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Evaluation of Mathematics Books Being Taught in Primary Schools According to Teachers' Opinions

Research Article

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ABSTRACT

This study aimed to evaluate the mathematics textbooks taught in primary schools in Northern Cyprus according to teachers' opinions. For this purpose, 304 classroom teachers working at different grade levels were reached in the 2023-2024 academic year using the convenient sampling method. The questionnaire form was applied to classroom teachers by survey method. Statistical software SPSS 24 was used to analyze the data. According to the results of the research, it was seen that classroom teachers frequently use mathematics books in the course planning phase, when doing activities when explaining the subjects, and when giving homework, and they recommend that students use them while studying. However, it has been determined that classroom teachers "sometimes" prefer to use mathematics books in mathematics projects and performance tasks. In addition, classroom teachers stated that they always keep the mathematics book at hand and use it while solving questions. In addition to all these, classroom teachers stated that they mostly, "always" and "often" use mathematics books for each grade level. However, the presence of classroom teachers who use the mathematics book "sometimes" also draws attention.

Keywords:
Mathematics textbook, classroom teacher, textbook evaluation, textbook use

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Introduction

Mathematics is a branch of science that examines shapes, numbers, multiples, arrangements, and related concepts within a logical system. Universal mathematics, according to Descartes, is the general order and unit of measurement. Mathematics is a strong and useful universal language that has developed from civilization to civilization regardless of religion, language, race, or country. Abstraction in mathematics is necessary to make sense of the information we acquire through our five senses and to get rid of the relative expressions in the language we use to convey them. Mathematics teaches us to describe, analyze, make inferences, and think fully, meaningfully, and functionally. Mathematics expands and deepens human intelligence by pushing its limits. The existence of these features related to mathematics shows that mathematics is a universal system of science and thought (Demirtaş, 1986; Francis, 2024).

Books are the most important means through which humanity transfers knowledge. Every book preserves an aspect of humanity's knowledge (Dron, 2023). These features of books have enabled human beings to become informed and produce knowledge. Textbooks are tools that have the feature of transferring information, organizing the information that has been found in the relevant field of science and accepted as "correct" for students until that day, controlling learning, and having an important place in teaching. Textbooks differ from other books with their features of providing detailed information and explaining the relationships between information, including exercises that control learning, study questions, and practical experiments (Şahin & Turanlı, 2005; Derakhshan, 2024).

Whether the educational institutions within the education systems and the primary education at the beginning of these institutions raise individuals equipped with the desired behaviours depends on the educational programs implemented. The education program can be shown as the main tool in achieving the goals of education. We see that various educational tools are used to create the desired behavioral changes in the student, to attract attention during teaching, and to increase and maintain interest. It is stated that the most important of these educational tools are "textbooks". The book is the most frequently used tool in the classroom after the teacher and the blackboard. In fact, in many cases, it is the only widely used teaching material (Kolaç, 2003).

Textbooks, which have a special place among educational tools, must be of appropriate quality. The main defining features of textbooks are that they are designed for students and that they have superior features such as providing detailed information, explaining the relationships between information, making the students repeat what they know, and reinforcing it. What should a good textbook be like? How appropriate are the textbooks taught today to the intended goals? What should be expected from textbooks? The answers to these questions will reveal the quality of today's primary and secondary education (Yılmaz, Seçken, & Morgil, 1998).

One purpose of mathematics taught in schools is to make society mathematically literate and to train the personnel needed by industry, technology, and other fields in daily life, and another purpose is to shape the mathematicians who will work in academic mathematics as mathematicians at a young age and to bring them into academic life as mathematical scientists. Each lesson has a special place and importance in terms of the knowledge and skills that students will acquire in primary education. Mathematics is one of the subject areas where this knowledge and skills can be gained. However, mathematics is generally known as a difficult field to learn and teach. Mathematics, which is sometimes defined as "difficult", "annoying" and "unfun" for students, is considered a "difficult to teach" and "low student interest" subject for teachers. Why there are such negative attitudes and thoughts towards mathematics courses, in general, is an issue that is being researched and needs to be investigated. Undoubtedly, many factors play an important role in this situation. Students' past mathematics experience, prejudices, concerns about failure, methods, and strategies used by teachers,

and the teacher's attitudes and beliefs towards this course can be counted among these factors. One of these factors is mathematics textbooks (Dayak, 1998; Duman et al., 2001).

Mathematics education has also been affected by the changes in the understanding of education and training, and change has become necessary in mathematics education (Baki, 2003). Printed materials, which have an important role in mathematics teaching, were also included in conveying this change. Printed materials are one of the oldest and most widely used, indispensable elements of education. Among the printed materials, the most important ones that allow the individual to work independently and repeat information over and over again are textbooks (Ünsal & Güneş, 2003).

Among the reasons for failure in mathematics lessons: There are factors such as the expressions in the books being complex and incomprehensible, and the examples given not being sufficiently related to daily life. As with other textbooks, there are many factors to be taken into consideration in the preparation of mathematics textbooks (Göze, 1999).

Textbooks are an educational tool. A well-prepared textbook is of great benefit to both teachers and students. Additionally, the textbook guides education and learning activities. In this context, textbooks are the indispensable and most used visual tools of the teaching-learning process (Demirel, 1999: 51–52; Binbaşıoğlu, 1995: 69). Textbooks create a document ready for the teacher. Because textbooks can be prepared by taking into consideration teaching-learning strategies, methods, and techniques. A well-prepared textbook; can give teachers the chance to overcome their deficiencies in teaching profession knowledge and use new teaching strategies, methods, and techniques (Kılıç and Seven, 2004).

Research on textbooks indicates that there is no globally accepted methodology or criterion for textbooks. The main reason for this is that the content of these books should be determined within the framework of each society's own cultural needs and educational understanding. However, researchers examining textbooks generally explain this analysis with classifications such as (l) visual and technical order, (2) content, and (3) language and expression. One of the most important issues in examining textbooks is to determine whether the content is given correctly. When the textbooks are examined, it is seen that there are some mistakes. These mistakes can sometimes be encountered in problems, exercises, expression of content, use of symbols, and in a wide variety of situations. While it is the teacher's greatest assistant in facilitating teaching, it is also the first-degree resource used by students who want to work at home or get help doing their homework. One of the criticisms about textbooks is the claim that books are written for teachers, not for students (Duman et al., 2001).

The title of the book also plays an important role in ensuring the attractiveness of the book cover. The title of the book should be understandable, concise, interesting, and eye-catching for students. A book cover should also include other necessary information such as the name of the author or authors, the name of the publishing house, and the edition of the book. In addition, other factors that affect the attractiveness of the book include the colors used, font type, and font size. When choosing a textbook, the reader will also want to see the information in the book systematically. In the book, some of the information is given as plain information, some as tables and diagrams, and some as figures. For this reason, the contents page of a book should be presented in a regular systematic manner. In addition, it is important to list the figures, diagrams, and tables in the book and even the appendices at the back of the book (Ersoy, 1998).

In addition to all this, textbooks should include dimensions on how teachers will teach the subjects and how students will also learn them, as mentioned above. It is pointed out that there is no evidence or examples showing that more effective teaching methods other than lecture, question-answer, and exercise are used in teaching mathematics. However, how it is taught is as important as what is taught, and in this sense, the role

of teaching methods and strategies cannot be denied. In this context, the criteria regarding teaching methods and strategies given below can help in the preparation and selection of mathematics textbooks (Ersoy, 1998).

According to Dayak (1998) considering the role of textbooks, which are the basis of education and training activities, in the teacher's realization of teaching activity; Ensuring that sections of textbooks such as objectives, content, and measurement and evaluation are suitable for education and training will contribute to education.

In the world; changes and developments in the fields of science, technology, and education require us to review the education system we are in and make the necessary changes to raise more qualified individuals (Taşdemir, 2011). In parallel with the developments in the world, primary and secondary education programs were restructured with an interdisciplinary approach in the Turkish Republic of Northern Cyprus (TRNC, in Turkish KKTC) in 2014 within the scope of the Basic Education Program Development Project (TEPGP) (KKTC MEB, 2016a) and as of 2016, both education and training programs were restructured with an interdisciplinary approach. Both programs and textbooks have been gradually implemented in schools. 1st, 4th, and 6th-grade curriculum and textbooks in the 2016-2017 academic year, 5th and 7th-grade curriculum and textbooks in the 2017-2018 academic year, 3rd and 8th-grade curriculum and It was stated that the textbooks were included in the system in the 2018-2019 academic year (KKTC MEB, 2016b). The strongest users of textbooks, which are of great importance in conveying a lesson to the student, are teachers. Therefore, it is important to know teachers' opinions and thoughts about textbooks, to eliminate deficiencies according to these opinions, to develop and organize printed materials accordingly if there are different opinions and to further increase the quality.

In this context, considering this latest restructuring process in the TRNC education system, it is thought that it is important to examine the mathematics textbook, which plays such an important role in the education process, in terms of content, scope, measurement, evaluation and application. With this research, it is intended to fill the gap in this field by evaluating the mathematics books implemented in primary schools based on teachers' opinions. When the literature is examined, it is noteworthy that there are few studies on the evaluation of primary school mathematics books. Evaluating mathematics books in 4th and 5th grades will provide more specific results. The study will contribute to the literature by revealing the current status of the books currently being taught through teachers' opinions. It is also important as a resource for future book evaluation research.

Purpose of the Research

The main purpose of the research is to examine the opinions of classroom teachers working in grades 1-5 in primary schools affiliated with the Ministry of National Education in Northern Cyprus, regarding their use of mathematics textbooks. Additionally, as a sub-objective, it will be investigated whether classroom teachers' use of mathematics differs significantly according to the grade level they teach.

Method

This study is descriptive research and a survey model was used in the research. A general survey model can be expressed as survey arrangements made on the entire universe or a group or sample to be taken from the universe, to reach an evaluation of the universe in a universe consisting of many elements. Survey or descriptive research is a type of research that aims to describe a past or present situation as it is. The individual, event, or object that is the subject of the research is tried to be defined in its conditions and as it is. No effort is made to change or influence them in any way (Karasar, 2009). Survey research is a study that aims to collect data to determine certain characteristics of a group (Büyüköztürk et al., 2018). In this research, teachers' opinions on the use of mathematics textbooks taught in primary schools in the 2023-2024 academic year were obtained through a survey. In this respect, this study is descriptive.

Population and Sample

The study population of the research consisted of 1108 classroom teachers working in Northern Cyprus. A convenient sampling technique was used when selecting the sample. This sampling method aims to prevent loss of time, money, and labour (Büyüköztürk et al., 2018, p. 95). Within the scope of the research, 304 classroom teachers were reached in Nicosia, Famagusta, Kyrenia, İskele and Güzelyurt districts with a margin of error of 5 percent and a confidence interval of 95 percent. 77 percent of the classroom teachers participating in the research are women and 23 percent are men. Additionally, the average age of teachers is 40 and the standard deviation is 7,768.

Data Collection Tools

To obtain quantitative data in the study, a questionnaire form of teachers' opinions on the use of primary school mathematics books prepared for teachers by Bulut and Tertemiz (2014) was used. The data collection tool developed to determine teachers' opinions on the use of primary school mathematics textbooks consists of three subsections and 27 items. In the first subsection of the survey, there are items related to teacher guidebooks, in the second subsection, there are items regarding textbooks, and in the third subsection, there are items regarding workbooks. In this research, the question items in the first two sections were used to be applied to classroom teachers. As a result of the Cronbach Alpha test, the reliability coefficient was found to be 0.86, and it can be said that the questionnaire form is reliable. Expert opinion was also taken for the content validity of the survey form. Schools were visited to apply the survey form and teachers were informed about the survey. In collecting quantitative data, a teacher survey was applied to 304 classroom teachers via Google Forms, and the data was obtained.

Information on Demographic Characteristics of Classroom Teachers

The minimum service period of the classroom teachers included in the research is 1 year, the maximum service year is 33, the arithmetic mean of their service period is 16.26 years and the standard deviation is 7.807. Within the scope of the research, an attempt was made to reach teachers at different grade levels. Thus, a survey was administered to 58 (19.1%) teachers from the 1st grade, 54 (17.8%) from the 2nd grade, 59 (19.4%) from the 3rd grade, 54 (17.8%) from the 4th grade, and 79 (26.0%) teachers from the 5th grade.

Analysis of Data

This study aims to examine the opinions of primary school teachers about their use of mathematics textbooks. Frequency, mean, standard deviation, and Chi-Square test values were calculated for the data obtained from the application of the questionnaire form used in the research. The Chi-Square test is used to determine the relationship between two or more categorical variables. Additionally, this test evaluates whether observed frequencies are statistically different from expected frequencies. The findings were explained and interpreted in the form of tables.

Results

In this section of the research, the findings obtained from the research and the tables related to these findings are included. The frequency, percentage, arithmetic mean and standard deviation statistics of the scores of classroom teachers working in grades 1-5 in primary schools regarding their use of mathematics textbooks are shown in Table 1.

Table 1. Opinions of classroom teachers on their use of mathematics textbooks

MATERIALS	Never		Sometimes		Often		Always		Arithmetic mean	Standard deviation
	f	%	*f*	%	*f*	%	*f*	%	$\bar{X}$	*SS*
1. I use the math book	0	0	34	11.2	120	39.5	150	49.3	3.38	.679
2. I use the mathematics book during the lesson planning phase.	4	1.3	48	15.8	134	44.1	118	38.8	3.20	.748
3. I use the mathematics book when explaining the topics.	5	1.6	66	21.7	131	43.1	102	33.6	3.09	.783
4. I use the mathematics book when giving homework.	3	1	51	16.8	149	49	101	33.2	3.14	.721
5. I use the mathematics book in the evaluation process of students.	23	7.6	136	44.7	99	32.6	46	15.1	2.55	.839
6. I use the mathematics book when giving performance and project tasks to students.	34	11.2	142	46.7	96	31.6	32	10.5	2.41	.824
7. I use the math book while doing activities.	11th	3.6	58	19.1	155	51	80	26.3	3.00	.775
8. I find the mathematics book explanatory enough.	10	3.3	92	30.3	145	47.7	57	18.8	2.82	.769
9. I always keep a mathematics book on hand.	7	2.3	26	8.6	131	43.1	140	46.1	3.33	.729
10. I use the mathematics book during the problem-solving phase.	2	0.7	39	12.8	150	49.3	113	37.2	3.23	.689
11. I recommend that they use the mathematics book in their project tasks.	30	9.9	155	51	86	28.3	33	10.9	2.40	.810
12. I recommend students use the mathematics book while studying.	17	5.6	76	25	137	45.1	74	24.3	2.88	.840
13. I recommend that they use reference books in addition to the mathematics textbook.	29	9.5	85	28	104	34.2	86	28.3	2.81	.955
14. I recommend that they solve different tests in addition to the mathematics textbook.	17	5.6	60	19.7	100	32.9	127	41.8	3.11	.911

Classroom teachers who participated in the research answered "sometimes" for the items "I recommend that they use the mathematics book in project tasks" ($\bar{X}$= 2.4) and "I use the mathematics book when giving performance and project tasks to students" ($\bar{X}$= 2.41). From this finding, it was seen that teachers preferred to use mathematics books sometimes in mathematics projects and performance tasks. As seen in Table 1,

classroomteachers said, "I use the mathematics book in the evaluation process of students" ($\bar{X}$=2.55), "I find the mathematics book explanatory enough" ($\bar{X}$=2.82), "I recommend that they use a reference book in addition to the mathematics textbook" ($\bar{X}$=2.81), "I recommend that students use the mathematics book while studying." I recommend it" ($\bar{X}$=2.88), "I use the mathematics book while doing activities" ($\bar{X}$=3.0), "I use the mathematics book when planning the lesson" ($\bar{X}$=3.2), "I use the mathematics book when explaining the subjects" ($\bar{X}$=3.09), "I use the mathematics book when giving homework " ($\bar{X}$=3.14), and "I recommend them to solve different tests in addition to the mathematics textbook" ($\bar{X}$=3.11), they answered "often". They stated that classroom teachers frequently use these findings in the course planning phase, while doing activities, explaining the subjects, and giving homework, and that they recommend students use the mathematics book while studying.

In addition, classroom teachers answered "always" for the following items: "I use the mathematics book during the problem-solving phase" ($\bar{X}$= 3.23), "I always keep the mathematics book at hand ($\bar{X}$= 3.33), "I use the mathematics book" ($\bar{X}$= 3.38). From these findings, classroom teachers stated that they always keep the mathematics book at hand and use it during the question-solving and solving phases.

Table 2. Teachers' usage of the mathematics book they teach in terms of the grade level variable – Chi-square (X^2) test

		The math book usage					
		Sometimes	**Often**	**Always**	**Total**	**Chi-square (X^2)**	**Asymp. sig(p)**
What grade level are you currently teaching?	1st Grade	9	23	26	58	12.192	0.143
	%	15.5%	39.7%	44.8%	100.0%		
	2nd Grade	5	28	21	54		
	%	9.3%	51.9%	38.9%	100.0%		
	3rd Grade	9	25	25	59		
	%	15.3%	42.4%	42.4%	100.0%		
	4th Grade	6	19	29	54		
	%	11.1%	35.2%	53.7%	100.0%		
	5th grade	5	25	49	79		
	%	6.3%	31.6%	62.0%	100.0%		
Total		34	120	150	304		
%		11.2%	39.5%	49.3%	100.0%		

The classroom teachers ' use of the mathematics book they teach in terms of the variable of grade level is examined in Table 2 and no significant difference was found as a result of the Chi-Square test ($p>0.05$). In other words, according to the Chi-Square test, teachers' use of mathematics books is the same according to grade level. Also, classroom teachers stated that they mostly always and frequently use mathematics books for each grade level in the classroom they teach. However, no classroom teacher says he or she never has used a mathematics textbook.

Discussion

The Ministry of National Education of Northern Cyprus announces the list of mathematics books accepted to be taught in schools every year on the ministry's page. While the Ministry of National Education in Turkey followed a method that left the selection of textbooks to the teacher for many years, with its latest change, it left the selection of textbooks to the students and parents. However, research shows that the most effective element of this method is the teacher. What is expected from the teacher, who is primarily responsible for the planning and implementation of instruction, is to make the right decision in choosing the textbook. The contribution of textbooks to teaching for both teachers and students further increases the importance of book selection (Küçükahmet, 2011, p.18; Keskin, 2021; Lindström-Sandahl, 2024). A different study has revealed that important results can be achieved when books and teacher support are provided appropriate to children's

reading levels and interests. There is a heavy reliance on mathematics books in mathematics classes in primary schools, and teachers focus on facilitating students' interaction with books. It is also noted that there are different emphases and ratios between early numerical concepts and operations in the content of first-grade mathematics textbooks used in schools, and differences in how operational and conceptual knowledge are integrated in tasks. These results showed that textbooks play an important role in primary school mathematics education and that teachers rely on books to engage students with mathematics (Sayers et al. 2021).

While Işık (2008) says that teachers sometimes use the mathematics textbook or do not use it at all and that they try to solve the problems experienced in the questions and problems in the textbook with the help of test books, Keleş (2014) states that they make students buy auxiliary resources and use practice tests from different sources, and when preparing for exams, they use test books. indicate their preference. Aydın (2010) states that they recommend students use test books so that they can see different question types and solutions while preparing for exams. Gün (2009), in his study, concluded that teachers sometimes use textbooks to help students follow the subject and prepare for exams. However, in this study, classroom teachers stated that they frequently used it during the lesson planning phase, when doing activities, when explaining the topics, and when giving homework, and that they recommended students to use the mathematics book while studying.

Conclusion and Recommendations

Considering the findings of this research, it was seen that classroom teachers frequently use it in the course planning phase, while doing activities, explaining the subjects, giving homework, and recommending students use the mathematics book while studying. However, it has been determined that classroom teachers sometimes prefer to use mathematics books in mathematics projects and performance tasks. Moreover, Classroom teachers stated that they always keep the mathematics book at hand and use it while solving questions. In addition to all these, classroom teachers stated that they mostly, "always" and "often" use the mathematics book for each grade level. However, the presence of classroom teachers who use the mathematics book "sometimes" also draws attention. For this reason, classroom teachers and students should be encouraged to use mathematics books effectively. The other issue is that it needs to be investigated why some teachers do not use mathematics textbooks frequently.

Future research based on the research results can be given as follows: Interviews can be conducted with teachers or surveys can be conducted to understand the reasons why teachers frequently use mathematics books. Understanding why teachers sometimes do not prefer mathematics books can help make improvements in education policies and curriculum development processes. Training programs can be organized for teachers to encourage the effective use of mathematics books. These programs can guide teachers on how to use math books more effectively and provide sample lesson plans. Research can be conducted on students' habits of using mathematics books and how they evaluate the books. Suggestions can be made on how students can use mathematics books more effectively and support their learning.

Alternative resources and methods can be investigated for classroom mathematics teaching. In addition to mathematics books, different approaches can be tried to improve students' mathematics skills by using different mathematics teaching tools such as digital resources, games or manipulatives. School management and education policy measures can be taken to encourage teachers to use mathematics books more effectively. Training programs or support resources can be provided so that teachers can improve their skills in using mathematics books.

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Metaphorical Perceptions of Secondary School Students Regarding New Generation Questions

Research Article

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ABSTRACT

Abstract In this study, the thoughts of the eighth grade students of secondary schools located in the central district of Bolu in the 1st term of the 2022-2023 academic year on the concept of "new generation questions" were tried to be revealed through metaphor. Phenomenology, one of the qualitative research methods, was used in this study, which aims to reveal and examine the metaphorical meanings that students attribute to the concepts of "new generation questions". The study group of the research consists of a total of 315 students studying in the eighth grade of secondary schools located within the borders of the central district of Bolu province in the 1st term of the 2022-2023 academic year. Information about the study group is given in Table 1 below. In order to collect the research data, a semi-structured interview form used in the qualitative research method was used as a data collection tool. In the analysis of the data, content analysis consisting of coding, finding the themes, organizing the data according to the codes and themes was used. Within the scope of the findings, 214 opinions on the thoughts of secondary school students on "New generation questions" were reached. The 214 views reached were grouped in terms of having common features and divided into 9 main themes. These themes are “Mental Depression, Confusion / Incomprehensibility, Attention, Effort, Despair, Strain, Disappointment, Disruption, Other”. It has been determined that the most frequently used dominant metaphors are "thorn, labyrinth, puzzle, covit-19 and death". It was seen that the obtained data supported the metaphors created by the explanations of the eighth grade students about the concept of "new generation questions". When the data of the participants were examined, it was seen that the metaphors they had about the concept of "new generation questions" were very high negative and very low positive. Keywords: Metaphor, New Generation Questions, Secondary School, 8th Grade Students, Bolu

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Introduction

One of the important elements of the education system is measurement and evaluation activities. While it can be determined to what extent the objectives can be achieved with measurement activities (Carter & Norwood, 1997), the evaluation process, which can be expressed as making a decision by comparing the criteria determined beforehand with the measurements, represents a very important process in making important decisions in the education process. The development of formalized and systematic assessment is clearly about legitimating social positions through diplomas, promoting the academic achievement that has marked the building of modern states, and using assessments as a means of institutional control at all levels (Broadfoot, 2007). In today's school systems, everyone has experienced how students struggle with this or that content, considering the weight of the exam (especially the differential coefficients) or how difficult it is to obtain. It is known that embodying evaluation in education is an often-condemned deficiency, which leads to valuing the measurable rather than measuring the worth (Broadfoot, 2007). Thus, when an existing system centers on students' results on standardized assessment tests, as in some Anglo-Saxon countries from the end of the 20th century, the effects triggered can have serious consequences. This focuses on testing rather than making expected progress in learning. On the other hand, as demonstrated in a comparative study of processes associated with testing in 18 American states (Berliner & Amrein, 2002); Tension and above all teaching, which is reduced to intensive preparation for exams, also produces a distortion, which finds its expression in the aphorism of "teaching for the exam".

Academic assessment is a common concept that has already been the subject of much research in educational sciences and the humanities more broadly. For example, some researchers have looked at the question of the objectivity of scoring, showing through different experiences the subjective aspect of grades and the often random character of resulting success or failure (Piéron, 1951). According to Perrenoud (1998), school success and failure are socially constructed realities in their global definitions and in attributing a value to each student through assessment practices that partially follow established scales. Bressoux and Pansu (2003) highlight the direct impact of assessment on self-esteem, sense of personal productivity, and student motivation. Bad grades can directly affect some students' belief in their ability to mobilize the resources needed to master and succeed in certain situations. Barlow (2003) thinks that assessment should be motivating above all else: far from discouraging the student, it should help him move forward in the mode of encouragement or encouragement. Evaluation should provide him not only the desire to progress, but also the means to do so. This is what he calls the dynamic aspect of assessment. Ames (1992) states that teachers' emphasis on effort rather than ability also plays an important role in students' self-perception. Feedback that refers to a student's progress and opportunities for improvement in their studies can help offset the negative impact of social comparisons. While external evaluation of student achievement plays an increasingly important role in education systems today; It has led to many debates at the scientific, practical and media levels. Its contribution as a tool that can contribute to the improvement of quality is not yet adequate in education systems (Mons, 2009).

In this context, a change was made in the transition system to secondary education in Turkey in 2017, to be implemented in the 2017-2018 academic year, and TEOG, which had been implemented since 2014, was abolished and replaced with LGS. With the new application, schools are divided into two categories: secondary education institutions that will admit students to high schools by exam and secondary education institutions that will accept students based on addresses. Secondary education institutions that will accept students by central examination are stated as Science High Schools, Social Sciences High Schools, and Secondary Education Institutions Implementing Special Programs and Projects. In this new application, where students can take the exam if they wish, a two-session multiple-choice exam consisting of a total of 90 questions in two areas, verbal and numerical, covering the content of the eighth grade curriculum, will be applied to the

eighth grade students. Turkish, Social Studies, English and Religious Culture and Moral Knowledge courses consist of 50 questions in total and the exam duration is 75 minutes; There are 40 questions in total in the numerical area created by the Mathematics and Science courses, and the exam duration is specified as 60 minutes, and it is stated that the correction formula (3 wrongs make a right) will be applied in the exam (MEB, 2018). As a matter of fact, with the change made in Turkey, taking the exam for the high school entrance exam (LGS), which was introduced as a part of the goal of creating opportunities for students to socialize more, has become optional. On the other hand, it was observed that almost all of the middle school senior students took the exam. On the other hand, expert comments and some criticisms that the exam, which consists of new generation questions and is conducted in this way, is difficult compared to previous years, found place in national media organs (Hürriyet, 2018).

In fact, skills-based education, which can basically be defined as the fact that education is business-oriented (Claessens 2006), is no longer seen as an end in itself but as a means of acquiring certain skills, and its purpose is to be able to function professionally in a business situation; in this case, the tool is "learning and education" (Meerler 2006). Indeed, according to Sicilia, there are reasons for adopting the concept of skills in teaching: responding to labor market developments, focusing more on vocational skills and employability, creating a new conceptual framework for communicating with employers (van der Klink et al., 2007). As mentioned above, it is a necessity to test learning situations during and at the end of the education process, which is a tool in the development of skills. The main tool of testing is exams. Exams are the process of testing the knowledge and skills of individuals in a certain field (Büyüköztürk, 2016). As a matter of fact, the problem of low academic performance in exams is a critical obstacle in any country as education contributes greatly to economic growth (Atkinson, 1987).

The opinions of students, who are one of the most important stakeholders of the education system and one of the most basic elements of the system, about the new generation questions asked about the current exam system and which they constantly encounter are important in terms of revealing the strengths and weaknesses of the current exam systems (formative, decision-making evaluation, etc.) applied in the context of these questions. At the same time, it is thought that it is worth considering the measures to be taken by the Ministry of National Education, the programs to be developed and the arrangements to be made, to reveal the perceptions of the students about the new generation questions through metaphors and to take the suggestions for improving the education system, especially the measurement and evaluation process of the system. In this context, the aim of the study is that secondary school eighth grade students are expected to acquire the targeted skills (Sanca, Artun, Bakırcı, & Okur, 2021) and enable the student to associate the current situation of the problem with their own experiences while solving a problem (Wijaya, Van den Heuvel-anhuizen, Doorman, & Robitzsch, 2014), a new generation of questions (Cited by Kılcan, 2021) known as questions (Miller, Linn, & Gronlund, 2009 cited in Kertil, Gülbağcı-Dede & Ulusoy, 2021) that are difficult to measure with familiar objective items. It is the examination of their views on the questions through the metaphors they put forward.

When the literature on the subject is examined, it is seen that although there are studies in the literature on non-routine problems, skill-based questions and PISA-TIMMS-style questions, the concepts of qualified questions and new generation questions are included in a limited number of studies (Aydurmuş and Çekmez, 2021). It was determined that there are limited number of studies on skill-based questions, and no study on students' metaphorical perceptions of new generation questions could be found by the researcher.

In a study conducted by Biber et al. (2018), the views of secondary school mathematics teachers on sample mathematics problems in LGS were examined. According to the results of the research, most of the teachers stated that new questions require high-level thinking skills such as interpretation, inference and analytical thinking, unlike TEOG questions, and that the change in the question style will bring a quality education understanding away from rote learning, and the perception that the exam will be difficult causes

most students to give up while some said that it made the students pay more attention to the lesson. In another study, it was determined that students were not sufficient in solving unusual questions by using more than one strategy; When the problem solving papers of the students were examined, it was observed that they were more successful in solving problems similar to the ones they encountered or solved before, and it was observed that the majority of the students had difficulties in solving non-routine problems. It was thought that this was due to the discussion and solution of routine problems in the curriculum. In addition, it has been observed that students do not need to make a significant change in their way of thinking when their first attempt at solving the questions is wrong, and they rarely change strategies between problems (Arslan & Yazgan, 2015; İncebacak & Ersoy, 2016). Skill-based questions prepared and published by Sanca et al. (2020) for secondary school fifth, sixth and seventh grade students by the Ministry of National Education were examined in terms of compliance with the cognitive domain and knowledge types dimension of the revised Bloom taxonomy. For many years, it has been determined that the questions that the students are dealing with appeal to low-level mental skills, and today, Skill-Based Tests have been published by the Ministry of National Education in order to fill this gap, and students are warned that these questions must be solved. From this point of view, this study was conducted in order to reveal which mental process the Skill-Based questions, which have been discussed for a long time and taken into account by all stakeholders, and as a result of the study, skill-based questions have factual knowledge (21.6%), procedural knowledge (%). 3.8) were at the conceptual knowledge level (74.6%). However, it was determined that the questions were at the stages of remembering (14.4%), understanding (77.9%), applying (1.6%), analyzing (1.1%) and creating (5%). When evaluated as a majority, it was also suggested that skill-based questions should be far from rote, enable creative thinking, aim at gaining problem-solving skills, trigger imagination, include problems in daily life, and activate high-level mental skills. In the study carried out by Ergün (2021), it was aimed to determine which knowledge and cognitive process dimensions are included in the exam questions of secondary school mathematics teachers and skill-based mathematics questions published by the Ministry of National Education, according to the Revised Bloom Taxonomy (RBT). Mathematics questions in classroom skill-based tests and middle school mathematics teachers' exam questions were analyzed by two coders according to RBT and classified. As a result of the research, it was found that while the skill-based mathematics questions of the Ministry of National Education measure the higher cognitive levels on the basis of knowledge dimension in RBT, the questions of mathematics teachers measure the lower cognitive level at the factual and conceptual levels. When we look at the results of the research according to the cognitive process dimension, 90% of the skill-based mathematics questions of the Ministry of Education are mainly at the level of understanding, application and analysis, and 10% are at the level of evaluation and creation. In the MEB, no questions were included in the remembering step. In the questions prepared by secondary school mathematics teachers, 99.9% of the questions are at the remembering, understanding and application stage, and only one question is at the analysis stage. Based on these results, it was determined that while the skill-based mathematics questions of the Ministry of National Education were at the level of questions measuring the higher skills of the students, the questions of the secondary school teachers did not carry the students to the next grade with metacognitive skills and did not adequately prepare them for the LGS, which also includes skill-based questions. In Karakeçe's (2021) study, it was tried to determine the perceptions of secondary school mathematics teachers about the skill-based mathematics questions in the numerical section of LGS and their evaluations of the difficulties they encountered with the students in the classroom, together with the inclusion of these question types in the teaching process. According to the results obtained from the research, it was concluded that the participants did not have sufficient knowledge about the concept of skill-based questions and the new exam system, and that they interpreted these concepts in the way they perceived. It was also noted that the teachers did not prepare original skill-based questions, and they also evaluated skill-based questions in a different category for both themselves and their students. Therefore, it was observed that the teachers asked the skill-based questions to the students in a separate time period such as the end of the lesson or a special lesson during the teaching

process. One of the issues that the participants complain about the solution of skill-based questions is that the questions take a lot of time because they are long and require the use of many skills. Teachers stated that they often had difficulty in understanding the questions. They stated that they had difficulty in understanding and solving the questions because most of the questions were above the students' readiness level. It has been concluded that the textbooks are insufficient in preparing students for skill-based questions. In addition, teachers generally stated that this question style should be shown to students starting from lower levels. In the study conducted by Kablan and Bozkurt (2021), it was determined that although teachers' awareness of LGS mathematics problems is high, their perceived instructional approaches are not compatible with ideal approaches, and some steps should be taken in order to eliminate the knowledge deficiencies experienced by teachers. In the context of the problem situation described above and the evaluation of the literature on the subject, it can be said that the importance of measurement and evaluation in education and the benefits to the education system are very important, and the studies on questions related to new generation questions are quite limited, and the majority of these studies were carried out with mathematics and teachers.

However, assessment is an integral part of the teaching and learning process, which can also be defined as a continuous validation process (Scallon, 2007) to guide the teaching and learning process, and a multidimensional function of assessment aimed at providing information to potential users and training partners about students, teachers, institutions or systems. (Broadfoot, 2007), it can be said that the subject of student evaluation is closely related to the evaluation of the education system, and what we try to measure through the results obtained by the students is generally the performance of teachers, pedagogical approaches, institutions or education systems. Therefore, due to the mirror effect of this study, it is important in terms of allowing teachers, individuals responsible for policy development in education, and the Ministry of National Education program development and evaluation and measurement and evaluation units to evaluate their own work. Because an assessment is valid if it contains information that makes subsequent learning possible and teachers use it to adjust their teaching" (Rémond, 2008). Research results on student assessment tools, principles and methods cannot be separated from the teaching content. Therefore, it is thought that the results of this research will also contribute to the regulation of the content, which is one of the important elements of the programs. As a matter of fact, there is a positive relationship between a clear evaluation process at both national and local levels and associated content management. In addition, it is thought that the results of the study can contribute to the increase of the quality of the teaching processes by guiding the in-class practices according to the openness of the teaching and the principle of relativity to the student within the scope of educational situations and based on a more robust literature.

Methodology

In this section, information about the model of the research, the study group, the techniques used in data collection and data analysis, validity and reliability studies are included.

Model of the Research

Phenomenology, one of the qualitative research methods, was used in this study, which aims to reveal and examine the metaphorical meanings that students attribute to the concepts of "new generation questions".

Study Group

The study group of the research consists of a total of 315 students studying in the eighth grade of secondary schools located within the borders of the central district of Bolu province in the 1st term of the 2022-2023 academic year. Information about the study group is given in Table 1 below.

Table 1. Demographic Characteristics of the Study Group

	Female		Male		Toplam	
Gender	**f**	**%**	**f**	**%**	**f**	**%**
	180	57,1	135	42,9	315	100

When the table is examined, 57.1% of the students in the study group are female and 42.9% are male students.

Data Collection

In order to collect the research data, a semi-structured interview form used in the qualitative research method was used as a data collection tool. The interview form was developed as a draft by the working group, and then this draft form was finalized by taking expert opinion. In the semi-structured interview form, only the genders of the students were asked to reveal their demographic status, then in this study, in order to determine the perceptions of the concept of "new generation questions" through metaphors, the students were asked "New generation questions ……similar, because……..." to fill in the blanks in the sentence. Even if the metaphor produced by the participants is the same, the "because" parts were carefully examined since the reason may be different. The answers obtained from this form ultimately formed the data source of the research.

In the study, the data were collected by the researcher from the eighth grade students of the secondary school located in the central district of Bolu in the 1st semester of the 2022-2023 academic year. The forms filled online by the volunteer students were processed. 315 of the 350 interview forms returned by the students were evaluated. Because 35 interview forms are empty, incomplete, etc. it was excluded from the analysis.

Data Analysis

In the analysis of the data, content analysis consisting of coding, finding the themes, organizing the data according to the codes and themes was used. According to Yıldırım and Şimşek (2016), the main purpose of content analysis is to reach concepts and relationships that can explain the collected data. The metaphors developed by the students were analyzed in four stages, which are detailed below: Coding and sorting, Identifying an example metaphor, Developing a category, and Ensuring validity and reliability (Saban, 2008).

Coding and Sorting

The interview forms collected from the students via the link were first reviewed, it was observed that not all of the students produced valid metaphors, and that some of them did not provide a logical reason even though they produced a metaphor, and these answers were excluded from the evaluation. The developed metaphors and their justifications were coded with expressions indicating the gender of the students and the number given by the researcher. In this 2-element coding, the first letter represents the student's gender (F: Female; M: Male) and the last number represents the number of the student. Example F6, M41; F281; M135.

Sample Metaphor Compilation

After the 315 interview forms suitable for the analysis were separated from the interview forms applied to the students, they were examined one by one and it was observed that the teachers produced 214 metaphors related to the concept of "new generation questions". Among the metaphors created, the metaphors that best represent the group were compiled and presented as an example just below the relevant group in the findings section.

Category Development Phase

A table was created that includes the codes of the students in the data collection form and the reasons for the metaphors. The metaphors related to the concepts of "new generation questions" brought together in this way and the relationships between their reasons were analyzed and categories were formed by bringing together the relevant ones. The metaphors created by the students regarding the concept of "new generation questions" were divided into 9 categories in total, taking into account their content. These categories are; "Spiritual Depression; Confusion/Incomprehensibility; Attention; Effort; Despair; Strain; Disappointment; Corruption and Other"

Information on the concept of "new generation questions" is given in general tables. Some metaphors are written in two or more (eg Labyrinth, Book, Abyss, Road, etc.). Even if the metaphor produced by the participants was the same, the reason was taken into different categories because the "because" parts were different. For example, the metaphor of the "maze" produced by the students was different because the reason was different, the metaphor of the labyrinth was included in 3 different categories such as "Mental depression", "Confusion/Conflict" and "Effort".

Validity and Reliability

Regardless of its type, validity and reliability are important concerns regarding the formation of the conceptual framework of any research, collection, analysis and interpretation of data, and presentation of findings (Merriam, 2013). In this direction, the data collected with the semi-structured interview form were examined in detail. Considering the answers given by the students, it was observed that there were 214 different metaphors related to the concept of "new generation questions", and different category areas thought to represent these metaphors, which were mentioned in detail in the findings section, were determined. In order to control whether the metaphors placed under the created categories represent the category they are in, the opinion of 2 field experts was consulted. At this stage, which was carried out to ensure the reliability of the research, 214 metaphor and 9 conceptual category tables related to the concept of "new generation questions" were shared separately with two field experts (2 faculty members) and they were asked to place the metaphors in one of the conceptual categories that they deem appropriate. The matching made by the experts and the matching made by the researchers were compared with each other. The reliability of the research was calculated using the formula of Miles and Huberman (1994), (reliability=consensus/consensus+disagreement x100). When the matching made by the experts whose opinions were sought and the researchers were compared, the reliability = (../..+..)x100=83% in terms of the formula expressed. It can be said that the consensus among researchers in qualitative studies is 70%, which is positive in terms of the reliability of the study.

Findings

In this section, the findings obtained regarding the metaphors produced by the students participating in the research about the concept of "New generation questions" are presented and analyzed in tables.

Findings Regarding the Concept of New Generation Questions

Based on student perceptions, 214 metaphors related to the concept of "new generation questions" were identified. In the research, it is seen that 214 metaphors related to the concept of "new generation questions" were produced based on the perception of 315 students. When the first five metaphors produced by the majority of the participants are examined, respectively; It is seen that there are Thorn (f=7), Maze (f=6), Puzzle (f=5), Covit-19 (f=5) and Death (f=5). In Table 2, some metaphors are written in two or more (eg Maze, Road, Grass man, Fog cloud, etc.). Even if the metaphor produced by the participants was the same, the reason was

taken into different categories because the "because" parts were different.214 metaphors produced by students were gathered under 9 categories by researchers. These categories are respectively;

1. Mental Depression
2. Confusion / Incomprehensibility
3. Attention
4. Effort
5. Despair
6. Strain
7. Disappointment
8. Distortion
9. Other

1. Mental Depression

There are 51 metaphors produced by 82 students in the "Mental depression" category, which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 2.

Tablo 2. Mental depression category

Meth. Num.	**Metaphor names**	**f**	**Met. Num.**	**Metaphor names**	**f**
1	Thorn	7	27.	Inability to breathe	1
2.	Lemon	5	28.	In-film advertisement	1
3.	Bottomless pit	4	29.	Ink	1
4.	Ghost	4	30.	Labyrinth	1
5.	Hell	4	31.	Lightning shock	1
6.	Heart attack	3	32.	Mosquito	1
7.	Horror tunnel	3	33.	Mother slipper	1
8.	Nightmare	3	34.	Mud	1
9.	Grim reaper	2	35.	Nail	1
10.	Thriller movie	2	36.	Nylon	1
11.	Doomsday	2	37.	Poisonous mushroom	1
12.	School	2	38.	Press	1
13.	Sirat bridge	2	39.	Prison	1
14.	Vampire	2	40.	Refrigerator	1
15.	Anaconda	1	41.	Shroud	1
16.	Bad egg	1	42.	Surgeon	1
17.	Baklava	1	43.	Swallow a pin	1
18.	Be under the rubble	1	44.	Swamp	1
19.	Brake	1	45.	Torture	1
20.	Cactus	1	46.	Vacuum cleaner	1
21.	Cayenne	1	47.	Vampire flower	1
22.	Dementors in Harry Potter	1	48.	Voldemort	1
23.	Eraser	1	49.	Walking on a hot sheet	1
24.	Fog cloud	1	50.	Washing up	1
25.	Headache	1	51.	Working in the heat	1
26.	Honey person	1		**Total**	**82**

Table 2 contains information about the metaphors that make up the category of "mental depression" and the number of students who developed each metaphor. When Table 2 is examined, it is seen that the metaphor produced the most by the students in this category is "thorn" (f=7). Below are examples of the logical bases of the metaphors produced for the category of "mental depression" explained by the students.

Nails: *"It's like walking on nails. Because our feet bleed all over, and these questions bother you all the time, and you end up depressed. " (M85).*

Mud: *"You try to get rid of it, but as you try, it gets dirty and you get stuck when you drink this dirt" (F87).*

Cactus*: "See if you touch it, it hurts and bleeds as you touch it. This pain becomes unbearable." (M98).*

Mother slipper*: "Because no matter how hard you try to escape, it will still find you. So you hate it, but you still can't get rid of it." (F112).*

Dementors in Harry Potter*: "Question sucks one's soul while solving too long. If I do the question wrong, all the happiness and peace in me goes away." (M126).*

Anaconda*: "As the anaconda kills its prey in the most painful way, not by poisoning it, but by strangling it, it gives us the same feeling in these questions." (F146).*

Volde Mort*: "He is ruthless like Volde Mort. HOW he killed Harry's parents, these questions are worse than killing us. (M151).*

2. Confusion / Incomprehensibility

There are 27 metaphors produced by 47 students in the "Confusion/ Incomprehensibility" category, which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 3.

Table 3 contains information about the metaphors that make up the "Confusion/ Incomprehensibility" category and the number of students who developed each metaphor. When Table 3 is examined, it is seen that the metaphor produced the most by the students in this category is "Labyrinth" (f=6). Below are examples of the logical bases of the metaphors produced for the "Confusion/ Incomprehensibility" category, explained by the students.

Sudoku: *of course, once you figure out the situation, the rest will be like ripping a sock. Because understanding the question is almost more difficult than solving the question and takes time. We cannot solve it because we cannot understand it." (E7).*

Tunnel of fear: *"These questions are difficult. Because even if we know and understand the issue, it becomes very complex in the problem and it becomes difficult for us to solve it. Even if you have a good understanding of the subject, especially in math questions, sometimes you can make mistakes because of a very misleading word. (M11).*

Tablo 3. Confusion/ Incomprehensibility" category

Meth. Num.	Metaphor names	f	Met. Num.	Metaphor names	f
1	Labyrinth	6	15.	Compound machine	1
2.	Death	5	16.	Cow udder	1
3.	Ivy	4	17.	Culture shock	1
4.	Matryoshka	3	18.	Fog cloud	1
5.	Su Doku	3	19.	Grandma's dishes	1
6.	Cliff	2	20.	Light a lamp in the dark	1
7.	Tunnel of fear	2	21.	Madness	1

8.	Human	2	22.	Math teacher	1
9.	Universe	2	23.	Nervous machine	1
10.	A deleted post	1	24.	News programs	1
11.	Abstract paintings	1	25.	Paragraph	1
12.	Bad life	1	26.	Philosophy	1
13.	Chess	1	27.	Word	1
14.	Clothes	1		**Total**	**47**

Ivy: *"You're just confused, and this mess goes on and on." (F33).*

Cow udder: *"Because if you know the structure of the cow's udder and how to milk it, you can milk a lot, but if you don't know, you can't milk it. Here, I cannot express milk either" (F147).*

3. Attention

In the "Attention" category, which was created among the metaphors produced in line with the students' opinions, there are 6 metaphors produced by 10 students, and the metaphors produced under this category are presented in Table 4.

Tablo 4. Attention category

Meth. Num.	**Metaphor names**	**f**	**Met. Num.**	**Metaphor names**	**f**
1	Puzzle	5	5.	Painting	1
2.	Driving	1	6.	Salt	1
3.	Hot tray	1		**Total**	**10**
4.	Mandala	1			

Table 4 contains information about the metaphors that make up the "Attention" category and the number of students who developed each metaphor. When Table 4 is examined, it is seen that the metaphor produced the most by the students in this category is "Puzzle" (f=5). Below are examples of the logical bases of the metaphors produced for the "Attention" category explained by the students.

Puzzle: *"It's like solving puzzles when there's a lot of noise around because these questions require a lot of attention. Of course, it also has a depressing side."(F282).*

Driving: *"Just as a moment of inattention while driving costs your life, so do these questions." (F173).*

4. Effort

There are 43 metaphors produced by 60 students in the "Effort" category created among the metaphors produced in line with the students' opinions, and the metaphors produced under this category are presented in Table 5.

Tablo 5. Effort category

Meth. Num.	**Metaphor names**	**f**	**Met. Num.**	**Metaphor names**	**f**
1	Road	4	23.	intricate	1
2.	Book	3	24.	Knitting a sweater	1
3.	Doctor	3	25.	Lemon	1
4.	Labyrinth	3	26.	Error	1
5.	Puzzle	3	27.	Mount Everest	1
6.	Art	2	28.	Music	1

7.	Bicycle	2	29.	Obstacle	1
8.	Carpenter	2	30.	picture	1
9.	Notebook	2	31.	Popcorn	1
10.	Origami	2	32.	Porcelain plate	1
11.	Tree	2	33.	Roadside	1
12.	Animal	1	34.	Shortcut	1
13.	Bumpy path	1	35.	Steel door	1
14.	Dog	1	36.	Strong and fierce storm	1
15.	Door	1	37.	Sycamore	1
16.	Field	1	38.	Target board	1
17.	Forest	1	39.	Teacher	1
18.	Fruit tree	1	40.	Treadmill	1
19.	Glass	1	41.	Water	1
20.	grass man	1	42.	Wet napkin	1
21.	Human	1	43.	Window	1
22.	Inclined plane	1		**Total**	**60**

Table 5 contains information about the metaphors that make up the "Effort" category and the number of students who developed each metaphor. When Table 5 is examined, it is seen that the metaphor produced the most by the students in this category is "Road" (f=4). Below are examples of the logical foundations of the metaphors produced for the "Effort" category explained by the students.

Human: *"Because you have to spend a lot of time and give your life to understand" (M16).*

Animal: *"Like an animal that is thought to be wild but not wild. Because the more you solve and try, although it may seem difficult at first, then it becomes fun and easy, you can do it more." (M17).*

Porcelain plate: *"You have to hold on tight or it will fall off. Your efforts will be wasted. That's why you always have to figure it out." (F47).*

Error: *"Because when I make a mistake, I try very hard to correct it, and for new generation questions, I try too hard to answer it. (M&&).*

5. Despair

There are 29 metaphors produced by 40 students in the " Despair " category created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 6.

Table 6 contains information about the metaphors that make up the " Despair " category and the number of students who developed each metaphor. When Table 6 is examined, it is seen that the metaphor produced the most by the students in this category is "Covid 19" (f=5). Below are examples of the logical bases of the metaphors produced for the " Despair " category, explained by the students.

Covid 19: *"When you get infected, you try hard to get rid of it, but you usually can't get rid of it." (F30).*

Playing with snow without gloves: *"At first you want to play, but your hands are freezing and you can't play anymore, so we want to solve it at first, but we give up because the questions are too difficult." (F36).*

Jalopy: *"It is impossible to do, to solve." (F51).*

Digging a well with a needle: *"Because it is impossible to succeed in a job with insufficient training conditions." (K74).*

Black hole: *"Because once you get in, you'll never get out." (M92).*

Tablo 6. Despair" category

Meth. Num.	Metaphor names	f	Met. Num.	Metaphor names	f
1	Covid 19	5	16.	Fall off a horse	1
2.	Cancer	3	17.	finished candle	1
3.	Hell	3	18.	Fire	1
4.	Coffin	2	19.	hillock	1
5.	Homework	2	20.	Idiocy	1
6.	Rubik's Cube	2	21.	Jews in Germany in World War II	1
7.	Six-hole water bucket	1	22.	Loot	1
8.	Be under the rubble	1	23.	Meteor	1
9.	Cliff	1	24.	Obsession	1
10.	Dead-end street	1	25.	Jalopy	1
11.	Depression	1	26.	Picking fruit from the tree	1
12.	Digging a well with a needle	1	27.	Sacrificial lamb	1
13.	Eggplant meal	1	28.	Suicide	1
14.	Playing with snow without gloves	1	29.	The ultra-rich	1
15.	Encounter with the Jaws shark	1		**Total**	**40**

Six-hole water bucket: *"Even if you try to fill it, it won't fill. It doesn't close at six. It constantly drains water. These questions will always flow like a six-hole bucket." (F105).*

Coffin: *"Like the darkness in the coffin, it makes your life dark. It extinguishes all your hopes." (M162).*

6. Strain

There are 13 metaphors produced by 19 students in the "Strain" category, which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 7.

Tablo 7. Strain category

Meth. Num.	Metaphor names	f	Met. Num.	Metaphor names	f
1	Labirent	4	8.	Nothing	1
2.	Story	3	9.	Paragraph question	1
3.	Ice walking	2	10.	Shortcut	1
4.	Don't be crippled	1	11.	Sunburn	1
5.	Jump on fire	1	12.	Tightrope walking	1
6.	Those who made decisions about bans during the Corona Period	1	13.	Torrential rain	1
7.	Mixer	1		**Total**	**19**

Table 7 contains information about the metaphors that make up the category of "Strain" and the number of students who developed each metaphor. When Table 7 is examined, it is seen that the metaphor produced the most by the students in this category is "Covit 19l" (n=4). Below are examples of the logical bases of the metaphors produced for the category of "Strain" explained by the students.

Nothing: *"There is nothing in this life as hard as nothingness." " (F65).*

Story: *"The use of the operations we learned in daily life is shown and a situation is created, since normal questions are usually transaction-oriented, you cannot find the operation in new generation questions, this is very difficult for people." (F80).*

Those who made decisions about bans during the Corona period*: "Because solving the logic of those people is as difficult as solving these questions." (M108).*

7. Disappointment

There are 21 metaphors produced by 29 students in the category of "Disappointment", which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 8.

Table 8 contains information about the metaphors that make up the category of "Disappointment" and the number of students who developed each metaphor. When Table 8 is examined, it is seen that the metaphor produced the most by the students in this category is "Demon attack" (f=3). Below are examples of the logical foundations of the metaphors produced for the "Disappointment" category, explained by the students.

Tablo 8. Disappointment category

Meth. Num.	Metaphor names	f	Met. Num.	Metaphor names	f
1	Surprise egg	4	12.	Shock licking at a temperature change	1
2.	Demon attack	3	13.	iftar dinner	1
3.	christmas lottery	2	14.	Math exam	1
4.	Diet	2	15.	Parachute	1
5.	Weight	2	16.	patient Assay results	1
6.	Car breakdown on the road	1	17.	Picnic	1
7.	**Abyss**	1	18.	stay on the road with your car	1
8.	Disruption of the holiday plan	1	19.	step on wet slippers	1
9.	Falling at the final line	1	20.	unknowingly eating rotten eggs	1
10.	Getting low grades while expecting high grades	1	21.	Vase	1
11.	Ink	1		**Total**	**29**

Demon attack: *"You start solving with desire, and every time you feel like you have been struck by a demon, your mouth is crooked." (M115).*

Abyss*: "You start with enthusiasm, but you come to such a place that it is an abyss and you experience shock." (M117).*

Shock licking at a temperature change: *"These questions shock us, as do the shock you get from the pain you feel when you pour spring water on your arm or stay in ice." ((M132)*

8. Distortion

There are 9 metaphors produced by 13 students in the category of "Disappointment", which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 9.

Tablo 9. Distortion category

Meth. Num.	Metaphor names	f	Met. Num.	Metaphor names	f
1	Domino game	3	6.	Blow-dried hair	1

2.	Mill	2	7.	Brand new car	1
3.	Wild animal	2	8.	Trauma	1
4.	Excess salt added to food	1	9.	Watercolor	1
5.	Fire and Ice	1		**Total**	**13**

Table 9 contains information about the metaphors that make up the category of " Distortion " and the number of students who developed each metaphor. When Table 9 is examined, it is seen that the metaphor produced the most by the students in this category is "Domino game" (f=3). Below are examples of the logical bases of the metaphors produced for the category of " Distortion " explained by the students.

The mill: *"It grinds all your knowledge like a mill and makes you forget." (F9).*

Brand new car*: "it should never be touched, if it touches, either it breaks down or you." (M31).*

Blow-dried hair: *"When the rain touches the blow-dried hair, it breaks down in this way, and it makes us forget the existing information."*

9. Other

There are 15 metaphors produced by 15 students in the "Other" category, which was created among the metaphors produced in line with the opinions of the students, and the metaphors produced under this category are presented in Table 10.

Tablo 10. Other category

Meth. Num.	**Metaphor names**	**f**	**Met. Num.**	**Metaphor names**	**f**
1	Fruit at the top of the tree	1	9.	Sour face	1
2.	Agent	1	10.	Cow	1
3.	Mother	1	11.	Cat toy	1
4.	Carousel	1	12.	Dog	1
5.	Void	1	13.	Vegetable	1
6.	Grass man	1	14.	*Emptiness*	1
7.	Dilek Teacher	1	15.	Intelligence test	1
8.	Fate	1		**Total**	**15**

Table 10 contains information about the metaphors that make up the "Other" category and the number of students who developed each metaphor. Below are examples of the logical bases of the metaphors produced for the "Other" category, explained by the students.

Emptiness: *"It puts you in an obscurity like in a vacuum, you don't know what to do" (F20).*

Agent: *"Like an agent, he separates those who know and those who don't know very well." (M24).*

Vegetable: *"You don't like the taste, but you have to eat it for health. You don't like these questions either, but you have to solve them for the exam. (F104).*

Sour face: *"Because it's sour first, then it gets sweet." (F121)*

Intelligence test: *"Like the intelligence test, he likes the super-intelligent, not the intelligent."(F60).*

Conclusion Discussion and Recommendations

In this study, the thoughts of the eighth grade students of secondary schools located in the central district of Bolu in the 1st term of the 2022-2023 academic year on the concept of "new generation questions" were tried to be revealed through metaphor. Within the scope of the findings, 214 opinions on the thoughts of secondary school students on "New generation questions" were reached. The 214 views reached were grouped

in terms of having common features and divided into 9 main themes. These themes are “Mental Depression, Confusion / Incomprehensibility, Attention, Effort, Despair, Strain, Disappointment, Disruption, Other”. It has been determined that the most frequently used dominant metaphors are "thorn, labyrinth, puzzle, covit-19 and death". It was seen that the obtained data supported the metaphors created by the explanations of the eighth grade students about the concept of "new generation questions". When the data of the participants were examined, it was seen that the metaphors they had about the concept of "new generation questions" were very high negative and very low positive. In addition, in this study, secondary school eighth grade students expressed their feelings and thoughts about negative metaphors in the themes of "Mental Depression, Confusion / Incomprehensibility, Attention, Hopelessness, Strain, Disappointment, Disruption, Other". It is thought that the intense mood can be reflected both in the educational situations in the lessons and in the testing situations. Therefore, it can be said that the meanings attributed by the students to the "New generation questions" are quite significant.

As it is known, the importance given to exams is increasing day by day in Turkey, and the training situations based on competencies and skills prepared within the scope of these exams and thus the testing situations for the new generation questions that are made as a result of learning-teaching experiences are becoming more important. However, the increase in the importance given to exams naturally brings some questions to the minds of researchers, such as what kind of effects they have on students who are preparing for the exams or who have just passed the exam. One of the most effective ways to understand these is to determine students' perceptions about the exam (Koçak et al, 2017). Ekinci and Bal (2019) aimed to determine the relationship between the learning areas in the Primary Education Mathematics Curriculum for the five, six, seventh and eighth grades and the Mathematics course question areas asked in the 2018 High School Entrance Examination and to determine the level of these questions according to the Revised Bloom Taxonomy. In their study to reveal how cognitive processes are measured, they stated that their problems with LGS are aimed at measuring students' high-level thinking skills such as evaluation and interpretation. Therefore, based on the study, it can be said that Ekinci and Bal (2019) have difficulty in questions that measure high-level thinking skills such as evaluation and interpretation of secondary school eighth grade students within the scope of this research. In the studies of Baltacı and Şahin (2021), it has been seen that the situations where students have difficulty in new generation questions are situations where the question level is high. As a matter of fact, in the theme of “Stress” and “Confusion/Unclearness” determined within the scope of this research, secondary school eighth grade students stated that “the questions are very complex, they cannot understand the questions, they are confused, etc.” commented from different angles. Kablan and Bozkuş (2019) aimed to determine the opinions of secondary school mathematics teachers and students on LGS mathematics problems applied since 2018 and to analyze LGS mathematics problems, which are expressed as "new generation questions" in the public, according to the opinions of teachers and students. As a result, the teachers' critical approach is that the curriculum, existing textbooks are not compatible with LGS and students are not ready for this exam. In line with this view, the teachers stated that the achievements in the curriculum and the content in the existing textbooks do not support cognitive skills and should be changed. In this context, it is known that teachers mostly use textbooks in their problem preferences in the teaching process (Özmen, Taşkın, & Güven, 2012). New generation questions have also affected the methods and techniques used by teachers in their lessons within the scope of educational situations designed to activate the content's delivery to achievements (Yüzüak & Arslan, 2021). It is also implicitly assumed that assessments in school only assess learning that is explicitly provided by teachers. For this reason, evaluation will only be about what is taught, which is discipline and reality, that is, the applied program. However, research has shown that assessment means assessing something else, sometimes called the concept of a "hidden curriculum," to qualify simple knowledge and skills often associated with a family-based mastery of the school culture that is rarely taught in this way. Moreover, the sociology of programs in this context shows quite robustly how the adoption of

school knowledge, which is evaluated “at the end”, is largely produced by the incorporation of poorly explained rules and representations throughout the school (Forquin, 2008). Therefore, students within the scope of the research also make negative evaluations about “New generation questions” and make them very difficult, not having the low-level structures of the relevant acquisitions, a "bad" grade or unsuccessful score from school-based items such as the strategies, methods and techniques used by the teachers, and the content used. An assessment can quickly create an emotional wound in students because the person's assessment is often perceived as right or wrong, behind the assessment of school work (Rey & Feyfant, 2015). As a matter of fact, assessment practices are always part of a socio/economic/political context that gives them their own color (Hadji, 2012).

Kablan and Bozkuş (2019) stated that students used long paragraphs, stories and different representations (images, tables, graphics, sample formulas, etc.) in the problems, drawing attention to the contextual characteristics of the exam. He concluded that the students characterized the mathematics problems in LGS as difficult and complex, which is in line with the themes reached in the relevant research, and the secondary school students included in this research also see the "New generation questions" as very difficult and incomprehensible complex structures. As a matter of fact, in a study conducted with teachers, teachers said that it would be difficult for them to solve sample questions in lessons, as paper and photocopy costs would increase for students studying in crowded classrooms (Yüzüak and Arslan, 2021; Deniz et al, 2020). However, the fact that students frequently encounter such questions and gain familiarity with the questions can bring success both mentally and emotionally at the solution point. According to the opinions of teachers participating in the same research; The length of the new generation questions causes students to be intimidated and approach the questions with prejudice. In a study conducted by Demir, Sarioğlu, and Çepni (2020), teachers shared their thoughts that new generation questions are unnecessarily long and time-consuming, and that the quality of the questions in the market should increase. In this study, some students stated that “New generation questions” measure attention and are unnecessarily prolonged with metaphors such as paragraphs and stories. In this context, it can be said that attention, reading speed and reading comprehension skills come into play in the solution of "new generation questions". In addition, in the same study, it was stated that while such questions caused some students to decrease their motivation, they also created an opportunity for some students to make more effort. For example, the themes that include affective factors such as "Mental Depression, Despair, Disappointment" determined within the scope of this study can be seen as structures that are thought to cause a decrease in students' motivation, while it has been reported that some students are of the opinion that these questions can be easily solved by trying under the theme of "Effort" and even become fun. So much so that within the scope of this research, while some students expressed their opinion that features such as perseverance, determination, struggle, and planned work can lead to success in order to solve "New generation questions", they also stated that they developed different methods (maze, animals that are thought to be wild but not wild, humans, etc.). . metaphors). Deniz et al., (2020) in their study titled “Science teachers' views on LGS new generation questions”, 25% of the teachers stated that the new generation questions are difficult and scary, and 60% of them improve the ability to interpret. In addition, 95% of the teachers showed that the new generation questions created prejudices in the students. In addition to these prejudices, it was observed that students increased their ability to interpret, the habit of reading books, and the use of information in daily life. As a matter of fact, when we look at the new generation science questions, it can be predicted that there are generally long questions, examples from life are tried to be asked in a context-based way, but students may approach this question style with prejudices, which they are not yet familiar with. Considering the effect of student perceptions on course success, it is important to know student perceptions of new generation questions (Yiğit, Deveci, & Dadandı, 2022). In addition, when the opinions reported under the other theme are examined, it is seen that such questions put children in an

obscurity, cause them deep indecision, but at the same time, they can be pleasant at the end of their efforts and guide the students towards the goal.

Assessment for learning makes it possible to adjust instruction to advance learning in the expected direction, provided that assessment tools are well-structured to provide information in this direction (Rémond, 2008). In this direction, when the function of the evaluation element is considered and the metaphors produced by the students included in the research regarding "New generation questions" are analyzed, first of all, students' learning and "New generation questions" in a context that supports their sense of self-efficacy by providing continuous feedback about their learning. Strategies aiming to increase the motivation to study should be developed and used in classrooms. For example, it creates a prejudice, anxiety, fear and anxiety for students who have problems in reading habits and reading comprehension, and therefore these problems are manifested in the fact that the questions in the related questions are too long. Therefore, this problem can be solved by using various strategies in reading comprehension by making studies on the reading habits of the students independently of the branch. As a matter of fact, according to the opinions of the teachers in their study, Yüzak and Arslan (2021); It has been concluded that the long new generation questions cause the students to be intimidated and approach the questions with prejudice, which may be due to their poor reading habits. Considering that the majority of the metaphors created by the students participating in the research for the related concept are associated with negative emotions, programs and courses that will change the perspective of the new generation questions should be developed and implemented.

In educational situations, various games, various ways of reasoning, and logical skills development studies should be done. For example, reasoning skills can be supported with games such as sudoku. In order to solve high-level problems and develop logical thinking, various discussion techniques can be integrated into the process of learning-teaching experiences (socratic discussion, brainstorming, reverse brainstorming, logic fallacies, reading circle, forum, circle, snowball, etc.). In some studies on the subject, when the teachers' suggestions for the development of the EBA content were examined, some teachers stated that the content should be updated, content containing new generation questions should be included, and more resource types should be included in the lessons (Altıntaş & Saka, 2021). In this context, studies can be carried out on the renewal and enrichment of the contents of both EBA and textbooks. In order to reduce students' anxiety levels about new generation questions, the strengths and weaknesses of such questions can be determined by conducting intensive studies on new generation questions. In the study of Yüzak and Arslan (2021), teachers generally suggested that students should solve plenty of questions in order to increase the success of LGS, and that they should read plenty of books to speed up their problem-solving times. Students who see different types of questions by solving trial exams can increase their success in the exam. It is possible to try to increase the success of the exam by having the students solve a lot of questions with the Support Training Courses and studies held outside of school hours. Within the scope of this research, a similar proposal can be made regarding new generation questions. In the studies of Güler, Arslan, and Çelik (2019), it was stated that the failure of teachers to include questions that would force students to think and make them think in the classroom environment was effective in LGS failure. Therefore, it can be said that teachers' giving enough space to questions that will increase students' cognitive reserves, force them, and lead them to think at a higher level in the classroom environment can be effective in making the negative predicates they create regarding the concept of "new generation question" positive. Based on the findings of this study, the following suggestions can be made for researchers: Within the scope of this study, general themes related to "New generation questions" have been reached. More specific structures (Mathematics, Turkish, etc.) can be designed for research on “new generation questions”. In addition, more comprehensive and detailed results can be obtained by conducting longitudinal studies on the related concept. The metaphors of teachers in different branches for "New generation questions" and the metaphors of students for "New generation questions" can be examined comparatively. Considering the strong relationships between perceptions and

attitudes, experimental studies can be designed to develop positive affective characteristics and test causal relationships by investigating what factors might cause students' affective reactions regarding students' perceptions of new generation science, mathematics and Turkish questions.

Ethics Committee Approval

The authors have to provide and submit an "Ethics Committee Approval" document while submitting their manuscript to IOJES journal. This document should be obtained from the related Ethical Committees of the universities. It is a requirement by ULAKBIM TR DİZİN for the journals waiting for possible inclusion in the TR DİZİN. All qualitative or quantitative studies which included data collection from participants by questionnaire, interview, focus group study, observation, and experiment must have the Ethics Committee Approval document. Ethics Committee Approval is not required for review articles. Ethics Committee Approval information (the title of the ethics committee, date, and number) must be stated clearly in the method section as well as on the last page of the manuscript.

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Teacher Attitudes Towards Educational Research

Research Article

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ABSTRACT

In this study, teachers' attitudes towards educational research were analyzed in terms of whether they display any differences depending on various variables. The purpose of this study is to determine teachers' attitudes towards educational research which is the most important source of development in the area of education. The survey research model, which is one of the quantitative research methods, was used in this study which aims at determining teachers' attitudes towards educational research. The study group of the study consists of 555 teachers, selected through the random sampling method, who worked in schools affiliated with Bitlis Provincial Directorate for National Education in the 2021-2022 academic year. "Teachers' Attitude Scale Towards Educational Research (TASTER) scale, developed by Yıldırım, İlhan, Şekerci ve Sözbilir (2013) was used in the study with the purpose of collecting data. The scale consists of 20 items from three sub-dimensions. The scale's cronbach alpha value is .88. The SPSS 22 software was used in the analysis of the data in the study. In line with the variables determined based on the results of the study, it was seen that in general the teachers have positive attitudes towards educational research.

Keywords:
Teacher, Attitude, Attitude of teachers, Educational research

Introduction

Education has a key role in the advancement and development of a society. Educational research in turn is an important aspect for the development and growth of education (Kahraman, Köleli, 2017). However, teachers have a critical role in the development of education. Teachers, who are one of the practitioners of results obtained from educational research which aim at bringing reliable and valid solutions in practice to problems seen in the area of education, are an important factor in increasing the quality of education. The are numerous educational studies which are carried out by scientist with the purpose of increasing the quality of

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education. Teachers are expected to carry out studies as per the research findings. However, research shows us that teachers generally cannot make use of educational research as much as they would like, that they have no access to current educational research, are not able to carry out sufficient research and have negative attitudes towards certain studies (Çepni and Küçük, 2003; Ekiz, 2006).

It is considered that the prevalence of research culture which our educational system targets in our educational system can be possible by determining teachers' attitudes towards educational research and improving these attitudes (Çepni and Küçük, 2003). Teachers, who have positive attitudes towards educational research, are expected to keep themselves updated, follow the related literature and be competent enough to provide solutions to the problems they face with their newly acquired knowledge.

The role of teachers in raising individuals who are equipped with research skills cannot be denied. Therefore, teachers are expected to be individuals with research skills, who are equipped and do research (Konokman, Tanrıseven and Karasolak, 2013). Auger and Wideman (2000) have stated that it is important they teachers' having positive attitudes towards doing research is important in terms of developing investigative identities. Küçük (2002) has stated that the teachers in our country only have a place in the data collection phase of scientific research. However, Artvinli (2010) expresses that teachers are only seen as the origin of educational research and has underlined that teachers should only be present in the data collection phase and that they should be the individuals who actively do research. In addition, teachers not being able to benefit from educational research today, not being able to acquire an investigative identity, not being able to do any research during their career and having negative attitudes towards the conducted research are topics which are a question of debate among educational researchers (Konokman, Tanrıseven and Karasolak, 2013).

When the literature is reviewed, numerous studies can be seen in which the attitudes of graduate students, teacher candidates and teachers towards scientific research and science are analyzed (Saracaloğlu, 2008; Erçoşkun, 2019; Dombaycı and Ercan, 2017; Çakmak, Taşkıran and Bulut, 2015; Camuzcu Aşiroğlu, 2016; Yıldız et al., 2019. There is not a high number of a studies which analyze teachers' attitudes towards educational research in Turkey and their relationship with the studies on this subject. It has been seen that studies related to this subject are mostly qualitative or descriptive research. The results of some of these studies are summarized below.

According to the research results of Yıldırım, İlhan, Şekerci and Sözbilir's (2014) study, it has been determined that a very small number of teachers follow educational research regularly, that they have difficulty in understanding these research and are not able to benefit enough from research findings in their careers. Yavuz Konokman, Tanrıseven and Karasolak's (2013) study shows that teacher candidates have positive attitudes towards educational research. The findings of Kahraman and Köleli's (2017) study indicates that there is a no significant connection between course hours, or in other words course load and gender in terms of attitude towards educational research. However, it has been concluded that female teachers' attitudes towards educational research is significantly lower compared to male teachers. In Çepni and Küçük's (2003) study, it has been determined that a majority of science teachers who participated in the study were not able to benefit from educational research. However, it has been expressed that the teachers stated that they did not believe that research findings are realizable in the field. In Şahin and Arcagök's (2013) study, when the teachers' frequency of doing research is analyzed, it can be seen that most of the teachers "sometimes" do research. In addition, it has been determined that other teachers do less research compared to young teachers, branch teachers and teachers who have completed their graduate studies. In Ekiz's (2006) study, the negative replies of a majority of classroom teachers are in parallel with the results of this study. As a result of Makhabbat, Çoklar and Gündüz's (2018) study, it has been determined that the academic motivation and self-sufficiency levels of the teacher candidates' attitudes towards educational research are significantly high and that these affect their attitudes. In Erdamar and Akpunar's (2017) study, it has been determined that the

metaphors formed by classroom teachers on educational research are 61,08 % positive and 38,92 % negative. Besides these, other studies in which the attitudes of academicians, who are seen as the leading individuals that carry educational research to the field of education, are analyzed in terms of different variables (Erbay. Beydoğan, 2017).

In order to increase the quality of their occupational competency, teachers should also follow the developments in their areas and carry their knowledge to the field of education like everyone else. Educational research is one of the main resources which puts the developments and advancements in education to the use of teachers (Şahin, Arcagök, 2013). Teachers are among the leading individuals who carry the results obtained in educational research to the field. Therefore, teachers are expected to fill the gap between educational field and research findings. In addition, teachers' views on the quality required for educational research and their expectations from educational research are extremely important. In our country, it is being discussed that there is a distance and gap between educational research and their reflection to the field of education. However, it has been seen that there is a small number of studies in the literature which analyze teachers' attitudes towards educational research, whether they follow these research and reflect their knowledge in their application fields to define this gap. On the line of this information, it was considered that teachers' attitudes towards educational research are important, and this topic was chosen for this study.

The purpose of this is to determine teachers' attitudes towards educational research which is seen as the source of the developments experienced in the field of education. It is considered that teachers, who have the greatest responsibility within the educational system, or in other words contemporary teachers having positive attitudes towards sufficient competency and knowledge is highly important. It is believed that teachers' attitudes towards educational research and the findings of these research will contribute to their occupational competency and will significantly and positively increase the quality of education in practice. Therefore, it was analyzed whether teachers' attitudes towards educational research display any differences in terms of different variables.

Methodology

The survey research model, which is one of the quantitative research methods, was used in this study which aims at analyzing teachers' attitudes towards educational research and determining whether teachers' attitudes towards educational research display any differences in terms of different variables. Survey research are studies in which the views or skills, interest, attitude, talent, etc. of participants on a subject or event are determined through large samples (Büyüköztürk et al., 2016).

Study Group

The study group of the study consists of teachers, selected through the random sampling method, who worked in schools affiliated with Bitlis Provincial Directorate for National Education in the 2021-2022 academic year. The study data were collected through the survey done with 566 teachers from different branches. The selection of the participating teachers was done on the basis of voluntariness. The data were collected in two different formats as the survey from developed on Google Drive and in written form. The survey form developed in Google Drive was shared with the teachers over online applications. Data were collected from a total of 566 teachers: 300 of whom were sent the survey online and 266 of whom completed the survey in written form. 11 survey forms were excluded from the evaluation process since demographic information was missing in this data set. The analyses were done over a date set consisting of 555 participants. The demographic characteristics of the participants are given in Table 1 as percentages and frequency.

Table 1. Distribution of Demographic Data of the Participants

Demographic Information	Value	Frequency	Percentage
Gender	Female	360	64,9
	Male	195	35,1
Education Level	Undergraduate	474	85,4
	Graduate	76	13,7
	Doctorate	5	,9
Cadre Type	Paid	101	18,2
	Contractual	188	33,9
	Permanent	266	47,9
Branch	Pre-school	34	6,1
	Classroom teacher	200	36,0
	Turkish	33	5,9
	Mathematics	43	7,7
	Social Studies	16	2,9
	Science	20	3,6
	Psychological Counseling and Guidance	19	3,4
	Foreign Language	36	6,5
	Music	7	1,3
	Physical Education	22	4,0
	Visual Arts	4	,7
	Physics-Chemistry-Biology	19	3,4
	Other	102	18,4
Position in School	Teacher	496	89,4
	Principal-Authorized Teacher	24	4,3
	Vice Principal	25	4,5
	Principal	10	1,8
Occupational Seniority	1-10 years	471	84,9
	11-20 years	62	11,2
	21-30 years	19	3,4
	31 years and over	3	,5
Faculty Graduated From	Faculty of Education	416	75,0
	Faculty of Science and Letters	87	15,7
	Other	52	9,4
Place of Service	Village	95	17,1
	Province	279	50,3
	City Center	181	32,6

Data Collection Tool and Analysis of Data

"Teachers' Attitude Scale Towards Educational Research (TASTER) scale, developed by Yıldırım, İlhan, Şekerci ve Sözbilir (2013), which is a 5 Likert type scale consisting of 20 items and scored between "I Completely Disagree" (1) and "I Completely Agree" (5) was used in the study with the purpose of collecting data. The scale consists of 3 sub-dimensions as, the necessity of educational research, valuing educational research and applicability of educational research. As a result of the scale's reliability analysis, the Cronbach Alpha coefficient for the whole scale was found as .88. The Cronbach Alpha coefficient for the scale's necessity of educational research sub-dimension was found as .84; for the scale's valuing educational research as .81 and for the scale's applicability of educational research as .78.

In addition, the Cronbach Alpha coefficient for the whole scale in this study independently was found as .83. The Cronbach Alpha coefficient for the sub-dimensions were found as .80 for necessity of educational research; .77 for valuing educational research and .68 for applicability of educational research. These data show that the scale has values at a "very reliable" level.

The data collected from 566 teachers were first analyzed with MS Excel packaged software and then with SPSS 22.0 analysis software. 11 survey forms were excluded from the data set since demographic information of 11 teachers was incomplete. The three factors of the scale, necessity of educational research, valuing educational research and applicability of educational research were developed as a 5 category Likert type scale. The scale categories were determined as "I Completely Disagree (1)", "I do not Agree (2)", "I am Undecided (3)", "I Agree (4)" and "I Completely Agree (5)" and were scored between 1 and 5. The scores of the 7 items with negative expressions in the applicability of educational research which is the third sub-dimension were reversed and recalculated. Missing data analysis was done for the teachers' missing answers to the items and it was determined that the missing data were distributed randomly. Then, missing data attribution was performed. The descriptive analyses related to TASTER and its factors are given in Table 2. Kolmogorov-Smirnov normality analysis was done for groups with a sample size over 50.

Table 2. Descriptive Analyses Related the Measurement Tools

	N	Min.	Max.	Mean	S.D.	Skewness	Kurtosis
Necessity of educational research	555	8,0	35,0	27,85	4,13	-,85	2,07
Valuing educational research	555	8,0	30,0	25,42	3,31	-1,00	2,55
Applicability of educational research	555	7,0	35,0	23,00	4,93	,31	,053
Scale Total	555	35,0	100,0	76,27	10,31	-,39	,65

When Table 2 is analyzed, it can be seen that the skewness and kurtosis values of data related to the scale and its factors are not between "-1,5 +1,5" with the exception of applicability of educational research. Kolmogorov-Smirnov normality analysis was done for groups with a sample size over 50. The normality analyses of the data are given in Table 3.

Tablo 3. Normality Analyses of the Data

TASTER	**Kolmogorov-Smirnov**		
	Statistics	**Sd**	**p**
Necessity of educational research	,107	555	,000
Valuing educational research	,141	555	,000
Applicability of educational research	,087	555	,000
Scale Total	,048	555	,004

*p<.05

When Tablo 3 is analyzed, it can be seen that the data do not display normal distribution in necessity of educational research (p=.000; p<.05), valuing educational research (p=.000; p<.05), applicability of educational research (p=.000; p<.05) and scale total (p=.004; p<.05) sub-factors. Büyüköztürk (2021) states that if the p-value is higher than .05 value, then the data do not display deviation from parametric distribution and that they are suitable for parametric distribution. Within this framework, the p-value being lower than .05 in our normality analysis shows that the data display nonparametric distribution. Therefore, nonparametric analyses were done. Mann-Whitney U test was done for independent variables with two different values and Kruskal-Wallis H test was done for variables with three or more values.

The data of the study were analyzed with the SPSS 22 software. Mann-Whitney-U test was to determine whether there was a significant difference between the teachers' attitudes towards educational research in terms of gender and Kruskal Wallis-H test was used to determine whether there was a significant difference between the teachers' attitudes towards educational research in terms of education level, cadre type, branch, position in school, occupational seniority, faculty graduated from and place of service.

Findings

In this section, findings related to whether the teachers' attitudes towards educational research in terms of education level, cadre type, branch, position in school, occupational seniority, faculty graduated from, and place of service display significant differences are given place to.

Mann-Whitney U test was used to determine whether there was a statistical difference between the teachers' attitudes towards educational research in terms of gender and the findings are given in Table 4.

Tablo 4. Differences in the Teachers' Attitudes Towards Educational Research in terms of Gender

Taster	Group	N	Mean Rank	Rank Total	U	P
Necessity of educational research	Female	360	277,27	99818,00	34838,0	,884
	Male	195	279,34	54472,00		
Valuing educational research	Female	360	264,87	95354,00	30374,0	,008
	Male	195	302,24	58936,00		
Applicability of educational research	Female	360	286,70	103212,50	31967,500	,082
	Male	195	261,94	51077,50		
Scale Total	Female	360	278,68	100324,50	34855,50	,892
	Male	195	276,75	53965,50		

*p<.05

Mann Whitney-U test results related to the sub-factor and scale total values for teachers' attitudes towards educational research in terms of gender are given in the table. When Table 4 was analyzed, a significant difference was not found in the necessity of educational research (p=.884; p<.05), applicability of educational research (p=.81; p<.05) and scale total (p=.892; p<.05) sub-factors. However, a statistically significant difference was found in favor of the male teachers in the valuing educational research sub-factor (p=.008; p<.05) in terms of the gender variable. Although a significant difference was not found, while the mean rank of the female participants in the scale total sub-factor was higher, the male participants' mean rank was higher in comparison in the other two factors.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of education level. The results are given in Table 5.

Table 5. Differences in the Teachers' Perceptions of Educational Research in terms of Education Level

Taster	Group	N	Mean Rank	Chi-Square	P
Necessity of educational research	Undergraduate	474	273,11	3,81	,149
	Graduate	76	310,60		
	Doctorate	5	245,90		
Valuing educational research	Undergraduate	474	271,08	6,37	,041
	Graduate	76	320,63		
	Doctorate	5	286,50		
Applicability of educational research	Undergraduate	474	270,52	7,20	,027
	Graduate	76	320,24		

	Doctorate	5	345,00		
Scale Total	Undergraduate	474	270,48	7,25	,027
	Graduate	76	323,49		
	Doctorate	5	299,90		

***p<.05**

Kruskal-Wallis H test results related to the sub-factor and scale total values for teachers' attitudes towards educational research in terms of education are given in the table. When Table 5 was analyzed, a significant difference was not found in the necessity of educational research sub-factor (p=.149; p<.05). However, a statistically significant difference was found in favor of teachers with graduate degrees in the valuing educational research sub-factor (p=.041; p<.05) in terms of the education level variable. A statistically significant difference was found in favor of teachers with doctorate degrees in the applicability of educational research sub-factor (p=,027; p<,05) in terms of the education level variable. In this sub-factor, it was seen that while higher mean rank belonged to the participants with doctorate degrees, they were followed by graduate and undergraduate degrees. A statistically significant difference was found in favor of the teachers with graduate degrees in the scale total sub-factor (p=,027; p<,05) in terms of the education level variable. In general, it was seen that the attitude towards educational research significantly displayed differences in terms of education level.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of cadre type. The results are given in Table 6.

Table 6. Differences in the Teachers' Perceptions of Educational Research in terms of Cadre Type

Taster	**Group**	**N**	**Mean Rank**	**Chi-Square**	**P**
Necessity of educational research	Paid	101	312,21	6,40	,041
	Contractual	188	262,73		
	Permanent	286	275,80		
Valuing educational research	Paid	101	296,20	1,79	,408
	Contractual	188	270,23		
	Permanent	286	276,58		
Applicability of educational research	Paid	101	278,34	,019	,990
	Contractual	188	279,15		
	Permanent	286	277,06		
Scale Total	Paid	101	298,47	2,14	,342
	Contractual	188	270,19		
	Permanent	286	275,75		

*p<.05

When Table 6 was analyzed, a significant difference was not found in the valuing educational research (p=.408; p<.05), applicability of educational research (p=.990; p<.05) and scale total (p=.342; p<.05) sub-factors. However, a statistically significant difference was found in favor of the teachers in the necessity of educational research (p=.041; p<.05) in terms of paid status under cadre type. It was seen that the paid teachers under cadre type have a stronger belief in the necessity of educational research compared to the teachers under different cadre types.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of branches. The results are given in Table 7.

Table 7. Differences in the Teachers' Perceptions of Educational Research in terms of Branches

Taster	Group	N	Mean Rank	Chi-Square	P
Necessity of educational research	Pre-school	34	280,60	14,62	,263
	Classroom Teacher	200	295,77		
	Turkish	33	289,08		
	Mathematics	43	221,79		
	Social Studies	16	288,38		
	Science	20	312,65		
	Psychological Counseling and Guidance	19	318,11		
	Foreign Language	36	256,63		
	Music	7	218,14		
	Physical Education	22	271,82		
	Visual Arts	4	194,38		
	Physics-Chemistry- Biology	19	233,00		
	Other	102	271,16		
Valuing educational research	Pre-school	34	292,12	15,32	,224
	Classroom Teacher	200	282,77		
	Turkish	33	319,42		
	Mathematics	43	208,38		
	Social Studies	16	300,00		
	Science	20	312,75		
	Psychological Counseling and Guidance	19	319,89		
	Foreign Language	36	263,18		
	Music	7	231,00		
	Physical education	22	288,80		
	Visual Arts	4	242,63		
	Physics-Chemistry- Biology	19	251,55		
	Other	102	274,26		
Applicability of educational research	Pre-school	34	285,50	20,22	,063
	Classroom Teacher	200	300,20		
	Turkish	33	254,23		
	Mathematics	43	209,78		
	Social Studies	16	251,41		
	Science	20	303,40		
	Psychological Counseling and Guidance	19	331,97		
	Foreign Language	36	280,19		
	Music	7	311,71		
	Physical Education	22	223,05		
	Visual Arts	4	188,75		
	Physics-Chemistry- Biology	19	253,50		
	Other	102	274,40		
Scale Total	Pre-school	34	282,82	19,07	
	Classroom Teacher	200	297,13		
	Turkish	33	286,52		
	Mathematics	43	207,37		
	Social Studies	16	280,25		
	Science	20	327,45		
	Psychological Counseling and Guidance	19	330,05		
	Foreign Language	36	267,10		
	Music	7	255,36		

	Physical Education	22	250,00	
	Visual Arts	4	188,88	,087
	Physics-Chemistry- Biology	19	236,24	
	Other	102	268,87	

*p<.05

When Table 7 was analyzed, a significant difference was not found in the necessity of educational research (p=.263; p<.05), valuing educational research (p=.224; p<.05), applicability of educational research and scale total (p=.063; p<.05) and scale total (p=.087; p<.05) sub-factors.

Although there was no statistically significant difference, it was seen that the teachers in the Psychological Counseling and Guidance branch have the highest mean rank in the attitudes towards educational research in terms branches in necessity of educational research, valuing educational research, applicability of educational research and scale total sub-factors.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of position in school. The results are given in Table 8.

Table 8. Differences in the Teachers' Perceptions of Educational Research in terms of Position in School

Taster	**Group**	**N**	**Mean Rank**	**Chi-Square**	**P**
Necessity of educational research	Teacher	496	276,20	4,26	,234
	Principal-Authorized Teacher	24	275,40		
	Vice Principal	25	274,84		
Valuing educational research	Principal	10	381,35	6,53	,088
	Teacher	496	273,35		
	Principal-Authorized Teacher	24	279,17		
Applicability of educational research	Vice Principal	25	334,78	,47	,925
	Principal	10	363,95		
	Vice Principal	25	292,02		
	Principal	10	302,75		
Scale Total	Teacher	496	275,25	2,97	,396
	Principal-Authorized Teacher	24	284,31		
	Vice Principal	25	294,20		
	Principal	10	358,70		

***p<.05**

When Table 8 was analyzed, a significant difference was not found in the necessity of educational research (p=.234; p<.05), valuing educational research (p=.088; p<.05), applicability of educational research (p=.925; p<.05) and scale total (p=.396; p<.05) sub-factors.

Although there was no statistically significant difference, it was seen principals have the highest mean rank in the attitudes towards educational research in terms of other position in school types in necessity of educational research, valuing educational research, applicability of educational research and scale total sub-factors.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of occupational seniority. The results are given in Table 9.

Table 9. Differences in the Teachers' Perceptions of Educational Research in terms of Occupational Seniority

Taster	Group	N	Mean Rank	Chi-Square	P
Necessity of educational research	1-10 years	471	275,16	1,09	,779
	11-20 years	62	293,15		
	21-30 years	19	300,47		
	31 years and over	3	269,17		
Valuing educational research	1-10 years	471	275,57	2,59	,458
	11-20 years	62	296,87		
	21-30 years	19	293,95		
	31 years and over	3	168,50		
Applicability of educational research	1-10 years	471	279,17	1,36	,715
	11-20 years	62	272,42		
	21-30 years	19	253,95		
	31 years and over	3	362,17		
Scale Total	1-10 years	471	277,06	,151	,985
	11-20 years	62	284,76		
	21-30 years	19	277,11		
	31 years and over	3	292,33		

*p<.05

When Table 9 was analyzed, a significant difference was not found in the necessity of educational research (p=.779; p<.05), valuing educational research (p=.458; p<.05), applicability of educational research (p=.715; p<.05) and scale total (p=.985; p<.05) sub-factors.

Although there was no statistically significant difference, it was seen that the teachers with 21-30 years of occupational seniority have the highest mean rank in the attitudes towards educational research in terms of occupational seniority in necessity of educational research sub-factor. It was seen that the teachers with 11-20 years of occupational seniority have the highest mean rank in terms of occupational seniority in valuing educational research sub-factor. It was seen that the teachers with 31 years and over occupational seniority have the highest mean rank in terms of occupational seniority in applicability of educational research and scale total sub-factors compared to other teacher groups.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of faculty graduated from. The results are given in Table 10.

Table 10. Differences in the Teachers' Perceptions of Educational Research in terms of Faculty Graduated From

Taster	Group	N	Mean Rank	Chi-Square	P
Necessity of educational research	Faculty of Education	416	284,49	3,69	,158
	Faculty of Science and Letters	87	248,37		
	Other	52	275,68		
Valuing educational research	Faculty of Education	416	285,60	5,43	,066
	Faculty of Science and Letters	87	241,90		
	Other	52	277,56		
Applicability of educational research	Faculty of Education	416	281,59	4,44	,109
	Faculty of Education	87	247,34		
	Other	52	300,62		
Scale Total	Faculty of Education	416	284,22	4,71	,095
	Faculty of Science and Letters	87	243,75		
	Other	52	285,52		

*p<.05

When Table 10 was analyzed, a significant difference was not found in the necessity of educational research (p=.158; p<.05), valuing educational research (p=.066; p<.05), applicability of educational research (p=.109; p<.05) and scale total (p=.095; p<.05) sub-factors.

Although there was no statistically significant difference, it was seen that the teachers who are graduates of the faculty of education have the highest mean rank in necessity of educational research and valuing educational research sub-factors compared to graduates of faculty of science and letters and other faculties. It was seen that the teachers who are graduates of other faculties have the highest mean rank in applicability of educational research and scale total sub-factors compared to the teachers who are graduates of faculties of science and letters and education.

Kruskal Wallis-H test was used to determine whether there was a statistically significant difference between the teachers' attitudes towards educational research in terms of place of service. The results are given in Table 11.

Table 11. Differences in the Teachers' Perceptions of Educational Research in terms of Place of Service

Taster	Group	N	Mean Rank	Chi-Square	P
Necessity of educational research	Village	95	291,01	,76	,681
	Providence	279	275,86		
	City Center	181	274,47		
Valuing educational research	Village	95	281,06	,22	,894
	Providence	279	279,91		
	City Center	181	273,45		
Applicability of educational research	Village	95	294,96	2,23	,327
	Providence	279	268,64		
	City Center	181	283,52		
Scale Total	Village	95	294,49	1,54	,463
	Providence	279	271,15		
	City Center	181	279,91		

*p<.05

When Table 11 was analyzed, a significant difference was not found in the necessity of educational research (p=.681; p<.05), valuing educational research (p=.894; p<.05), applicability of educational research (p=.327; p<.05) and scale total (p=.463; p<.05) sub-factors. Although there was no statistically significant difference, it was seen that the teachers who work in villages have highest mean rank in necessity of educational research, valuing educational research, applicability of educational research and scale total sub-factors compared to the teachers who work in providences and city centers.

Discussion and Conclusion

It is important to know what people's attitudes are towards a given subject or event in terms of determining how human behaviors will ve like in the predicted future (Üstüner, 2006), because it is stated that attitudes have a positive or a negative effect on behaviors and that accordingly, if teachers have stronger belief, they can benefit more from research results (Yıldırım, İlhan, Şekerci, Sözbilir, 2013). Teachers' views on educational research is a critical issue which needs to be given attention to, because it is considered that a positive attitude towards the topic will increase chances of following current research, benefitting from the findings and carrying these results to the field (Kahraman, Köleli, 2017).

In the area of educational research, teachers' assuming an implementing role and their attitudes towards the conducted research are critical in terms of scientific research (Ozturk, 2011). Therefore, it was attempted to determine teachers' attitudes towards educational research in this study. When the studies in the literature

on educational research are reviewed, it can be seen that, in general the views of students and teacher candidates' on the research done in this area have been given place to.

It was found that there is a significant difference in the teachers' attitudes in favor of the male teachers in terms the gender variable in the valuing educational research sub-factor. It can be stated that the male teachers give more importance to educational research compared to the female teachers in terms of gender. Similar to the findings of this study, Şahin ve Arcagök (2013) have determined in their study that male teachers give more importance to educational research compared to female teachers. When the literature is reviewed, it can be seen that the findings obtained in terms of the gender variable are contradictory. In Beycioğlu, Özer and Uğurlu's (2010) study on the value given by female and male teachers to educational, a significant difference was not found either in terms of the gender variable. Similarly, it can be seen that a significant difference has not been found in terms of gender in studies carried out with teachers, teacher candidates and graduate level participants (Ekiz, 2006; Konokman et al., 2013; Saracaloglu, 2008; Uçgun & Ünal, 2015). This finding can also be found in Polat's (2014) study on teacher candidates. Contrary to these findings, a significant difference in favor of female teachers was found in İlhan et al.'s (2015) study on science teacher candidates' attitudes towards educational research. It was seen that studies on attitudes towards educational research are not centralized around a common theme in terms of gender.

A significant difference was found in the teachers' attitudes in favor of the teachers with graduate degrees in valuing educational research sub-factor; in favor of the teachers with doctorate degrees in applicability of educational research sub-factor and in favor of the teachers with graduate degrees in the scale total sub-factor in terms of education level. Although a significant difference was not found in necessity of educational research sub-factor, it was found that the mean rank scores of the teachers with graduate degrees are higher compared to the teachers with undergraduate and doctorate degrees. In the light of these findings, it can be stated that the teachers with graduate degrees give more importance to educational research compared to teachers with different education levels. The teachers with doctorate degrees have a stronger belief in the applicability of educational research compared to the teachers with undergraduate and graduate degrees. In general, the reason for the teachers with undergraduate degrees being left in the background in all of the sub-factors might be related to their inability to reach the competence level required for them to understand educational research, find them necessary, value them and believe that they are applicable. It was determined that there is a significant difference in favor of the teachers with graduate degrees in general in terms of education level.

It was determined that there is a significant difference in favor of the paid teachers in necessity of educational research sub-factor in terms of the cadre type variable. In the light of these findings, it can be stated that paid teachers have a stronger belief in the necessity of educational research in the necessity of educational research compared to the teachers under different cadre types. When the literature is reviewed, it can be seen that there are study findings indicating that teachers find educational research necessary (Ekiz, 2006; Uçgun&Ünal, 2015). In addition, it was found in Makhatbat, Çoklar and Gündüz's (2018) study that teacher candidates find educational research necessary. It was seen that cade type is not a variable that causes a significant difference in the attitudes toward educational research.

A significant difference was not found in the teachers' attitudes in terms of branches in any of the sub-factors. Although a significant difference was not found, it is a striking point that the teachers in the Psychological Counseling and Guidance branch have higher mean ranks in all sub-factors and the scale total sub-factor. In these teachers' Psychological Counseling and Guidance undergraduate program, courses such as statistics and science history might have positively influenced their attitudes towards educational research. Similar to the findings of this study, in Konokman, Tanrıseven & Karasolak's (2013) study on teacher candidates, it was found that individuals' departments do not lead to a significant difference in their attitudes

towards educational research. Contrary to these findings, Yavuz (2009) concluded in his study that classroom teachers, pre-school teachers and special education teachers are more interested in educational research compared to teachers of other branches. Yavuz states that the latest changes made in primary education and in-service training might have led to this finding. It was seen that teachers' branch is not a variable which causes a significant difference in the attitude towards educational research.

A significant difference was not found in the teachers' attitudes in terms of the position in school variable in any of the sub-factors and the scale total sub-factor. It was seen that the principals have the highest mean rank scores in all of the sub-factors and the scale total sub-factor. This result might be a promising aspect in the face of numerous problems teachers experience during their graduate education. It was seen that position in school is not a variable which causes a significant difference in the attitude towards educational research.

A significant difference was not found in the teachers' attitudes in terms of the occupational seniority variable in any of the sub-factors and the scale total sub-factor. Although there is no significant difference, the teachers with 21-30 years of occupational seniority in the necessity of educational research and the teachers with 31 years and over occupational seniority in the applicability of educational research and the scale total sub-factor having higher mean rank might be related to having a deeper understanding of the importance of the subject and the positive results of research by time. Contrary to this finding of the study, Şahin and Arcagök (2013) have determined that teachers with 1-10 years of occupational seniority have a more positive outlook.

A significant difference was not found in the attitudes of the teachers in terms of the faculty graduated from variable in any of the sub-factors and the scale total sub-factor. Although there is no significant difference, the teachers who are graduates of faculty of education coming to the fore in the necessity of educational research and valuing educational research sub-factors and graduates of faculty of education being more knowledgeable about educational research during their undergraduate education period might be due to their inclusion in the data collection process of numerous research. It is noteworthy that the teachers who are graduates of faculty of science and letters remain in the background in all of the sub-factors and the scale total sub-factor despite their more research analysis oriented educational programs.

A significant difference was not found in the attitudes of the teachers in terms of the place of service variable in any of the sub-factors and the scale total sub-factor. Although there is no significant difference, it was determined in all of the sub-factors and scale total sub-factor that the teachers who work in villages have higher mean rank scores. In the light of these findings, it can be stated that due to having a smaller number of students, not having a social circle and wanting to use their limited time in the most productive manner, teachers might be spending their time to do more research and more implementation oriented activities under the working conditions of village schools. It was found that place of service is not a variable which causes a significant difference in the teachers' attitudes towards educational research.

As a result of the determined variables, it was found that the teachers in general have a positive attitude towards educational research. Within the framework of the analyses done on seniority, position in school, branch, place of service, cadre type and faculty graduated from variables, a significant difference was not found between the groups in terms of the teachers' attitudes. It is considered that this is generally due to the positive point of view of the teachers. However, significant differences were found in gender and education level variables and this difference was in favor of the male teachers. In terms of the education level variable, a significant difference was found in favor of the teachers with doctorate degrees in applicability of educational research sub-factor and in general in favor of the teachers with graduate degrees and against the teachers with undergraduate degrees.

Author Contribution Rates

All of the authors have assumed an equal role in all phases of the article. The authors have read and approved the final version of the study.

Ethics Committee Approval

This study was carried out with the approval decision of Kahramanmaraş Sütçü İmam University, Faculty of Social Sciences and Humanities, Scientific Research and Publications Ethics Committee (Protocol no. E-72321963-020-161638), dated 06.10.2022 in meeting 2022-46 and Decision no. 3).

Declaration of Conflict of Interest

The authors declare that they have no conflict of interest with any institution or person within the scope of the study.

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Analysis of Teacher Candidates' Views on the use of Humanoid Robots in Education and Frankeshtein Syndrome

Research Article

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ABSTRACT

Humanoid robots, which represent the culmination of the relationship between humans and technology, are beginning to emerge as new stakeholders in education. The uncertainty surrounding the potential impacts of humanoid robots in education has sparked debates. These debates reveal a dichotomy, with one side expressing optimism and the other highlighting negative aspects, referred to as the Frankenstein Syndrome. This dualistic situation, particularly the Frankenstein Syndrome, which creates confusion in the minds of teachers, is hindering the integration of humanoid robots into education. It is noted that the Frankenstein Syndrome is culturally contingent. This underscores the importance of exploring the use of humanoid robots in education within a cultural context. The aim of this study is to determine the views of teacher candidates regarding the use of humanoid robots in education and the Frankenstein Syndrome, which refers to the possibility of these robots becoming autonomous and getting out of control, and to analyze these views according to various variables. The research, conducted on a total of 758 teacher candidates, employs a survey method. The data collected through the survey were analyzed using descriptive statistical techniques. The analysis revealed that the teacher candidates participating in the study, in line with the literature, partially approve of the use of humanoid robots in education while also finding it somewhat unsettling. Similarly, the teacher candidates partially acknowledge the positive functions of humanoid robots in education while also expressing concerns that they may lead to certain drawbacks in the teaching process. While the teacher candidates participating in the study generally view humanoid robots positively in terms of technological advancement, they largely oppose these robots taking on teacher roles and functions. Teacher candidates have predominantly embraced the role of humanoid robots as "teacher assistants" in their involvement in education. Participant teacher candidates who are not fully familiar with the Frankenstein syndrome have expressed partial belief in its occurrence, yet they find it dangerous for humanity and education. These dualistic views of teacher candidates regarding the positive aspects of humanoid robots and the negative aspect of the

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Frankenstein syndrome have shown significant variations according to demographic variables such as gender, department, class, and family's economic and educational status. In the study, it was evaluated that the perceptions of humanoid robots, both positive and negative (Frankenstein syndrome), may be influenced by a lack of knowledge and experience, as well as cultural factors. Therefore, the absence of the Frankenstein syndrome, a product of Western culture, in Turkish culture may facilitate the integration of humanoid robots into the Turkish Education System. What should be feared here is not the humanoid robots themselves, but rather the "ambitious and arrogant human" profile who designs them by exploiting science for malevolent purposes. Indeed, out-of-control humanoid robots (Frankenstein) are the manifestation of the monstrous feelings of an unbalanced individual who uses science for arrogance and ambition, lacking balance in intellect, emotion, and conscience.

Keywords:
Humanoid robot, Frankenstein syndrome, Human-technology relationship, Teacher candidate.

Introduction

Although the relationship between the human, technology and machine dates back to ancient times, it has gained a very different dimension in the 21st century. This dimension, which started at the beginning of this century with new generation technologies such as the internet, smart systems and artificial intelligence, was reflected in education and transformed it into digital pedagogy (Istrate, 2022). This process, which radically transformed human life, first with robots and then with humanoid robots, opened the door to completely different horizons in education as in every stage of life. Humanoid robots (Şen, 2021), which carry the unity of education and technology to a new dimension that is unlike its predecessors, are being seriously discussed. These discussions have led to a dual situation and perspective. According to the first perspective, which sees humanoid robots as the driving force of education, they may have a functional role in improving education systems (Çaka, 2022: 180). However, there is also a second view that humanoid robots may gain autonomy over time and make independent decisions and actions. According to them, the possibility that humanoid robots will be out of the control of those who build and programme them is disastrous for humanity and education. Hence, this catastrophic possibility has been labelled as Frankenstein syndrome. In this study, the aforementioned dualist perspective on humanoid robots is analysed in the context of education.

Humanoid robots, which are understood to have important functions in the future of education, are automatic robots that are anthropomorphised by artificial intelligence, can communicate, interact, work and physically resemble humans (Kim, Kreps & Rukhsana, 2021:64). Humanoid robots are machines supported by artificial intelligence and can be defined as electro-mechanical machines (Başer & Bakırtaş, 2023: 209) equipped with intelligent systems that are shaped like humans, can imitate some human actions such as hands, arms, bodies and heads, and can interact with humans. In other words, humanoid robots are machines that physically have a head, body, two arms and two legs, resemble humans and can interact socially with humans (Tiejun 2005 as cited in Köse, 2023:1). The ancestor of robots, the predecessor of humanoid robots, goes back to Al Qazeera on the axis of the idea of "automatic" machines (Çırak & Yörük, 2015). In this context, some sources (Coşkun & Gülleroğlu, 2021; Dereli, 2020) also mention the names of Leonardo da Vinci, Jacques de, Vaucanso, Karel Capek, Turing, Babbage, Tezuka and Cahit Arf in the development course of humanoid robots. However, the first humanoid robot with functions closest to those of today was "WABOT-1" developed at Waseda University in Japan. This was followed by models such as P2, WABIAN, ASIMO, HRP, HUBO and ATLAS (Huang et al., 2019). At this point, it is necessary to remember the "SURALP" made by Sabancı University in 2007 and the humanoid robots such as "Akıncı" (2014), "Ada" (2018) and "Arat" (2020) produced by Akınsoft in Konya (Akyıldız, Köksalan, & Pektaş, 2024). Subsequently, studies on humanoid robots have gained momentum in parallel with the developments in artificial intelligence technology and have become a stakeholder in many fields and sectors, including education.

Along with the use of humanoid robots in many sectors such as industry, defence, health and agriculture, their use in education is becoming more and more widespread. When the use of humanoid robots in education is considered from a positive perspective, this development can be seen as a requirement of the digital pedagogy of the 21st century. As a matter of fact, there are important reasons for the use of humanoid robots in education, such as individualisation of teaching (Tuna & Tuna, 2019) and overcoming teacher limitations. Although it is still early for our country, based on the experiences of developed countries, it can be stated that humanoid robots can have important functions in education. The first ones that come to mind are humanoid robots as patient and tireless teachers or teacher assistants, increasing the effectiveness of the teaching process and making learning entertaining (Şen, 2021: 833). For example, humanoid robots, which are seen as "play and learning companions" by students, can have many functions as teachers or assistant teachers in academic development, management and control in education and special education (Yılmaz & Kara, 2023; Coşkunserçe, 2021; Şen, 2021; Şişman, 2019). Humanoid robots, which are seen as a "didactic tool" and a "social actor" by teachers (Ekström & Pareto, 2022), are highly effective in technology-based education such as STEM (Chalmers et al., 2022). In this regard, Lin, Jo, and Tseng (2007) state that humanoid robots are functional in teaching language, mathematics and design in education. Ekström & Pareto (2022) add to these that they increase students' motivation, participation and concentration. On the other hand, humanoid robots are effective in improving learning and motor functions in children with autism (Bharatharaj et al., 2022). It is certain that culture and therefore the level of social and pedagogical acceptance of humanoid robots has an impact on these positive functions of humanoid robots in education (Kaplan, 2004). This situation is very important in terms of the adoption and user-friendliness of humanoid robots (Bal et al., 2024). In this respect, firstly, teachers and prospective teachers should accept this phenomenon. Because only in this way can the expected benefits of humanoid robots be achieved.

The second perspective of the use of humanoid robots in education, the negative perspective, is actually based on anxieties about the possibility of their gaining autonomy. This concern, known as the Frankenstein syndrome, is actually closely related to the acceptance of humanoid robots depending on the culture (Nomura et al., 2012). In Western culture, Frankenstein, vampires and zombies have always been symbols representing social fears and anxieties with their half-human and half-animal figures. This situation continues today through stories and films that harm humanity with cyborgs that are half human and half machine like the Terminator. The following assessment of Szollos (2017) on the background of fears about the possibility of humanoid robots gaining autonomy and turning into monster robots is remarkable:

> *In the background of the fear of humanoid robots gaining autonomy and turning into monsters (frankenstein syndrome), there is destruction, death, individual fragmentation and loss in a collective identity. This situation, which is seen as the evil scientist's attempt to replace God, is in a way similar to Freud's fear of the son overcoming the father, which is related to the post-romantic period. Since it is human beings who make robots, the arrogance we should actually fear is forbidden knowledge. Because in fact, it is not only technology that we fear, but the human ambition and arrogance that creates this monster. Our fear is of becoming an empty, mechanical shell of cold, unfeeling rationalism. It is the loss of human qualities that unsettles us, not the robot's but our own soullessness and mechanisation that is the source of our fears. Ultimately, this fear is the mind, science, art, industry that creates new Frankensteins. Humanoid robots are in fact projections of our dehumanisation (p. 434-435).*

The implications of the possibility of autonomy of humanoid robots on education can be addressed from many perspectives. One of them is the possibility of changing the known general teaching and pedagogical principles and moral norms in education with humanoid robots. This will mean that current teachers will have to up-date almost all of their potential. This is because relevant research (Crompton, Gregory & Burke, 2018) shows that teachers lack experience and knowledge about the integration of robotics into education. However, education with humanoid robots will introduce new principles such as robo-pedagogy and robo-ethics (Tzafestas, 2018). The second possible situation is that it is unclear what the techno-ontological situation that will emerge as a result of robo-pedagogy will lead to in students' minds and

behaviours (von Braun et al., 2021). With this techno-ontological situation, it is frightening that humanoid robots become autonomous and cause Frankenstein syndrome. Thirdly, with the inclusion of humanoid robots in education, the "human-human communication and interaction" that we have been accustomed to for centuries may be damaged and the consequences of this are unpredictable (Bodley, 2015). Fourthly, humanoid robots are likely to pacify the education community, especially teachers. In this case, a community pacified by artificial intelligence technologies may become open to the manipulations of many dominant groups, especially technology companies (Akgül & Şahin, 2022).

The examples of the pros and cons of using humanoid robots in education mentioned so far can be multiplied. What these examples show us is that the use of humanoid robots in education can be addressed in a dual situation, one positive and one negative. In fact, whether humanoid robots are good or bad depends, first of all, on the health and balance of the human brain that designs and produces them. In addition, whether humanoid robots are good or bad depends on the understanding of the meaning attributed to these robots and the culture's perspective on this. At this point, the results of using humanoid robots in education will also vary according to the balanced human and the meaning and acceptance attributed to them. As a matter of fact, relevant research (Nomura et al., 2012) shows that this meaning and acceptance are seriously affected by culture. In this respect, the meaning attributed to humanoid robots in Turkish educational culture and their acceptance will determine the future of the adaptation of humanoid robots in the Turkish Education System (TES) with the digital pedagogy of the 21st century. If this is the case, the views of current pre-service teachers, who are the teachers of the future, on the use of humanoid robots in education have a determining effect on the integration of humanoid robots into TES. Therefore, at the point of contributing to this integration, this research, whose aim is to analyse pre-service teachers' views on the use of humanoid robots in education and Frankenstein syndrome, is important.

Method

Research Model

This research, which aims to determine pre-service teachers' views on the use of humanoid robots in education and Frankenstein syndrome and to analyse them according to various variables, was designed on the axis of quantitative paradigm and conducted in the survey model. Quantitative research is the analysis of the data collected through appropriate means and the expression of the findings with quantitative (numerical) values in a way that the reader can understand (Patton, 2005). The survey model, which is realist, objective and positivist in character, is suitable for social and humanities research and involves observing and describing the current situation related to the subject being studied (Akdağ, 2021). In other words, the survey model is a type of research that examines the opinions, perceptions, interests and attitudes of the participants included in the sample regarding an event, phenomenon or subject (Karasar, 1999: 77). In terms of its function, survey model is a research that aims to collect data in order to determine certain characteristics of the participants belonging to the sample that is representative of the population. In this type of research, the opinions, thoughts and attitudes of the participants about the event, phenomenon or subject studied are investigated (Büyüköztürk et al., 2008).

Population and Sample

The population of this study consists of a total of 4993 (https://egitim.firat.edu.tr; https://www.inonu.edu.tr) pre-service teacher students studying at the Faculty of Education of Fırat and Inonu Universities in the 2023-2024 academic year. The sample was consisted of a total of 758 participants who could be reached in this population and volunteered to participate in the study by convenience sampling. Convenience sampling is the creation of a sample by selecting a group that is suitable for the purpose of the researcher and easy to access in order to gain speed and practicality to the study (Patton, 2005; Yıldırım &

Şimşek, 2013). At the point where the sample represents the population, the following literature information was used: "In a scientific research, according to the deviation rate of ".05" for a population size of 5000 people, a sample of 356 people is sufficient" (Balcı, 2009: 10). Accordingly, it can be stated that the sample of 758 people reached in the population of 4993 people is sufficient to represent the population. The distribution of the participants constituting the research sample according to their demographic characteristics is shown in Table 1.

Table 1. Demographic distribution of the study sample

Variables		**f**	**%**
Gender	Female	570	75.2
	Male	188	24.8
Class	1	220	29.0
	2	162	21.4
	3	186	24.5
	4	190	25.1
Department/Branch	Science-Mathematics	92	12.1
	Class-Language-Social	666	87.9
Daily internet usage time (hours)	1	14	1.8
	2	72	9.5
	3	196	25.9
	4	476	62.8
Family Income Status	Good	112	14.8
	Middle	596	78.6
	Poor	50	6.6
Mother's Educational Status	Primary education	528	69.7
	High school	142	18.7
	University	88	11.6
Father's Educational Status	Primary education	298	39.3
	High school	252	33.2
	University	208	27.4
Total		**758**	**100.00**

Data and Analysis

The research data were collected with the "Questionnaire on Prospective Teachers' Views on the Use of Humanoid Robots in Education and Frankenstein Syndrome" (ÖAEİRFSA) developed by the researchers. In the development of the questionnaire, a draft questionnaire form with a total of 38 items, eight of which were related to personal information and 30 of which were related to humanoid robots and Frankenstein Syndrome, was created by reviewing the relevant literature. Then, these draft items were presented to five experts working at the Department of Educational Sciences, Faculty of Education, Fırat and İnönü Universities. Four of these experts were two Prof. Dr. and two Assoc. Prof. Dr. from the Department of Curriculum and Instruction, Department of Educational Sciences. One Associate Professor from the Department of Computer and Instructional Technologies was also consulted. In line with the feedback received from the experts, the items in the draft form were examined in terms of suitability to the research topic, clarity and comprehensibility, and six items related to humanoid robot and Frankenstein Syndrome were eliminated. Thus, a total of 32 items, eight of which were related to personal information and 24 of which were related to the study topic, were finalised. The 24 items related to the study topic were graded as "3-Yes", "2-Partially" and "1-No". After that, the SCT-IRFS was presented to a total of 1500 pre-service teachers included in the sample via face-to-face and Google Drive. Of the 835 questionnaire forms returned, 77 were eliminated due to

incomplete, duplicate and incorrect filling, and the remaining 758 questionnaire forms were uploaded to the digital environment to be evaluated for analysis. In the analysis of these data, SPSS-22 Package Programme was used and frequency and percentage techniques were used among descriptive statistical techniques. Chi-square test was used in the analysis of the opinions of pre-service teachers stated in the SAEIRFSA according to personal (demographic) variables. In the use of Chi-square test, normality distribution of the data was examined first. Fisher's test was applied to each cell in the distribution for values less than "5", and the Chi-square test, which is applied to determine whether the frequencies obtained comply with a certain hypothesis or theoretical distribution or whether they are different, was applied to the data where the distribution is accepted as normal. In the analyses, p=0.05 was accepted as significance level. For the effect value of the significant difference in the research, Cramer's V value, which is suitable for the Chi-square test (Özsoy & Özsoy, 2013: 341), was examined. In reading this value, the CV value stated by the same authors, "small" effect between .07-.21, "medium" effect between .21-.35 and "large" effect if it is greater than .35 was used.

Findings

Pre-Service Teachers' Perceptions of Humanoid Robots

The general perceptions of the prospective teachers who participated in the research about the humanoid robot are shown in Table 2.

Table 2. Pre-Service teachers' perceptions of humanoid robots

Opinions	Yes		Partially		No	
	f	%	f	%	f	%
1- I have enough information about humanoid robots in general	86	11.3	502	66.2	170	22.4
2- I have enough knowledge about the use of humanoid robots in education	58	7.7	434	57.3	266	35.1
4- The use of humanoid robots in education is generally positive	208	27.4	454	59.9	96	12.7
5- The use of humanoid robots in education is generally unsettling	254	33.5	396	52.2	108	14.2
8- The use of humanoid robots in education is the result of technological development	544	71.8	188	24.8	26	3.4
9- The use of humanoid robots in education is the pushing of the limits of humanity by technology	370	48.8	300	39.6	88	11.6
17- The use of humanoid robots in education is a commercial imposition	306	40.4	340	44.9	112	14.8

When Table 2 is analysed, it is understood that the prospective teachers who participated in the research have "partial knowledge" about both humanoid robots in general (66.2% Partially) and their use in education (57.3% Partially). Similarly, pre-service teachers, who consider the use of humanoid robots in education as a "partially" positive development in general (59.9% Partially), are "partially" (52.2% Partially) uneasy about this development. Pre-service teachers regard the use of humanoid robots in education as a technological development (71.8% Yes) rather than a commercial imposition (44.9% Partly). 48.8% of pre-service teachers regard the use of humanoid robots in education as technology pushing the limits of humanity.

Chi-square (X^2) test was applied to determine whether there is a significant difference between the opinions of pre-service teachers regarding the items in Table 2 according to demographic variables. As a result of the test, it was determined that there was a significant difference between the opinions of the participants

according to gender in items 2 ($X^2_{(df=2)}$=19.434; p=0.000), 4 ($X^2_{(df=2)}$=24.880; p=0.000) and 5 ($X^2_{(df=2)}$=17.787; p=0.000). According to the significant difference in item 2, female pre-service teachers (59.6%; n=340) are partially more knowledgeable about the use of humanoid robots in education than male pre-service teachers (50.0%; n=94). According to the significant difference in item 4, male pre-service teachers (41.5%; n=78) had a more positive opinion about the use of humanoid robots in education than females (22.8%; n=130). However, according to the significant difference in item 5, female pre-service teachers (35.4%; n=202) were more anxious about the use of humanoid robots in education than male pre-service teachers (27.7%; n=52). In order to calculate the effect size for all three items, Cramer's V value, which is suitable for the Chi-square test, was analysed. These values are $M2_{(C-V)}$=.054, $M4_{(C-V)}$=.084 and $M5_{(C-V)}$=.043. Accordingly, it can be stated that the significant difference in all three items is at small effect level.

According to the grades variable, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 2 in the 1st ($X^2_{(df=6)}$=26.071; p=0.000) and 2nd ($X^2_{(df=6)}$=30.983; p=0.002) items. Accordingly, 3rd grade students of the Faculty of Education (14.5% Yes; n=32) considered themselves to have more knowledge about humanoid robots than 2nd grade students (6.5% Yes; n=12). On the other hand, 4th grade students (10.5% Yes; n=20), compared to 2nd grade students (6.2% Yes; n=10), consider themselves to have more knowledge about the use of humanoid robots in education. The effect sizes of the significant difference in these items are $M1_{(C-V)}$=.182 and $M2_{(C-V)}$=.198, both of which have large effect sizes.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 2 in the 9th ($X^2_{(df=2)}$=17.543; p=0.000) and 17th ($X^2_{(df=2)}$=6.607; p=0.037) items according to the department variable. Accordingly, pre-service teachers in quantitative departments (65.2%; n=60), compared to those in verbal departments (46.5% Yes; n=310), see the use of humanoid robots in education more as technology pushing the limits of humanity. On the other hand, pre-service teachers from verbal departments (41.1% Yes; n=274), compared to those from numerical departments (34.8% Yes; n=32), see the use of humanoid robots in education more as commercial imposition. The effect values of the significant difference in these items are $M9_{(C-V)}$=.150 and $M17_{(C-V)}$=.093, both of which have large effect sizes.

According to the variable of daily internet usage, it was determined that there was a significant difference in the 8th item ($X^2_{(df=6)}$=19.871; p=0.003) between the opinions of pre-service teachers regarding the items in Table 2. Accordingly, pre-service teachers (74.8% Yes; n=356) who use the internet for 4 hours or more per day, more than those who use the internet for 1 hour per day (66.3% Yes; n=130), see the use of humanoid robots in education as a result of technological development. The effect size of the significant difference in this item is $M8_{(C-V)}$=.160 and has a large effect size.

While there was no significant difference between the opinions of pre-service teachers regarding the items in Table 2 according to the family economic status variable, there was a significant difference in items 1 ($X^2_{(df=4)}$=16.697; p=0.002) and 17 ($X^2_{(df=4)}$=13.695; p=0.008) according to the mother's education level. Accordingly, pre-service teachers whose mothers were university graduates (20.5% Yes; n=18) considered themselves more knowledgeable about humanoid robots than primary school graduates (9.5% Yes; n=50). On the other hand, pre-service teachers whose mothers are high school graduates (43.7% Yes; n=62) see the use of humanoid robots in education as a commercial imposition more than university graduates (34.1% Yes; n=30). The effect values of the significant difference in these items are $M1_{(C-V)}$=.147 and $M17_{(C-V)}$=.133, both of which have large effect sizes.

According to the variable of father's education, it was determined that there was a significant difference in the 4th item ($X^2_{(df=4)}$=10.669; p=0.037) between the opinions of pre-service teachers regarding the items in Table 2. Accordingly, pre-service teachers whose fathers are high school graduates (31.7% Yes; n=80) see humanoid robots as a positive development more than those whose fathers are primary school graduates

(21.5% Yes; n=64). The effect size of the significant difference in this item is $M4_{(C-V)}$=.118 and has a large effect size.

Functions of Humanoid Robots in Education

The opinions of the pre-service teachers participating in the study on the functions of humanoid robots in education are given in Table 3.

Table 3. Pre-Service teacher' views on the functions of humanoid robots in education

Opinions	Yes		Partially		No	
	f	%	f	%	f	%
10- The use of humanoid robots increases effectiveness and efficiency in education	264	34.8	374	49.3	120	15.8
11- The use of humanoid robots mechanizes education	404	53.3	292	38.5	62	8.2
12- Humanoid robots can teach students anything	42	5.5	228	30.1	488	64.4
13- Humanoid robots are limited in what they can teach students	600	79.2	124	16.4	34	4.5
14- The use of humanoid robots increases the problem solving skills of the student	130	17.2	432	57.0	196	25.9
15- The use of humanoid robots improves students' creativity	200	26.4	380	50.1	178	23.5
16- The use of humanoid robots in education is mandatory in terms of adaptation to the 21st Century	147	23.0	374	49.3	210	27.7
18- Courses on the use of human robots should be included in the curriculum of the Faculty of Education	308	40.6	282	37.2	168	22.2
21- The use of humanoid robots is more suitable for special education than general education	256	33.8	298	39.3	204	26.9

The opinions of pre-service teachers teachers about the functions of humanoid robots in education are given in Table 3. According to this, the pre-service teachers who adopted the item that humanoid robots increase effectiveness and efficiency in education with a degree of 49.3% Partially, did not accept that they would teach everything (64.4% No). The pre-service teachers, who see the things that humanoid robots can teach as limited (79.2% Yes), see them as "partially" related to students' problem solving (57% Partially) and creativity (50.1% Partially). 53.3% of the teachers think that humanoid robots will mechanise education. Prospective teachers refrained from expressing a clear opinion about the necessity of humanoid robots in education for adaptation to the 21st century, their being more suitable for special education and the introduction of courses in education faculties.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 in the 10th ($X^2_{(df=2)}$=15.813; p=0.000) and 16th ($X^2_{(df=2)}$=17.841; p=0.000) items according to gender. According to the significant difference in item 10, male pre-service teachers (46.8% Yes; n=88) have a more positive view of the use of humanoid robots in education than female pre-service teachers (30.9% Yes; n=176). According to the significant difference in item 16, male pre-service teachers (34.0% Yes; n=64), compared to female pre-service teachers (19.3% Yes; n=110), consider the use of humanoid robots in education more necessary in terms of adaptation to the 21st century. The effect size of the significant difference in both items is $M10_{(C-V)}$=.144 and $M16_{(C-V)}$=.153, which is at large effect level.

According to the grade variable, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 in the 16th ($X^2_{(df=6)}$=14.336;p=0.026) items.

According to this, 1st year students of the Faculty of Education (22.7% Yes; n=50), compared to 4th year students (18.9% Yes; n=36), consider the use of humanoid robots in education more necessary in terms of adaptation to the 21st century. The effect size of the significant difference in this item is $M16_{(C-V)}$=.097, which is at medium effect level.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 according to the department variable in items 10 ($X^2_{(df=2)}$=16.081;p=0.000), 14 ($X^2_{(df=2)}$=6.916;p=0.031) and 21 ($X^2_{(df=2)}$=8.050; p=0.018). Accordingly, pre-service teachers in verbal departments (37.2% Yes; n=248) were more positive about the use of humanoid robots in education than those in numerical departments (14.4% Yes; n=16). Similarly, pre-service teachers in the verbal department (18.2% Yes; n=120), compared to those in the numerical department (10.9% Yes; n=10), see the use of humanoid robots in education more beneficial in terms of problem solving in students. However, pre-service teachers in numerical department (47.5% Yes; n=42) adopted the view that humanoid robots are suitable for special education rather than general education more than those in verbal department (32.1% Yes; n=214). The effect values of the significant difference in these items are $M10_{(C-V)}$=.146, $M14_{(C-V)}$=.096 and $M21_{(C-V)}$=.103, and it can be stated that the effect size in items 10 and 21 is large, while the effect size in item 14 is medium.

According to the variable of daily internet use, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 in items 11 ($X^2_{(df=6)}$=21.501; p=0.001) and 18 ($X^2_{(df=6)}$=15.553; p=0.016). Accordingly, pre-service teachers (55.5% Yes; n=264) who use the internet for 4 hours or more per day are more likely than those who use the internet for 1 hour per day (42.9% Yes; n=6) to think that the use of humanoid robots in education will mechanise education. On the other hand, those who use the internet for 2 hours a day (50.3% Yes; n=36) adopted the view that "The use of humanoid robots is more suitable for special education than general education" more than those who use the internet for 4 hours or more a day (41.2% Yes; n=196). The effect sizes of the significant difference in these items are $M11_{(C-V)}$=.119 and $M18_{(C-V)}$=.101, which have large effect sizes.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 according to the family economic status variable in items 12 ($X^2_{(df=4)}$=23.038; p=0.000) and 15 ($X^2_{(df=4)}$=19.976; p=0.001). Accordingly, pre-service teachers with poor family economic status (16.0% Yes; n=8) adopted the view that humanoid robots can teach students everything more than those with good family economic status (8.9% Yes; n=10). On the other hand, pre-service teachers with medium family economic status (28.9% Yes; n=172) adopted the view that humanoid robots develop creativity in students more than those with good family economic status (14.3% Yes; n=16). The effect values of the significant difference in these items are $M12_{(C-V)}$=.174 and $M17_{(C-V)}$=.172, both of which have large effect sizes.

According to the mother education variable, it was determined that there was a significant difference between the opinions of the pre-service teachers regarding the items in Table 3 in the 10th item ($X^2_{(df=4)}$=18.642; p=0.001). Accordingly, pre-service teachers whose mothers are university graduates (47.7% Yes; n=42) see humanoid robots as a positive development more than those whose mothers are high school graduates (31.0% Yes; n=44). The effect size of the significant difference in this item is $M10_{(C-V)}$=.111 and has a large effect size.

According to the variable of father's education, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 3 in items 10 ($X^2_{(df=4)}$=12.189; p=0.016) and 21 ($X^2_{(df=4)}$=9.851; p=0.043). Accordingly, pre-service teachers whose fathers are university graduates (57.7% Yes; n=120), more than those whose fathers are high school graduates (49.2% Yes; n=124), see humanoid robots as a positive development. On the other hand, the view that "The use of humanoid robots is more suitable for special education than general education" was adopted more by pre-service teachers whose fathers were university graduates (36.5% Yes; n=76) than those whose fathers were primary school graduates (32.9% Yes;

n=96). The effect values of the significant difference in this item are $M10_{(C-V)}$=.090 and $M21_{(C-V)}$=.081, and they have medium effect size.

Humanoid Robots and the Teacher

The opinions of the pre-service teachers participating in the study about humanoid robots in the context of teachers are given in Table 4.

Table 4. Pre-service teachers' views on humanoid robots and teachers

Opinions	Yes		Partially		No	
	f	%	f	%	f	%
6- It is appropriate to use the humanoid robot as an assistant to the teacher in education	407	53.7	267	35.2	84	11.1
7- It is unacceptable for the humanoid robot to replace the teacher in education	596	78.6	124	16.4	38	5.0
19- The use of humanoid robots in education makes the teacher's job easier	314	41.4	346	45.6	98	12.9
20- The use of humanoid robots in education makes the teacher passive	400	52.8	284	37.5	74	9.8

When Table 4 is analysed, it is understood that the pre-service teachers who rejected the replacement of the teacher by humanoid robots to a great extent (78.6%) were of the opinion that they would make the teacher passive (52.8% Yes). Pre-service teachers, who see the function of humanoid robots in education as "helping the teacher" (53.7% Yes), also agree "partially" (45.6%) that they will facilitate the teacher's work.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 4, according to gender, in items 7 ($X^2_{(df=2)}$=22.245; p=0.000) and 19 ($X^2_{(df=2)}$=13.729; p=0.001). According to the significant difference in item 7, female pre-service teachers (82.5% Yes; n=470) were more likely than male pre-service teachers (67.0% Yes; n=126) to see humanoid robots replacing teachers as unacceptable. According to the significant difference in item 19, male pre-service teachers (51.1% Yes; n=96) adopted the view that humanoid robots facilitate the work of teachers in education more than female pre-service teachers (38.2% Yes; n=218). The effect size of the significant difference in both items is $M7_{(C-V)}$=.171 and $M19_{(C-V)}$=.135, which is at large effect level.

According to the grade variable, it was determined that there was a significant difference in the 6th item ($X^2_{(df=6)}$=24.220;p=0.000) between the opinions of pre-service teachers regarding the items in Table 4. Accordingly, 1st year students of the Faculty of Education (55.5% Yes; n=122) adopted the view that "It is appropriate to use humanoid robot as an assistant to the teacher in education" more than 4th year students (35.8% Yes; n=68). The effect size of the significant difference in this item is $M6_{(C-V)}$=.179, which is at large effect level.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 4 in items 6 ($X^2_{(df=2)}$=18.950; p=0.000) and 20 ($X^2_{(df=2)}$=10.903; p=0.004) according to the department variable. Accordingly, pre-service teachers in the verbal department (50.5% Yes; n=336) adopted the view that the use of humanoid robots in education would help teachers more than those in the numerical department (39.1% Yes; n=36). Similarly, pre-service teachers in verbal department (54.1% Yes; n=360) adopted the view that the use of humanoid robots in education would make teachers passive more than those in numerical department (43.5% Yes; n=40). The effect values of the significant difference in these items are $M6_{(C-V)}$=.158 and $M20_{(C-V)}$=.120 and have a large effect size.

According to the variable of daily internet usage, it was determined that there was a significant difference in the 6th item ($X^2_{(df=6)}$=20.254; p=0.002) between the opinions of pre-service teachers regarding the items in Table 4. Accordingly, pre-service teachers who use the internet for 3 hours or more a day (53.1% Yes; n=104) adopted the view that the use of humanoid robots in education would help teachers more than those who use the internet for 1 hour a day (14.3% Yes; n=2). The effect size of the significant difference in this item is $M6_{(C-V)}$=.116 and has a large effect size.

It was determined that there was a significant difference in the 7th item ($X^2_{(df=4)}$=34.002; p=0.000) between the opinions of pre-service teachers regarding the items in Table 4 according to the family economic status variable. Accordingly, pre-service teachers with good family economic status (23.2% partially; n=26), compared to those with poor family economic status (8.0% partially; n=4), see the replacement of teachers by humanoid robots in education as unacceptable to a greater extent. The effect size of the significant difference in this item is $M7_{(C-V)}$=.150 and has a large effect size.

According to the mother education variable, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 4 in the 19th item ($X^2_{(df=4)}$=12.556; p=0.015). Accordingly, pre-service teachers whose mothers are university graduates (54.5% Yes; n=48) are more likely than those whose mothers are primary school graduates (39.4% Yes; n=208) to think that the humanoid robot will make the teacher's job easier. The effect size of the significant difference in this item is $M19_{(C-V)}$=.090, which is of medium effect size.

According to the father's education variable, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 4 in items 6 ($X^2_{(df=4)}$=13.148; p=0.011), 7 ($X^2_{(df=4)}$=10.485; p=0.033) and 19 ($X^2_{(df=4)}$=13.467; p=0.009). Accordingly, pre-service teachers whose fathers are university graduates (54.8% Yes; n=114) have a more positive view of the use of humanoid robots in education than those whose fathers are high school graduates (44.4% Yes; n=112). On the other hand, the view that "It is unacceptable for a humanoid robot to replace the teacher in education" was adopted more by pre-service teachers whose fathers graduated from primary school (81.2% Yes; n=242) than those whose fathers graduated from university (73.1% Yes; n=152). The pre-service teachers whose fathers were university graduates (50.0% Yes; n=104) adopted the view that humanoid robots in education make teachers passive more than those whose fathers were primary school graduates (38.3% Yes; n=114). The effect values of the significant difference in this item are $M6_{(C-V)}$=.093, $M7_{(C-V)}$=.083 and $M19_{(C-V)}$=.104, and the effect size in the first two items is medium and in the last item is large.

Frankenstein Syndrome

The opinions of the pre-service teachers participating in the study on Frankenstein syndrome are given in Table 5.

Table 5. Pre-service teachers' views on Frankenstein syndrome

Opinions	Yes		Partially		No	
	f	%	f	%	f	%
22- I am familiar with Frankenstein syndrome, which is the danger of humanoid robots getting out of control and acting on their own	148	19.5	276	36.4	334	44.1
23- I believe that Frankenstein syndrome will happen	218	28.8	346	45.6	194	25.6
24- Frankenstein syndrome is dangerous for humanity and education	410	54.1	254	33.5	94	12.4

The opinions of prospective teachers about the Frankenstein syndrome, which expresses the possibility of humanoid robots gaining autonomy and harming humanity, are given in Table 5. Accordingly, it is

understood that the pre-service teachers who participated in the research do not have enough information about Frankenstein syndrome (19.5% Yes) and do not believe that this possibility will be realised (28.8% Yes, 45.6% Partially). However, despite this, 54.1% of the pre-service teachers consider this possibility as dangerous for humanity and education.

It was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 5 according to gender in items 22 ($X^2_{(df=2)}$=6.510; p=0.039) and 24 ($X^2_{(df=2)}$=15.220; p=0.000). According to the significant difference in item 22, male pre-service teachers (25.5% Yes; n=48) had more knowledge about Frankenstein syndrome than female pre-service teachers (17.5% Yes; n=48). According to the significant difference in item 24, female pre-service teachers (57.9% Yes; n=330) consider Frankenstein syndrome more dangerous for humanity and education than male pre-service teachers (42.6% Yes; n=80). The effect size of the significant difference in both items is $M22_{(C-V)}$=.059 and $M24_{(C-V)}$=.142, and the effect size in item 22 is small, while the effect size in item 24 is at large effect level.

According to the grade variable, it was determined that there was a significant difference in the 22nd item ($X^2_{(df=6)}$=15.677;p=0.016) between the opinions of pre-service teachers about the items in Table 5. Accordingly, 1st year students of the Faculty of Education (20.9% Yes; n=46) believe that Frankenstein syndrome will be realised more than 4th year students (17.9% Yes; n=34). The effect size of significant difference in this item is $M22_{(C-V)}$=.102, which is at large effect level.

It was determined that there was a significant difference in the 23rd item ($X^2_{(df=2)}$=10.242;p=0.006) between the opinions of pre-service teachers regarding the items in Table 5 according to the department variable. Accordingly, pre-service teachers in numerical departments (41.3% Yes; n=38) believed that Frankenstein syndrome would occur more than those in verbal departments (27.0% Yes; n=180). The effect size of the significant difference in this item is $M23_{(C-V)}$=.116 and has a large effect size.

According to the variable of daily internet usage, it was determined that there was a significant difference in item 24 ($X^2_{(df=6)}$=20.128; p=0.003) between the opinions of pre-service teachers regarding the items in Table 5. Accordingly, pre-service teachers (57.1% Yes; n=272) who use the internet for 4 hours or more per day find Frankenstein syndrome more dangerous for humanity and education than those who use the internet for 1 hour per day (42.9% Yes; n=6). The effect size of the significant difference in this item is $M24_{(C-V)}$=.115 and has a large effect size.

It was determined that there was a significant difference in the 22nd item ($X^2_{(df=4)}$=25.232; p=0.000) between the opinions of pre-service teachers regarding the items in Table 5 according to the family economic status variable. Accordingly, pre-service teachers with poor family economic status (36.0% Yes; n=18) believed that Frankenstein syndrome would be realised more than those with medium family economic status (16.1% Yes; n=96). The effect values of the significant difference in this item are $M7_{(C-V)}$=.129 and have a large effect size.

According to the mother's education variable, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 5 in items 22 ($X^2_{(df=4)}$=43.719; p=0.000) and 23 ($X^2_{(df=4)}$=12.959; p=0.011). Accordingly, pre-service teachers whose mothers were university graduates (40.9% Yes; n=36) were more knowledgeable about Frankenstein syndrome than those whose mothers were primary school graduates (14.8% Yes; n=78). Similarly, pre-service teachers whose mothers were university graduates (40.9% Yes; n=36) believed that Frankenstein syndrome would occur more than those whose mothers were high school graduates (14.8% Yes; n=78). The effect sizes of the significant difference in these items are $M22_{(C-V)}$=.170 and $M23_{(C-V)}$=.092, which have large effect sizes.

According to the variable of father's education, it was determined that there was a significant difference between the opinions of pre-service teachers regarding the items in Table 4 in item 22 ($X^2_{(df=4)}$=13.148; p=0.011).

Accordingly, pre-service teachers whose fathers are university graduates (30.8% Yes; n=64) are more knowledgeable about Frankenstein sensorum than those whose fathers are high school graduates (14.3% Yes; n=36). The effect size of the significant difference in this item is $M11_{(C-V)}$=.140 and has a large effect size.

Discussion, Conclusion and Recommendations

Similar to the transformation of robots in many sectors, which is the point where the relationship between human and technology has reached, humanoid robots are doing the same in education (Ferrando, 2014). In this respect, the use of humanoid robots in education has been frequently discussed recently, and it is inevitable that these discussions will spread to Turkey in the near future. The ability to make these discussions on a healthy ground depends on the literature and experiences related to the subject. In this respect, the findings obtained in this research, which is motivated to contribute to the creation of literature on the use of humanoid robots in education, which will be one of the important discussion topics of TES in the near future, and the conclusions reached based on them are given below:

In most of the foreign literature (Chalmers et al., 2022; Şen, 2021; Munar, 2013; Syrdal et al., 2020; Kaplan, 2004), it has been observed that there is a dual situation, one positive and one negative, regarding the use of humanoid robots in education. The results of this research on whether this situation is also true in our country revealed a similar dual situation. As a matter of fact, while the pre-service teachers who participated in the research found the use of humanoid robots in education "partially" positive with a rate of 59.9%, the same pre-service teachers found this situation "partially" unsettling with a rate of 52.2%. Supporting this finding, Yıldırım and Şad (2019) concluded that teachers accepted the use of humanoid robots in education at a moderate level (undecided). According to Chang et al. (2010) cited by these researchers, these dual attitudes of teachers may be due to the fact that the use of humanoid robots in education is difficult and complex. Another reason for these dual attitudes of pre-service teachers towards the use of humanoid robots in education may be that robots are seen more related to industry, production and STEM. As a matter of fact, the research findings of Reich-Stiebert and Eyssel (2013) in Germany and Kaygısız, Üzümcü and Uçar (2020) in Turkey support this. However, the fact that people's perceptions of robots are affected by culture (Kaplan, 2004) may also have affected the views of pre-service teachers on the subject. Indeed, studies conducted without considering the cultural factor (Crompton, Gregory & Burke, 2018) have shown that humanoid robots can act as a catalyst for education when used correctly.

In the context of demographic variables, it was determined that male pre-service teachers had a more positive attitude towards the use of humanoid robots in education than female pre-service teachers. It was determined that as the level of class level of university education increased, the level of knowledge about the use of humanoid robots in education also increased. According to the department and internet usage time, it was determined that the prospective teachers of numerical department and the prospective teachers who use the internet more often perceived the use of humanoid robots in education more from the technological dimension. In the same subject, it was determined that the level of parental education also affected the pre-service teachers' views on humanoid robots. All these findings can be interpreted as that pre-service teachers' perceptions of humanoid robots are affected by demographic conditions related to gender, education and culture. As a matter of fact, the results of Kala's (2022) research on the subject support this interpretation.

According to the pre-service teachers who participated in the research, the functions of humanoid robots in education are "partially" (49.3%) positive. According to most of the pre-service teachers (79.2%) who stated that humanoid robots will mechanise education (53.3% Yes), the things they will teach are limited. The pre-service teachers partially (49.3%) agreed with the statement that humanoid robots are necessary for adaptation to the 21st century. This may be due to the fact that the pre-service teachers participating in the

research do not have much knowledge about the use of humanoid robots in education. Another possibility is that since the subject is new for Turkey (Şen, 2021), there is little data on it. The fact that there are almost no studies on the use of humanoid robots in education in Turkey and that the studies are mostly related to special education (Türkalp, 2023; Çakmak Ekici, 2023; Özdemir, 2015) supports this possibility.

In the study, it was determined that gender and grade level affected pre-service teachers' views on the functions of humanoid robots in education; upper grades and male pre-service teachers had a more positive view of the use of humanoid robots in education. The findings of similar studies (Şahin & Arslan Namlı, 2019) that men have a higher perception of technology support this result. The positive views of the upper grades are probably due to receiving more information. However, it is noteworthy here that pre-service teachers studying in the verbal department and having a poor economic level see the use of humanoid robots in education more positively. More research findings are needed for the possible reasons for this. In the study, it was determined that pre-service teachers with parents with high level of education had more positive views on humanoid robots. As a matter of fact, the research findings of Öztuzcu and Karamete (2022) show that parents (father) affect students' technological perceptions.

Discussions on the use of humanoid robots in education are mostly focused on the possible effects of robots on the role, position and function of the teacher in the classroom (Chalmers et al., 2022). While the pre-service teachers who participated in the study generally welcomed the developments in the field of humanoid robots, they did not show the same optimistic attitude towards their functions in education. The participant pre-service teachers saw the use of humanoid robots as an assistant to the teacher at a rate of 53.7%. On the other hand, 78.6% of them found it unacceptable for the humanoid robot to replace the teacher. The negative views of pre-service teachers about humanoid robots may be largely due to the uncertainty about whether these robots will replace the teacher (Orhani, 2023). As a matter of fact, studies (Yılmaz & Kara, 2023; Coşkunserçe, 2021; Şen, 2021; Şişman, 2019) show that both students and teachers see humanoid robots in education as an assistant teacher, teaching material, and student's friend. What is important here is that instead of rejecting humanoid robots immediately, it should be seen as a didactic tool and seek ways to benefit from it. Because research (Çaka, 2022; Lin, Jo & Tseng, 2007) has shown that humanoid robots can be very useful in individualising teaching (Tuna & Tuna, 2019) and supporting students (Ekström & Pareto, 2022) when used as an assistant to the teacher. As a matter of fact, many countries actively use humanoid robots (Keane, et al., 2016), which are seen as suitable for constructivist education, as the driving force of education. In this respect, at the point of adaptation of TES in Turkey to the 21st century digital pedagogy, it is useful to determine the role, position and functions of humanoid robots in education in a way to relieve teachers' uneasiness.

In the study, when pre-service teachers' views on humanoid robots and the role and function of the teacher were analysed demographically, it was determined that female and verbal pre-service teachers were more anxious about humanoid robots. Here, the uneasiness of women may be related to the structure of Turkish culture that opens more job opportunities for men (Çakır, 2008). Similarly, the concerns of those in the verbal branch may be related to the fact that they do not have many options other than teaching in the labour market. In the study, it was determined that pre-service teachers who use the internet more and whose parents have a higher level of education adopt the idea of humanoid robots helping teachers in education. This may be related to technology familiarity and technology optimism related to educational level.

One of the prominent dimensions in the ongoing debates on the use of humanoid robots in education is the possibility that they may get out of control and become harmful over time. The consequences of this concern, which is referred to in the literature (Syrdal et al., 2020) as the Frankenstein syndrome, are uncertain. This uncertainty seems to be a new, unknown problem for TES, which is already struggling with many problems. Although it is stated that Frankenstein syndrome is related to Western history and culture (Sunar, 2020; Bodley, 2015), TES cannot be expected to ignore the risk of humanoid robots becoming autonomous.

From the participants' answers to these items, it is understood that pre-service teachers in Turkey are not fully aware of the Frankeştay syndrome. Accordingly, they believe "partially" (45.6%) that this possibility will be realised. Nevertheless, 54.1% of the pre-service teachers found Frankenstein syndrome dangerous for humanity and education. These findings can be interpreted as that the pre-service teachers who participated in the study, although they did not know about the Frankenstein syndrome and partially believed that it would be realised, they felt a little uneasy. This indifference and partial uneasiness of pre-service teachers in Turkey about the Frankenstein syndrome can be attributed to cultural reasons as well as lack of knowledge. Because there is no record in the minds of Turkish people about the Frankenstein syndrome, which is a phenomenon based on similar figures in ancient Greece and Rome, which are the sources of nutrition of Western culture. This means that it is not correct to expect phenomena that are a Western experience and reality to be reflected to the same degree in different cultures. As a matter of fact, related literature and research (Munar, 2013; Kaplan, 2004) have shown that fears about Frankenstein syndrome are culture-dependent, and although this fear is present in Western countries, the level of acceptance of robots is high in Japan.

In the study, when pre-service teachers' views on Frankenstein syndrome were analysed demographically, it was determined that male pre-service teachers and those with better parental education had more knowledge on this subject. What is noteworthy here is that female, numerical branch, lower class, those who use internet more and those with poor economic status are more anxious about Frankenstein syndrome. The fact that these variables are related to demographic conditions is interesting in terms of showing that perceptions and opinions about Frankenstein syndrome are culture-dependent.

Ultimately, humanoid robots are a reality of 21st century digital pedagogy (Birgit et al., 2017). It is inevitable for TES to take humanoid robots on its radar in order to adapt the system to the age. However, in the integration of humanoid robots into TES, the perceptions, opinions and acceptance of teachers and pre-service teachers are vital. For this, humanoid robots, the benefits they will provide and the possible uneasiness they will cause should be addressed in the context of Turkish culture. At this point, the Frankenstein syndrome, which is the work of Western history and civilisation, is also included. Because it is not humanoid robots that should be feared here, but the profile of "ambitious and arrogant people" who design them by using science for their evil ambitions. As a matter of fact, a close look at the issue reveals that humanoid robots are the manifestation of the monstrous feelings lying in the inner depths of human beings who have not developed in a balanced way in terms of intelligence, emotion and conscience. In this respect, humanoid robots are human beings' own copies (Funk, 2014: 69), in all their good and bad aspects. What needs to be done in the context of education is to raise balanced individuals who will not use knowledge for malicious purposes. In the context of the teacher, it is better to focus on the new roles, functions and workload (Wang et al., 2023) that humanoid robots will bring to the teacher rather than taking away the teacher's job. In the context of symptoms related to humanoid robots, it is important to address the uncertainties that robots will cause in students' minds, robot addiction (von Braun et al., 2021) and robo-ethical problems (Belpaeme et al., 2018).

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Development of a Scientific Process Skill Test for 60-72 Months Preschool Children: A Validity and Reliability Study*

Research Article

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ABSTRACT

This research aimed to develop a valid and reliable scientific process skill test (SPST) for 60-72 months old preschool children. The study group of the research consisted of a total of 241 preschool children. 36 questions were prepared regarding scientific process skills. Test items were prepared with 3 options. The item visualized the options according to the level of the children. The prepared questions were presented to the opinion of two academicians who are experts in the field of science education and three preschool teachers. According to the expert opinions received, two items were excluded from the test. A preliminary pilot application was conducted with 114 preschool children with the remaining 34 items. Six items were removed from the test after pre-pilot application. A pilot application was made to 127 preschool children with the remaining 28 items. Three items were removed after the pilot application. As a result of the pilot application, the KR-20 reliability coefficient of the test was calculated as 0.786. The final version of the test was arranged to consist of 25 items. These results indicate that the test is highly reliable, meaning that the test results accurately reflect the measured property and are reproducible.

Keywords:
Scientific Process Skills, Preschool Children, Test Development, Reliability

Introduction

Early childhood is one of the most important periods of life. Because it forms the basis of our lives. Early childhood educators emphasize that the effective use of scientific process skills is essential requirements for

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early exploration and problem-solving (Jirout and Zimmerman, 2015). Young children naturally benefit from these process skills when investigating whatever catches their attention (Akman et al., 2018). In this way, children explore the world and their environment through the use of their senses and by asking questions (Conezio and French, 2002; Trundle, 2010). In the preschool period, children are more ready to develop their scientific processes than to learn abstract concepts (Butts and Prescott, 1990).

Scientific process skills are the skills that scientists use in the process of doing science. These skills form the basis of scientific methods. Scientific process skills were defined differently by researchers. According to Padilla et al. (1984), he defined scientific process skills as abilities that are suitable for many branches of science and can be easily transformed into other situations. According to Ostlund (1992), scientific process skills are tools to obtain information about our world and to systematize this knowledge. According to Lind (2000), they are the basic skills that students use to access information, think about problems, create knowledge and formulate results. According to Çepni et al. (2016), they are skills that facilitate the learning of science, gain research paths and active learning, develop the ability to take responsibility for their own learning, and increase the permanence of learning at the same time.

Scientific process skills were classified by researchers into basic scientific process skills and integrated scientific process skills (Saracho and Spodek, 2008). In the preschool period, children are expected to use basic scientific process skills, including uncomplicated skills (Jones et al., 2008). There are six basic scientific process skills. These are observation, communication, classification, measurement, inference and prediction (Jones et al., 2008; Padilla, 1990; Saracho and Spodek, 2008; Yoon et al., 2015). Integrated scientific process skills are very similar to those used by adult scientists. These skills are integrated skills that consist of different combinations rather than a step-by-step process (RGS, 2019). The integrated nature of scientific process skills is evident as they support the development of one skill in exchange for the development of another (Guarrella, 2021).

The development of basic scientific process skills in early childhood is an important issue. Because in order for children to master integrated scientific process skills in the future, they must first have basic skills (Turiman et al., 2012). Although all skills are unique, they are related to each other (Germann and Aram, 1996). It is important for children to actively use their scientific process skills and to be equipped with basic skills such as observation, measurement, comparison and estimation (Aydoğdu, 2009). Scientific process skills are not unique to science. Skills such as inference can be used in literacy, while measurement can also be used in mathematics and other areas (Maral et al., 2012; Whittaker, 2021). Children should be provided with such skills in the preschool period so that they can use scientific process skills effectively in the future years (Kefi et al., 2013). For this reason, as a requirement of the 21st century, it is necessary to support children's awareness of the level of use of scientific process skills from an early age (Maral et al., 2012). Preschool education programs emphasized that children should grow up as individuals with scientific process skills (Ministry of National Education [MoNE], 2024).

When the literature is examined, it is seen that the number of studies conducted on scientific process skills in the preschool period, which is a new research area for Turkey, has increased in recent years (Alabay and Özdoğan, 2018; Ayvaci, 2010; Bingöl and Ünal, 2019; Demir, 2022; Kavak, 2020; Keçeci et al., 2019; Kefi et al., 2013; Kunt, 2016; Kuru and Akman , 2017; Şahin, et al., 2011; Şahin, et al., 2018; Tok, 2020; Uludağ and Erkan, 2023; Yıldız and Zengin, 2021; Yıldız, 2023). In this context, it is thought that developing a valid, reliable, up-to-date measurement tool that covers all basic scientific process skills to be used in studies with children will contribute to the studies in the field. This research aimed to develop a valid and reliable scientific process skill test (SPST) for 60-72 months old preschool children. The main research question of the research is "What is the validity and reliability of the scientific process skill test (SPST) to be developed for preschool children?" in the form.

Methodology

This research aimed to develop a valid and reliable scientific process skill test (SPST) for 60-72 months old preschool children. For this aim, it was applied to 241 preschool children aged 60-72 months. Quantitative research method was used in the research. Construct validity was ensured by applying item analysis. Necessary reliability analysis was performed.

Study Group

While developing the scientific process test, the study group consisted of preschool children from six different schools. The distribution of the study group according to schools is given in Table 1.

Table 1. Distribution of the study group by schools

Implementation type	School	*f*
Pre-Pilot Application	Kindergarten I	33
	Kindergarten II	40
	Preparatory class attached to primary school I	41
Pilot Application	Kindergarten III	40
	Kindergarten IV	42
	Preparatory class attached to primary school II	43

Two kindergartens (Kindergarten I *f*: 33, Kindergarten II *f:* 33) and a preparatory class attached to primary school (*f:* 41) were determined as the study group for the pre-pilot application of the test. For the pilot implementation of the test, two kindergartens (Kindergarten III *f:* 40, Kindergarten IV *f:* 42) and a preparatory class attached to primary school I (*f:* 43) were determined as the study group. The study group of the research consisted of a total of 241 preschool children, including 114 preschool children in the pre-pilot application and 127 preschool children in the pilot application.

In the process of developing the Scientific Process Skill Test (SPST), the steps given in Figure 1 were followed.

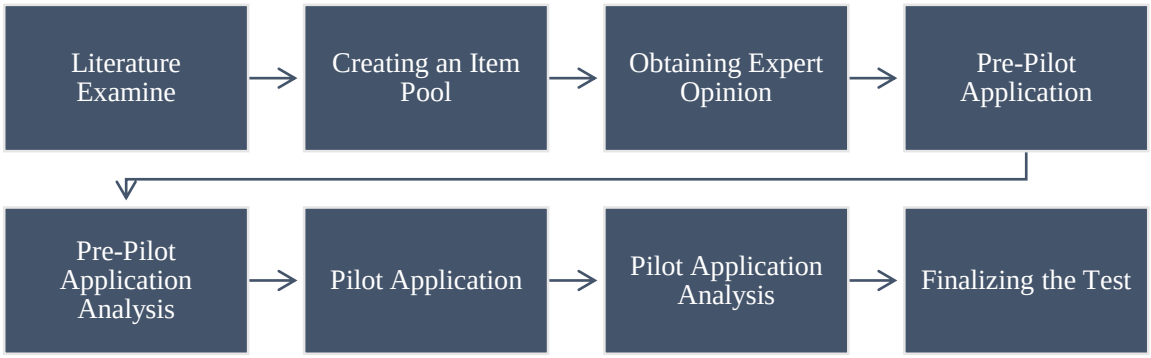

Figure 1. Steps Followed in the Scientific Process Skill Test (SPST) Development Process

With the scientific process skill test (SPST), it was aimed to measure a total of six scientific process skills: observation, classification, measurement, prediction, inference and communication. In the research, firstly, the literature was examined. Basic scientific process skills and characteristics were identified. 36 questions were prepared regarding these characteristics. Test items were prepared with 3 options. The item visualized the options according to the level of the children. The prepared questions were presented to the opinions of two academicians who are experts in the field of science education and three preschool teachers regarding the

suitability of the level, the root of the questions, the distractors and the ability of the questions to meet the achievements. In line with the expert opinions received, two items were removed from the test. In other items, the necessary arrangements were made and the pilot application was started. While applying the Scientific Process Skills Test (SPST) to children, the following guidelines were taken into consideration:

- The researcher met with the children in the classroom and one-on-one before the test was administered.
- The test was carried out in an environment where the child and the researcher were alone and there were no quiet and remarkable objects.
- A seating arrangement was created where the child and the researcher could sit face to face. In particular, chairs where the child could sit comfortably were preferred.
- All the items in the test and pictures of the items were shown and the questions were asked to the students. The necessary markings were made by the researcher.

Data Analysis

Pre-pilot and pilot applications were carried out in the research. 114 preschool children participated in the pre-pilot and 127 preschool children participated in the pilot program. Item analysis was applied to the scores of the children from the test to ensure construct validity. First of all, the scores of the children from the SPST were ranked and the lower and upper 27% groups were determined. Subsequently, item analysis was performed and the discrimination indices and difficulty values of the test were calculated. In line with the data obtained, if the item discrimination index is 0.40 and greater, the item is described as very good, if it is between 0.30-0.39, the substance is described as very good, and if it is between 0.20-0.29, the item is considered to be usable in compulsory cases. If it was 0.19 or less, the item was excluded from the test (Tekin, 2010; Turgut, 1992). Reliability analysis was performed with SPSS program. In the developed test, children were asked questions. The children were asked to choose the pictures shown. In this respect, it is similar to multiple-choice tests. One of the ways to calculate the reliability of a test is to calculate the Kuder Richardson (KR-20) coefficient (Heale and Twycross, 2015). KR-20 represents the same alpha test as Cronbach's alpha (Bardhoshi and Erford, 2017). KR-20 is used to measure the internal consistency of multiple-choice tests, while Cronbach's alpha is used on a scale that can be scored from one to five (McMillan, 1992). For this reason, the KR-20 reliability coefficient was calculated in the study.

Results

SPST discrimination indices (d) and difficulty levels (p) values obtained from the pre-pilot application were given in Table 2.

Table 2. SPST difficulty levels (p) and discrimination indices (d) values obtained from pre-pilot implementation

Questions	Groups	Total Score	p	d
1	Upper group	29	0.84	0.13
	Lower group	25		
2	Upper group	31	0.67	0.61
	Lower group	11		
3	Upper group	27	0.79	0.13
	Lower group	22		
4	Upper group	29	0.66	0.54
	Lower group	12		

5	Upper group	31	0.75	0.48
	Lower group	16		
6	Upper group	26	0.61	0.45
	Lower group	12		
7	Upper group	29	0.69	0.48
	Lower group	14		
8	Upper group	21	0.59	0.16
	Lower group	16		
9	Upper group	27	0.67	0.41
	Lower group	14		
10	Upper group	20	0.48	0.32
	Lower group	10		
11	Upper group	24	0.59	0.35
	Lower group	13		
12	Upper group	27	0.5	0.74
	Lower group	4		
13	Upper group	27	0.62	0.48
	Lower group	12		
14	Upper group	28	0.67	0.45
	Lower group	14		
15	Upper group	23	0.38	0.64
	Lower group	3		
16	Upper group	31	0.91	0.29
	Lower group	26		
17	Upper group	23	0.53	0.41
	Lower group	10		
18	Upper group	29	0.62	0.64
	Lower group	9		
19	Upper group	16	0.43	0.16
	Lower group	11		
20	Upper group	31	0.67	0.64
	Lower group	11		
21	Upper group	22	0.24	0.29
	Lower group	12		
22	Upper group	27	0.79	0.1
	Lower group	26		

23	Upper group	16	0.49	0.06
	Lower group	14		
24	Upper group	25	0.64	0.32
	Lower group	15		
25	Upper group	23	0.53	0.41
	Lower group	10		
26	Upper group	16	0.46	0.39
	Lower group	13		
27	Upper group	23	0.51	0.45
	Lower group	9		
28	Upper group	30	0.75	0.41
	Lower group	17		
29	Upper group	22	0.54	0.32
	Lower group	12		
30	Upper group	25	0.61	0.38
	Lower group	13		
31	Upper group	24	0.59	0.35
	Lower group	13		
32	Upper group	24	0.61	0.32
	Lower group	14		
33	Upper group	21	0.5	0.35
	Lower group	10		
34	Upper group	17	0.38	0.32
	Lower group	7		

When Table 2 is examined, there are 16 items with discrimination indices of 0.40 and higher, 10 items with discrimination indices of 0.30-0.39, and 2 items with discrimination indices of 0.20-0.29. There are 6 items (1st, 3rd, 8th, 19th, 22nd and 23rd) with discrimination indices of 0.19 and smaller. These items were excluded from the test. The remaining 28 questions were applied to 127 preschool children and a pilot application was carried out. SPST discrimination indices and difficulty values obtained from the pilot application were given in Table 3.

Table 3. SPST difficulty levels (p) and discrimination indices (d) values obtained from pre-pilot implementation

Questions	Groups	Total Score	p	d
2	Upper group	32	0.66	0.55
	Lower group	13		
4	Upper group	32	0.66	0.55
	Lower group	13		
5	Upper group	30	0.66	0.44

	Lower group	15		
6	Upper group	26	0.6	0.32
	Lower group	15		
7	Upper group	32	0.64	0.58
	Lower group	12		
9	Upper group	22	0.47	0.35
	Lower group	10		
10	Upper group	27	0.51	0.55
	Lower group	8		
11	Upper group	23	0.51	0.32
	Lower group	12		
12	Upper group	25	0.47	0.52
	Lower group	7		
13	Upper group	27	0.6	0.38
	Lower group	14		
14	Upper group	31	0.69	0.44
	Lower group	16		
15	Upper group	27	0.54	0.5
	Lower group	10		
16	Upper group	19	0.50	0.11
	Lower group	15		
17	Upper group	29	0.61	0.47
	Lower group	13		
18	Upper group	33	0.69	0.55
	Lower group	14		
20	Upper group	26	0.54	0.44
	Lower group	11		
21	Upper group	18	0.44	0.17
	Lower group	12		
24	Upper group	23	0.48	0.38
	Lower group	10		
25	Upper group	27	0.51	0.55
	Lower group	8		
26	Upper group	19	0.50	0.11
	Lower group	15		
27	Upper group	27	0.51	0.55

	Lower group	8		
28	Upper group	31	0.73	0.34
	Lower group	19		
29	Upper group	25	0.45	0.55
	Lower group	6		
30	Upper group	28	0.52	0.58
	Lower group	8		
31	Upper group	28	0.61	0.41
	Lower group	14		
32	Upper group	28	0.58	0.47
	Lower group	12		
33	Upper group	24	0.45	0.5
	Lower group	7		
34	Upper group	22	0.41	0.47
	Lower group	6		

When Table 3 is examined, there are 19 items with discrimination indices of 0.40 and higher, 6 items with discrimination indices of 0.30-0.39. There is no substance between 0.20-0.29 values. There are 3 items (16th, 21st and 26th) with discrimination indices of 0.19 and smaller. These items were excluded from the test.

According to the results of the pilot study, the KR-20 reliability coefficient for SPST was calculated as 0.786. According to these findings, the final version of the test was arranged to include 25 items. The relationship between the items in the scientific process skills test and the scientific process skills is given in Table 4.

Table 4. Relationship between the items in the scientific process skills test and the scientific process skills

Scientific Process Skills	**Question Numbers**	**Number of Questions**
Observation	2, 4, 5, 6, 7	5
Classification	9, 10, 11, 32, 34	5
Prediction	17, 18, 20, 31	4
Measurement	12, 13, 14, 15	4
Inference	24, 25, 28, 33	4
Communication	27, 29, 30	3

When Table 4 is examined, there are 5 items regarding observation skills, 5 items regarding classification skills, 4 items related to estimation skills, 4 items related to measurement skills, 4 items related to inference skills and 3 items related to communication skills. The scientific process skill test (SPST) consists of a 25 questions with 3 options. The scientific process skill test (SPST) covers 6 skills. These; observation, classification, estimation, measurement, inference and communication skills. The highest score to take SPST is 25, and the lowest score is 0.

Conclusion and Discussion

This research aimed to develop a valid and reliable scientific process skill test (SPST) for 60-72 months old preschool children. With the scientific process skill test (SPST) developed, it was targeted to measure a total of six scientific process skills: observation, classification, measurement, prediction, inference and communication. When the literature is examined, there are six basic scientific process skills for preschool children. These are observation, communication, classification, measurement, inference, and prediction (Jones et al., 2008; Saracho and Spodek, 2008; Yoon et al., 2015). In this context, it can be said that the skills targeted to be measured in the test content are compatible with the scientific process skills used by children in the preschool period.

In the literature, there are tests developed by following similar steps to this research (Feyzioğlu, et al., 2012; Karslı and Ayas, 2013; Özkan, and Kılıçoğlu, 2020; Şahin et al. 2018). Expert opinion was consulted for the scope validity of the results of the test, and it is a frequently used method in such studies (Feyzioğlu, et al., 2012; Köroğlu et al., 2021; Şahin et al. 2018; Yıldız, et al., 2019). On the other hand, it was determined that some of the studies did not include expert control (Narlı and Baser, 2008; Varış and Cesur, 2012). Scientific process skills are generally used in many basic fields such as science, chemistry, physics, and biology (Yıldırım and Altun, 2015). The questions prepared in this context were presented to the opinion of two academicians who are experts in the field of science education. It was also presented to the opinion of three preschool teachers. In this respect, it can be said that the study offers a deeper perspective for scope validity by consulting the opinions of experts in different fields.

Item analysis was used to ensure the construct validity of the scientific process skills test. In the scientific process skill test (SPST), there are 19 items with discrimination indices of 0.40 and greater, 6 items between 0.30-0.39, and items between 0.20-0.29. Test item discrimination indices are between 0.32-0.58. Test item discrimination indices are between 0.32-0.58. According to Tekin (2010), the item discrimination indices value of the test developed is 0.40 and above, and the discrimination power of the item is high. Between 0.30 and 0.39, it is seen that the substance shows very good substance properties. Therefore, it can be said that the developed test is discrimination.

KR-20 reliability coefficient was calculated for the reliability analysis of the study. The KR-20 reliability coefficient was found to be 0.786. Can (2014) defined the range between $0.60 \leq \alpha < 0.90$ as "highly reliable" in the evaluation of the alpha reliability coefficient. Similarly, according to Büyüköztürk et al. (2018), the KR-20 reliability coefficient above 0.70 indicates that the data collection tool is reliable. Based on this information, it can be said that the test developed is quite reliable.

Within the scope of the research, it can be said that he developed a test in which basic scientific process skills can be measured. Within the scope of this study, preschool children aged 60-72 months were studied. In future studies, younger age groups can be selected as the study group. Valid and reliable tests and scales that can be applied with gamification and digital technological tools can be developed for the preschool period.

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