktürk, 1988, , p: 389). According to the 1975 report of TÖB-DER, the recruitment of teachers from many different sources such as Teachers' High Schools, Education Institutes and Higher Teachers' Schools in the field of education and training, which requires expertise, has corrupted the profession and the unity of thought and behaviour among teachers has disappeared due to this reason (TÖB-DER, 1975). Indeed, in 1976-1977, there were different numbers of Primary Teacher High Schools, two-year Institute of Education, three-year Institute of Education, Higher Teacher Training Schools, Male Technical Teacher Training School, Female Technical Teacher Training School, Trade and Tourism Teacher Training School, Industrial Arts Teacher Training School and Higher Islamic Institute. At this point, those who set out with the idea of finding a job no matter what have chosen to become teachers (TOB-DER, 1977). In the 1989 Teacher Training Advisory Board Meeting, a retrospective regret was expressed and the following was said about the educational policies and teacher training practices since the 1960s: "In order to meet the increasing need for teachers, from time to time, for social, economic and political reasons, there have been practices that prioritised quantity over quality, which were not very useful. Among these, the practice of reserve officer teachers initiated in 1960, the practice of substitute teachers in 1961-1962, the practice of teacher by letter initiated in 1974, the practice of teacher training with accelerated programmes since 1978..." (MEB-ÖYDKT 1989).

2.5. From 12 September Coup to 28 February

The Tenth National Education Council (23-26 June 1981), held under the ministry of Hasan Sağlam, ended with the decision that "the school should be considered as the basic level of management in the educational organisation", and other parts of the Council were added to or retouched on the past, with the emphasis on the training of teachers and other high-level educational personnel in teacher training institutions, and the in-service training of personnel. The Eleventh National Education Council (8-11 June 1982), which was held under the ministry of Hasan Sağlam, was almost entirely about teachers and teaching profession with its content based on the titles of development of teacher education, pre-service problems and suggestions in teacher education, training of education experts, in-service training of teachers and experts, problems of teachers and experts and suggestions for solutions. For the first time, the concept of specialisation in education (Educational Administrator, Educational Inspector, Educational Planning, Guidance in Education, Programme Development in Education, Special Education, Educational Technology, Nutrition Education, Public Education, Measurement, Evaluation and Guidance in Education) was emphasised. In addition, with the establishment of faculties and departments of education in universities, teachers were given the opportunity to pursue master's and doctorate degrees either in their own disciplines or in various specialised areas of education.

As of 1982, two-year Institutes of Education, Schools of Education and 3-year Institutes of Education, the number of which had been reduced to 17 in 1981, were extended to 4 years and affiliated to universities under the name of Faculties of Education. The Council of Higher Education (YÖK), which was established with the 1982 Constitution, became the administrative centre of the education institutes affiliated to universities. Technical and Art Higher Teacher Training Schools were also transformed into Faculties of Technical Education. There were also those who had done their military service as teachers, and these were assigned to the east and south-east with the 1987 regulation. In the Twelfth National Education Council

held between 18-22 June 1988 under the ministry of Hasan Celal Güzel, the following comment was made on teacher training policies: "In order to provide new generations with a consciousness of development, Turkey's development goals should be liaised with the subjects taught in the classroom in terms of where and why Turkey's needs are used; students should be given information about various professions" (YÖK, 2007). The economic policy implemented in Turkey after January 24, 1980 had an impact on the commercialisation of the education system and the centralisation of education around YÖK, facilitating these processes (Beytekin & Çıldır, 2023). The five years following the 24 January Decisions were the years in which some changes began to be seen in the educational policies of the country. The commercialisation of public schools, the proliferation of attempts to open private educational institutions from the 1980s onwards, the establishment of private universities, working students being directed to open education and being victimised with limited branch opportunities significantly weakened the egalitarian character of education. In addition, during this period, social opposition was silenced and many people were suspended from educational institutions. In 1982, Prof. Dr. Selçuk Kantarcıoğlu, a member of the Advisory Council of the Council of Higher Education, stated that with the Higher Education Council (YÖK) established in 1981, equality of opportunity was abolished, those with money were given the opportunity to pursue an academic career, the nepotism method would find a field of application with this law, and absenteeism would increase (Cumhuriyet, 25.1.1982). Since the 1980s, it can be said that a political style that adapted the market logic to all areas of life has been dominant. As a result of the transformation of education colleges into faculties of education with a law enacted in 1989, the primary teaching programmes within these institutions could not produce graduates for several years from 1992 onwards; in order to fill this gap, short-term (at least 26 weeks) pedagogical formation courses were opened at universities upon the request of the Ministry of National Education, and graduates of various faculties who completed these courses were appointed as primary teachers (Özoğlu, 2010). The period between 1980 and 2002 was also a period of rising Islamism. The 12 September regime used both Kemalism to legitimise itself and the Turkish-Islamic synthesis. The practice of compulsory religion classes that emerged in this period is an example in this regard. In this period, it was also an important political attitude to demand the obedience of citizens through religious references. The military regime used the Turkish-Islamic synthesis as a valve to prevent radical Islamism. The rise of another right-wing political organisation in the late 1980s accelerated the rise of Islamism in all sectors (Bora, 2021, p: 475), thus affecting education policies and teacher training strategies. In the Thirteenth National Education Council held between 15-19 January 1990 under the ministry of Avni Akyol, the subject was mainly non-formal education.

In the Fourteenth National Education Council held between 27-29 September 1993 under the ministry of Nahit Menteşe, it was decided to make the necessary legal arrangements for the establishment of a Teacher Training Coordination Board in order to ensure a continuous cooperation between the Ministry of National Education and the Council of Higher Education in teacher training (YÖK, 2007, p. 22). Starting in 1994 and ending in 1997 with the new teacher training model, the Pre-Service Teacher Education project led to a major transformation in the teacher training system (Okçabol 2005). This project was initiated, financed (as a loan) and sustained under the expertise of the World Bank in cooperation with MoNE and YÖK. This new model, based on the recommendations of the Carnegie Forum on Education and the Economy, was used to meet the educational needs of the United States. However, this programme was deficient in two aspects in particular: previous teacher training experiences and

recommendations were not taken into account in the development of this model, and Turkey's specific conditions, such as religious fundamentalism problems and economic conditions, were prepared without consulting educationalists, without any research, and without paying attention to the situation of the faculties (Okçabol, 2012, p: 223). In the Fifteenth National Education Council (13-17 May 1996) convened during Turhan Tayan's ministry, the decisions to improve the coordination between the relevant higher education institutions and the Ministry, to improve the teaching profession economically and socially, to direct teachers towards master's and doctorate degrees, and to establish a National Education Academy to support in-service training and research and development related to teaching were partially implemented. The Sixteenth National Education Council (22-26 February 1999), convened during the ministry of Metin Bostancıoğlu, focused on teaching in vocational and technical education. In fact, the first subsequent council was convened seven years later and the next three councils did not go beyond the repetition of the problems related to the teaching profession. Interestingly, the format of the pages of the Ministry's Board of Education and Training (MoNE, 2023a), where the decisions of the last three councils were published, has moved away from the format in which the decisions of the other councils were published, and has turned into a list of recommendations.

2.6. From 28 February to Today

28 February marks the process in which the Refah-Yol coalition, Islamic capital, the military and the bureaucracy attempted to suppress it. 28 February led to a process of questioning and recreation of the forms of existence and participation of Islamic actors in the public sphere; Islamic elites had to invent strategies of articulation between the past and the future in accordance with their new class status in order to position themselves legitimately within the system, and public Islam was now secularised in capitalist, democratic and rational forms (Yankaya, 2012). The 28 February decisions can be said to have closed the paths of teacher training for some groups. The equivalence of some universities, such as Al-Azhar, was cancelled and this cancellation provision was retroactively applied and those who had graduated from these universities years ago and were teaching in Turkey were dismissed; with the transition to eight years of uninterrupted education, it was made de facto impossible for vocational school students to enter university by not recognising their acquired rights, and thus at least three generations of "children of the others" were purged, which also affected İmam-Hatiplis (Özipek, 2021, p: 643). One of the most important decisions of 28 February in terms of education policies was the statement that "Education policies should once again be in line with the spirit of the Tawhidi Tedrisat Law". It can be said that the idea of "unity", which was born out of this spirit, accelerated the process of homogenising the decision-making processes in education and validating the strategy of "gathering in one hand", which was imposed by the 12 September coup, and reinforced it in the eyes of the society after 28 February. In 1997, in order to ensure "the continuity of the reformist attitude of the teacher training system", the National Committee for Teacher Training was established in line with the proposal to establish a national committee in the Carnegie report, and with this decision, it was aimed to establish a permanent body that would bring together the relevant parties of teacher training and employment (Ministry of National Education, Council of Higher Education and Faculties of Education) and advise on national teacher training policies (YÖK, 2007). With this policy, decisions on teacher training have fostered an understanding that demands unquestioning students through hollow teachers. On this basis, the National Education Development Project

(NEGP), which was carried out in 1997 in cooperation with YÖK and the Ministry of National Education in order to restructure the structure and functioning of faculties of education, envisaged radical changes in faculties of education. As a result, graduates of the faculties of science and theology were given the right to become teachers by completing a master's degree without thesis.

After 2002, governments have strengthened neoliberal policies in education. In 2006, with a regulation made by the Council of Higher Education, the responsibility of training religious culture and moral education teachers was transferred from the faculties of theology to the faculties of education. However, prospective teachers continued to take their subject courses in theological schools (Kavak et al., 2007). In this period, following the transfer of the relevant programmes to faculties of education, theology backgrounds were appointed in faculties of education. With the government's decision dated 2 November 2009, all vocational and technical education faculties were transformed into faculties of technology, art and design or trade and tourism. As a result of this decision, approximately 73 years of experience and teacher training process in vocational and technical fields were erased (Okçabol, 2012). Furthermore, those who want to teach in vocational/technical fields are required to apply for teaching certificate programmes in the same faculties to be opened (Okçabol, 2012). In March 2009, YÖK authorised foundation universities to open faculties of theology to train teachers. On 27 August 2009, YÖK decided to restart teaching certificate programmes (pedagogical formation) for all undergraduate students and students had to pay higher education fees to enrol in such programmes. In the meantime, the proliferation of private schools meant that teachers in these schools did not enjoy the same rights as public school teachers. The National Committee for Teacher Training, which was established during this period, operates with cadres formed by those close to the government; it can be said that they are content with approving the decisions of the Council of Higher Education (YÖK) rather than opposing it. In the programme of the 64th Government in 2015, under the shadow of neoliberalism, it is decided to establish a libertarian, productive and competitive education system that educates the manpower needed by the knowledge-based economy and to train teachers in accordance with this system (Government Programme-64.-, 2015). With the Law No. 3797 dated 12 May 1992 on the "Organisation and Duties of the Ministry of National Education", the Directorate was renamed as "General Directorate of Teacher Training and Education" and restructured as "General Directorate of Teacher Training and Development" with the Decree Law No. 652 published in the Official Gazette dated 14.09.2011. The 2022 Law on Teaching Profession (Official Gazette, 2022) is also problematic in that it does not include policies related to teacher training. The slow increase in public expenditures on education and the increasing difference between the quality of high schools and the private tutoring system in university entrance have created increasing inequalities in access to quality education (Pamuk, 2022). The fact that teacher training universities are becoming more popular in private universities and that the private sector prefers teacher candidates trained at private universities constitutes an important dimension of these inequalities. However, the problem is not only economic. It can be said that teaching, which used to be considered as a public job, has entered a process of erosion of the culture and character of education with the marketisation of education, deregulation of the teaching profession and the evaluation of education from a profit/loss perspective, thus individualism has become popular (Yıldız, 2012).

TODAY AND CONCLUSION

Today, even in the most difficult moments of the War of Independence, in spite of the Maarif Congress and Heyeti İlimiye Meetings, which were held in order to put common sense into action, the features of the councils as an opinion-making body in determining policy and creating a road map have almost been lost. Under these circumstances, it is really difficult to understand the state of teacher training in Turkey. Again, there is a view specific to the times of disorganisation. Education faculties train teacher candidates who can work in primary, secondary and high schools. In addition to this, with a new decision taken by the Council of Higher Education (YÖK) (YÖK, 2023), other practices related to teacher training are summarised as follows: In faculties other than teacher training faculties, pedagogical formation education is provided face-to-face or remotely within the formal education and training period (starting from the third semester as elective courses). There are Master's Degree programmes without thesis in Teaching Profession and they also train teachers. Pedagogical Formation Education Certificate Programme for graduate students continues. As can be seen, our teacher training policy is always rewinding. Especially in the 2022-2023 education and training period, it seems that almost all university students, except freshmen, will be allowed to take formation courses as elective courses during undergraduate education, and the application will be determined by the universities. This situation, due to the insufficient number of lecturers within the faculties of education, means both teacher training with each faculty's own lecturers and teachers trained by distance education asynchronously.

The number of teacher training faculties is around 95 in public and private universities and there are about 200 000 students studying in these faculties. In the academic year 2022-2023, a total of 6 939 511 students are studying in all universities. Of these, 3 754 095 are undergraduate students (YÖK, 2023). Even if the number of students of a few programmes such as Medicine, Law, etc., which also guarantee employment upon graduation, is roughly subtracted, this number will be around three million. If only the number of fourth year students of these programmes is roughly calculated, it is approximately 750 000. When both the graduates of the faculty of education who could not be appointed in the past and those who have received formation in the past and are waiting are added to this number (since 572 thousand 19 candidates applied to the 2023 KPSS educational sciences session, 572 thousand 19 candidates are currently 572 thousand 19 candidates, not counting those who have given up hope!) Including approximately 50 000 new graduates of the faculty of education, it means that around 1 250 000 teacher candidates will be waiting to be appointed as teachers at the end of the 2023-2024 academic year. In the meantime, the Ministry of National Education, which never publishes any statistics on the number of teachers needed in terms of branches, conducts an oral exam in addition to KPSS. While the discussions on how the oral exam is conducted and its fairness continue, it is certain that how so many people will be taken to the oral exam is a separate problem.

The focus of the solution lies first and foremost in convincing everyone, from seven to seventy, that education is a science and teaching is a profession requiring expertise. On the other hand, it is obvious that the multi-sourcing in teacher training, which has been going on since the past, must be ended. Accordingly, a solution can be realised by transforming faculties of education into postgraduate faculties and by including students from science and other faculties who wish to become teachers and whose graduation grades are above seventy-five out of a hundred in the programme through oral/written examinations. For example, for guidance counsellors or

psychological counsellors to work in schools, the psychology department of the faculty of science will be used. This training will last for two years, one year will be in the form of lectures and the other year will end with each student producing a thesis that solves a problem in practice in a school on the basis of an agreement with the Ministry of National Education. A second solution is to strengthen the faculties of education in the context of the areas with the greatest need for teachers, in such a way that graduates of science and other faculties are never included. In other words, for example, the physics teaching programme will be in the faculty of education with a strong physics teaching programme in every aspect, and students from science faculties will not be made teachers by giving them a certificate through formation or some other means.

It would not be correct to state that the solutions mentioned above are thornless. For years, educational scientists have been producing research reports and articles on how to get out of the situation. In order to evaluate this accumulation, it can be said instead of the last word that the fact that teaching is a profession as a reflection of the belief in science should be realised by the society and the world, and policy makers (top managers) should calculate the society/world of the future and the state it will be in with strong probabilities, and especially employment and population-oriented solutions should be produced. On the other hand, while doing this, it is obvious that we have just entered a new century (postmodern/near modern age) in which technology, learning objects, artificial intelligence have started to emerge and the world's resources have been exhausted, and that all conceptualisations and problems should be handled on this basis.

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PREDICTION OF TEACHERS' READINESS FOR CHANGE WITH DATA MINING ALGORITHMS

ÖĞRETMENLERİN DEĞİŞİME HAZIR OLMA DURUMLARININ VERİ MADENCİLİĞİ ALGORİTMALARI İLE TAHMİNİ

Ahsen Filiz¹

ÖZET

Araştırmanın amacı, veri madenciliği algoritmaları ile sınıflandırma analizi kullanarak öğretmenlerin değişime hazır olma durumlarının hangi değişkenler üzerinde etkili olduğunu tahmin etmektir. Çalışmada veri madenciliği yazılımı olan WEKA programı kullanılmıştır. Çalışmada nicel araştırma türlerinden genel tarama modeli kullanılmıştır. Çalışmanın katılımcılarını, Türkiye’de farklı illerde Milli Eğitim Bakanlığına bağlı resmi okullarda görev yapan 171 öğretmen oluşturmaktadır. Veri toplama aracı olarak “Kişisel Bilgi Formu” ve “Değişime Hazır Olma Ölçeği” kullanılmıştır. Çalışmada öğretmenlerin değişime hazır olma durumlarını etkileyen en önemli değişkenin yaş olduğu sonucuna ulaşılmıştır. Çalışmada öğretmenlerin değişime hazır olma durumlarını etkileyen en önemli faktörün belirlenmesi yapılacak olan araştırmalara ışık tutacağı ve veri madenciliği yöntemi kullanımına örnek teşkil etmesi açısından katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Değişime hazır olma, öğretmen, veri madenciliği

ABSTRACT

The aim of the study is to predict which variables are effective on teachers' readiness for change by using classification analysis with data mining algorithms. WEKA program, a data mining software, was used in the study. General survey model, one of the quantitative research types, was used in the study. The participants of the study consisted of 171 teachers working in public schools affiliated to the Ministry of National Education in different provinces in Turkey. "Personal Information Form" and "Readiness for Change Scale" were used as data collection tools. In the study, it was concluded that the most important variable affecting teachers' readiness for change was age. It is thought that determining the most important factor affecting the readiness of teachers for change will shed light on future research and contribute to the use of data mining method.

Keywords: Readiness for change, teacher, data mining

GİRİŞ

Günümüzde değişim ve yenilik kavramlarına sıklıkla rastlamaktayız. Özellikle bilişim ve teknolojinin hızla geliştiği ve gelişim ile ortaya çıkan bilgi yoğunluğu eğitim alanını yakından etkilemiştir. Eğitimin gerçekleşmesi ile ilerlemeyi amaçlayan değişim, teknik ve insani bakımdan engeller ile karşılaşabilmektedir (Karacabey ve Bozkuş, 2018). Yapılan çalışmalar da insani bakımdan ortaya çıkan engellerin teknik engellerden daha önemli olduğunu ortaya koymuştur (Burke, 2017).

Sosyal, ekonomik ve politik sistemlerle etkileşim içerisinde olan eğitim sistemi okullarda bazı değişimleri zorunlu hale getirmiştir. Okulların bu süreci başarılı bir şekilde gerçekleştirebilmesi için sürekli öğrenmeyi hayat felsefesi haline getirmiş kendine değişime adanmış yönetici ve öğretmenlere ihtiyaç vardır (Levent, 2016). Çünkü eğitim alanının çevresinde gelişen, değişen yeniliklere yabancı kalması mümkün değildir. Eğitimin değişim üretme işlevi bunun nedeni olarak açıklanabilir (Mitchell, 2000). Eğitim alanının en önemli unsuru olan öğretmenler, hem değişimden etkilenen hem de değişimi etkileyen bireyler olduğu için süreçte kritik bir role sahiptir (Levent, 2016).

Son yıllarda eğitimde değişim adına yürütülen 2023 vizyon belgesi eğitimde değişim, gelişim ve reform hareketi olarak tanımlanmaktadır. Bu vizyonun temel felsefesi; eleştirel düşünme,

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iletişim, teknoloji gibi 21. yüzyıl becerileri olarak tanımlanan becerilerin öğrencilerin kazanmasını sağlamaktır. Bu becerileri öğrencilere kazandırmak ve çağın ihtiyaçlarını karşılayacak ahlaklı bireyler yetiştirmek öğretmenlerin en önemli sorumluluklarından biridir. Bunun için de öğretmenlerin değişme çalışmalarına başlamadan önce yeniliklere ve değişime hazır olması son derece önemlidir. Buradan hareketle, veri madenciliği algoritmaları ile sınıflandırma analizi kullanarak öğretmenlerin değişime hazır olma durumlarının hangi değişkenler üzerinde etkili olduğunu ortaya koymak amaçlanmıştır.

Bu kapsamda aşağıdaki araştırma sorularına cevap aranmıştır.

1. Veri madenciliği algoritmalarına göre, öğretmenlerin değişime hazır olma durumlarını belirlemede hangi değişkenler etkilidir?
2. Öğretmenlerin değişime hazır olma durumlarını belirlemede hangi algoritmalar kullanılabilir ve hangi algoritma en iyi sonucu verir?

Veri Madenciliği

Veri madenciliği, yapay zeka, istatistik, veri tabanları, bilgi bilimi, reklamcılık, veri tabanı pazarlaması, sağlık, e-ticaret, güvenlik gibi birçok alanda (Manjarres vd., 2018) kullanılan büyük miktarlardaki verilerden ilgili bilgilerin çıkarılmasını sağlayan disiplinler arası bir alandır (Jain vd., 2011). Bu kullanım alanlarından biri de son zamanlarda eğitim ortamı olmuştur. Eğitim Veri Madenciliği ve Öğrenme Analitiği, eğitim verilerinden bilgi keşfini desteklemeyi amaçlayan hem farklı hem de yakınsak bakış açıları, metodolojiler, stratejiler ve araçlar sunan yeni gelişen alanlardır (Luna vd., 2017). Hem Eğitim Veri Madenciliğinin hem de Öğrenme Analitiğinin kökleri dijital eğitim tesislerine dayanmakta ve sıklıkla aynı eğitim zorluklarını ele almaktadır. Günümüzde, belirli konuların geçici analizi için ve eğitim verilerinden yararlı bilgilerin çıkarılmasını ve analiz edilmesini kolaylaştırmak için erişilebilir çok sayıda araç bulunmaktadır. Bu bağlamda, eğitsel veri madenciliği, yeni öğrenme teorilerinin elde edilmesinde ve mevcut öğrenme teorilerinin geliştirilmesine katkıda bulunmada bir araç olarak kullanılabilir (Romero ve Ventura, 2017).

Veri madenciliğinde sıklıkla sınıflandırma, kümeleme ve birliktelik kuralları şeklinde üç yöntem kullanılır (Alan, 2012). Çalışmada "Sınıflandırma Analizi" yöntemi kullanılmıştır. Sınıflandırma tekniğinin temel amacı, her bir veri durumu için hedef sınıfı doğru bir şekilde tahmin etmektir (David vd., 2013). Sınıflandırma ile veriler bölümlere ayrılır, genel veya özel kategorilerin her biri bir sınıf olarak belirlenir (Bramer, 2007). Sınıflandırma tekniği yazılımı olan WEKA en yüksek performansa sahiptir (Zupan ve Demsar, 2008). WEKA programı, kullanım kolaylığı, desteklenen dosya formatları, algoritmalar ve makine öğrenmesi paketleri gibi birçok açıdan incelendiğinde en kullanışlı programdır (Kaya Keleş ve Özel, 2014).

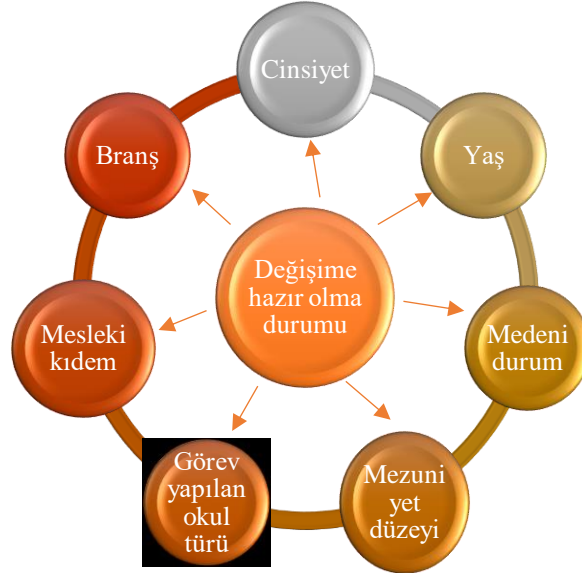
Araştırmanın Önemi

Öğretmenlerin değişime hazır olma durumları önemli olmasına rağmen literatürde öğretmenlerin değişime hazır olma durumlarını etkileyen faktörleri belirlemeye yönelik az sayıda çalışma yapıldığı görülmektedir. Çalışma aynı zamanda veri madenciliği yöntemiyle öğretmenlerin değişime hazır olma durumlarında etkili olan faktörleri önem sırasını verme özelliğine de sahiptir. Alanyazında böyle bir çalışmaya rastlanmamıştır. Bu nedenle çalışmanın literatürdeki boşluğu dolduracağı düşünülmektedir.

YÖNTEM

Araştırma Modeli

Araştırmada var olan bir durum ortaya konarak var olduğu şekliyle betimlemek amaçlandığı için tarama modeli kullanılmıştır. Tarama modeli, bir araştırmada araştırma sorularını cevaplamak veya hipotezlerini test etmek amacıyla araştırmacı tarafından geliştirilerek planlanan bir modeldir (Karasar, 2007). Çalışmanın araştırma modeli Şekil 1 'de verilmiştir.



Şekil 1. Araştırma Modeli

Örneklem

Çalışmanın örneklemini 2022-2023 eğitim öğretim yılında Türkiye’de farklı illerde Milli Eğitim Bakanlığına bağlı resmi okullarda görev yapan 171 öğretmen oluşturmuştur. Öğretmenler basit tesadüfi örneklem yöntemiyle belirlenmiştir.

Veri Seti

Araştırmanın veri setini çalışmaya katılan 171 öğretmenin değişime hazır olma ölçeğinden elde edilen sonuçları oluşturmaktadır. Veriler araştırmacılar tarafından veri toplama araçları aracılığıyla toplanmıştır. Veri setinde öğretmenlerin değişime hazır olma durumlarının belirlenmesi için kullanılacak bağımlı ve bağımsız değişkenler bulunmaktadır. Bağımlı değişken değişime hazır olma durumu, bağımsız değişkenler ise öğretmenlerin; cinsiyeti, yaşı, medeni durumu, mezuniyet düzeyi, görev yaptığı okul türü, mesleki kıdemi ve branşdır. Tablo 1’de değişkenlere ilişkin sınıflandırmalar verilmiştir.

Tablo 1. Bağımsız Değişkenler

Bağımsız değişkenler	Sınıflandırma	Tür
Cinsiyet	Kadın, erkek	Sözel veri
Yaş	24-68	Sayısal veri
Medeni durum	Evli, bekar	Sözel veri
Mezuniyet düzeyi	Yüksekokul, Lisans, Lisansüstü	Sözel veri
Görev yapılan okul türü	İlkokul, ortaokul, lise	Sözel veri
Mesleki kıdem	1-10 yıl, 11-20 yıl, 21 yıl ve üstü	Sayısal veri
Branş	Okul öncesi öğretmeni, sınıf öğretmeni, branş öğretmeni	Sözel veri

Veri Toplama Aracı

Bu çalışmada veri toplama aracı olarak “Kişisel Bilgi Formu” ve “Değişime Hazır Olma Ölçeği” kullanılmıştır. Aşağıda veri toplama araçlarının özellikleri verilmiştir.

Kişisel Bilgi Formu

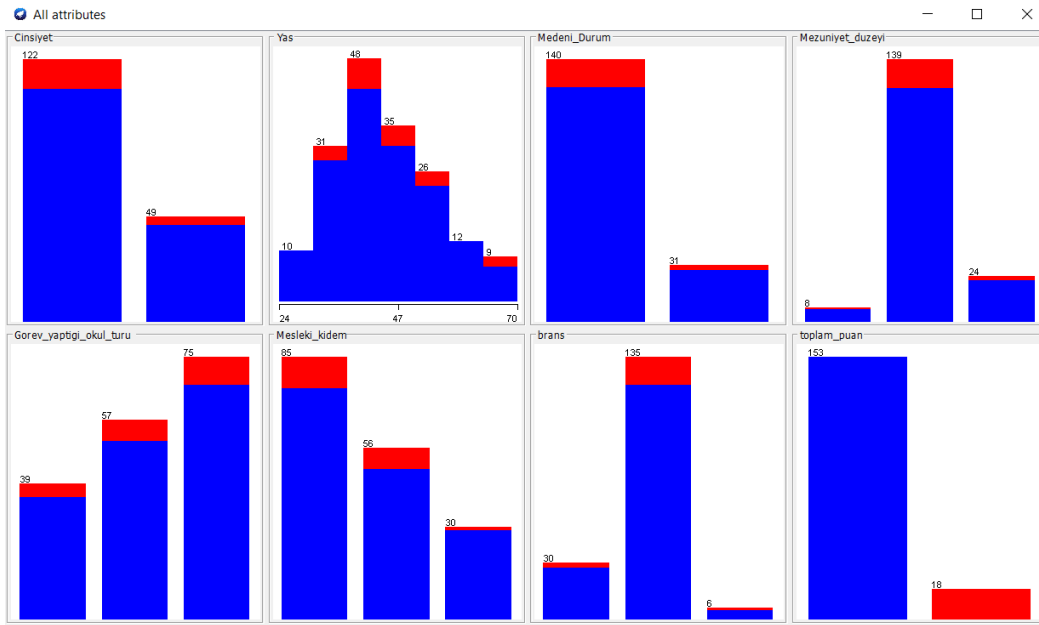
Kişisel bilgi formunda öğretmenlerin; cinsiyeti, yaşı, medeni durumu, mezuniyet düzeyi, görev yaptığı okul türü, mesleki kıdemi ve branşı ile ilgili sorulara yer verilmiştir

Değişime Hazır Olma Ölçeği

Kondaqçı, Zayim ve Çalışkan tarafından 2013 yılında geliştirilen “Değişime Hazır Olma Ölçeği” okullarda öğretmen, yönetici ve rehber öğretmen olarak çalışan iş görenlerin değişime hazır olma düzeylerini ölçmek için geliştirilmiştir. 5’li likert tipinde olup 12 sorudan oluşan bilişsel, duygu ve kararlılık olmak üzere üç boyuta sahip bir ölçektir. Ölçeğin güvenirlik katsayısı sırasıyla bilişsel boyut için .87, duygu boyutu için .75 ve kararlılık boyutu için .90 olarak bulunmuştur. Ölçekten alınabilecek en düşük puan 12 en yüksek puan 60’tır. Öğretmenlerin değişime hazır olma durumları değerlendirilirken 12-36 puan aralığı düşük, 37-60 puan aralığı yüksek olarak değerlendirilmiştir.

Verilerin Analizi

Öğretmenlerin değişime hazır olma durumlarında hangi değişkenlerin etkili olduğunu belirlemede veri madenciliği yazılımı olan 3.8.4 versiyonlu WEKA programı kullanılmıştır. WEKA, Yeni Zelanda Waikato Üniversitesi tarafından geliştirilen birçok sınıflandırma tekniği içeren açık kaynaklı bir yazılımdır (Aydemir, 2017). Çalışmada öğretmenlerin değişime hazır olma ölçeğinden elde edilen veriler, excel dosyasına aktarılmış ve WEKA programının kullanımı için notepad ile açılarak arff uzantılı dosya formatına dönüştürülerek kaydedilmiştir. Bu verileri içeren değişkenler ve türleri Şekil 2’de verilmiştir.



Şekil 2. Değişken grafikleri

@attribute Cinsiyet { kadın,erkek }

@attribute Yas real

@attribute Medeni_Durum { evli,bekar }


```

@attribute Mezuniyet_duzeyi { Yuksekokul,lisans,lisansustu }
@attribute Gorev_yaptigi_okul_turu { ilkokul,lise,ortaokul }
@attribute Mesleki_kidem { 21yil_ustu,11_20yil,1_10yil }
@attribute brans { sinif_ogretmeni,brans_ogretmeni,okul_onesi_ogretmeni }
@attribute toplam_puan { yuksek,dusuk }
@data
kadin,65,evli,Yuksekokul,ilkokul,21yil_ustu,sinif_ogretmeni,yuksek
kadin,68,bekar,Yuksekokul,ilkokul,21yil_ustu,sinif_ogretmeni,yuksek
kadin,55,evli,lisans,ilkokul,21yil_ustu,sinif_ogretmeni,yuksek
kadin,44,bekar,lisansustu,lise,21yil_ustu,brans_ogretmeni,yuksek
erkek,41,evli,lisans,lise,11_20yil,brans_ogretmeni,yuksek
kadin,53,bekar,lisans,lise,21yil_ustu,brans_ogretmeni,yuksek
kadin,33,evli,lisans,ortaokul,11_20yil,brans_ogretmeni,yuksek
kadin,33,evli,lisans,ortaokul,1_10yil,brans_ogretmeni,yuksek
kadin,55,bekar,lisans,ortaokul,21yil_ustu,brans_ogretmeni,yuksek
erkek,62,evli,lisans,lise,21yil_ustu,brans_ogretmeni,yuksek
erkek,42,evli,lisans,ortaokul,11_20yil,brans_ogretmeni,yuksek
kadin,45,evli,lisans,ortaokul,21yil_ustu,brans_ogretmeni,yuksek
kadin,24,bekar,lisans,ortaokul,1_10yil,brans_ogretmeni,yuksek
kadin,44,bekar,lisansustu,ortaokul,21yil_ustu,brans_ogretmeni,yuksek
kadin,43,evli,lisans,ortaokul,11_20yil,brans_ogretmeni,dusuk
kadin,43,evli,lisans,ilkokul,11_20yil,okul_onesi_ogretmeni,yuksek
kadin,52,bekar,lisans,ortaokul,21yil_ustu,brans_ogretmeni,yuksek
kadin,46,evli,lisans,ortaokul,21yil_ustu,brans_ogretmeni,yuksek

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BULGULAR VE YORUM

Çalışmada veriler öğretmenlerin değişime hazır olma durumlarını etkileyen faktörleri tahmin etmek için kullanılmıştır. WEKA programı kullanılmış ve WEKA programına göre model oluşturmada birçok karar ağacı algoritması belirlenmiştir. Kullanılan verilerin sınıflandırma algoritmaları, performans ölçümleri ve başarı dereceleri aşağıda Tablo 2’de verilmiştir.

Tablo 2: Sınıflandırma Algoritmaları, performans ölçümleri ve başarı dereceleri

Algoritmalar	Doğru sınıflandırılan örnek	Doğruluk (%)	TP Oranı	FP Oranı	Kesinlik	Duyarlılık	F-Ölçütü
K-Star	149	87.1345	0,871	0,897	0,798	0,871	0,833
Logistic Regression	152	88.8889	0,889	0,895	0,800	0,889	0,842
Multilayer Perceptron	140	81.8713	0,819	0,904	0,793	0,819	0,806
Random Forest	148	86.5497	0,865	0,898	0,798	0,865	0,830
Random Tree	140	81.8713	0,819	0,904	0,793	0,819	0,806
IBk	135	78.9474	0,789	0,907	0,789	0,789	0,789
Random Committe	142	83.0409	0,830	0,902	0,794	0,830	0,812

Confusion matrix of Random Tree Algoritması

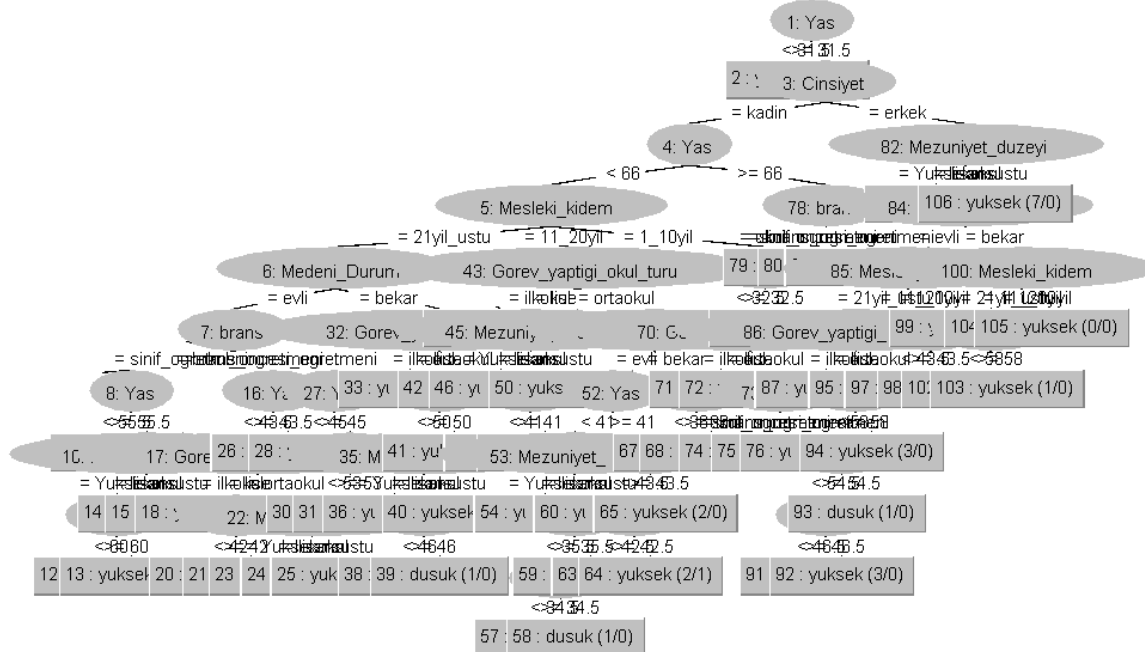
Elde edilen veriler doğrultusunda, ağaç kategorisi içerisinde en başarılı algoritma Random Tree olarak belirlenmiş ve aşağıda confusion matrix ve modelin ürettiği sınıflar verilmiştir.

Table 3. Confusion Matrix

		Öngürülen sınıflama	
		Low	High
Sınıflandırma	Yüksek	140	13
	Düşük	18	0

Tablo 3’de Random Tree algoritma sınıflandırmasına göre, değişime hazır olma durumu yüksek düzeyde olan 140 öğretmen doğru sınıflandırılmıştır.

Tree View

**Şekil 3.** Değişime hazır olma sınıflandırması için Random Tree algoritması karar ağacı

Şekil 2’de Random Tree algoritmasının ürettiği dallar görsel olarak verilmiştir. Bu ağaca göre öğretmenlerin değişime hazır olma durumlarını en çok etkileyen değişkeninin yaş olduğu görülmektedir.

SONUÇ, TARTIŞMA VE ÖNERİLER

Çalışmada öğretmenlerin değişime hazır olma durumlarını belirlemede hangi değişkenin etkili olduğunu veri madenciliği analizine göre incelenmiştir. Veri madenciliği analizinde kullanılan WEKA programı ile çalışmadan elde edilen veriler pek çok algoritma ve görsel sonuçlar ortaya çıkarmıştır. Random Tree algoritmasının ürettiği dallara göre, öğretmenlerin değişime hazır olma durumlarını etkileyen en önemli değişkenin yaş olduğu sonucuna ulaşılmıştır. Levent (2016) çalışmasında öğretmenlerin değişime hazır olma durumlarını farklı değişkenlere göre incelemiş ve yaş değişkeninin öğretmenlerin değişime hazır olma durumlarında anlamlı bir şekilde farklılaştığını tespit etmiştir. Benzer şekilde Er (2013), öğretmenlerin okulun değişime açıklığına ilişkin algılarında yaşa göre meslekte yeni olanların lehine anlamlı farklılık bulmuştur. Gılıç (2015) yaşı daha olgun olan öğretmenlerin değişim konusunda daha tutucu olduklarını tespit etmiştir. Buradan öğretmenlerin değişime hazır olma durumlarında yaş faktörünün ön planda olduğu söylenebilir. İstatistiksel çalışmalar ile hangi yaş gruplarının değişime hazır olma durumlarına direnç gösterdikleri tespit edilebilir. Öğretmenlerin değişime yönelik tutumlarını daha derinlemesine araştırmak için nitel ve nicel çalışmalar birlikte yürütülebilir. Örneklem sayısı artırılarak daha genellenebilir sonuçlar elde edilebilir.

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