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Opinions of Mathematics Teachers on Measurement and Evaluation[1]

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ABSTRACT

The purpose of this study is to examine the opinions of mathematics teachers comprehensively about measurement and evaluation. The study was conducted as a case study. The study group consists of 15 volunteer mathematics teachers working in schools in various regions of Turkey in the 2021–2022 academic year. A semi-structured interview method was used to collect research data, and a content analysis technique was used to analyze the data. The results of the study showed that mathematics teachers do not have enough information about the purposes of measurement and evaluation, and they generally think product-oriented. It was determined that teachers mostly use multiple-choice and open-ended questions in written exams and they care most about in-class participation and homework while giving performance grades. Also, it was concluded that the teachers paid attention to one or a few issues in the evaluation of the project assignments and could not complete the evaluation. It was determined that mathematics teachers used traditional measurement and evaluation techniques and did not have adequate knowledge about alternative measurement and evaluation techniques. Based on the results obtained of the study, various suggestions were made to practitioners and researchers.

Matematik Öğretmenlerinin Ölçme ve Değerlendirmeye İlişkin Görüşleri

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ÖZ

Bu araştırmanın amacı matematik öğretmenlerinin matematik derslerinde ölçme ve değerlendirmeye ilişkin görüşlerini kapsamlı bir şekilde incelemektir. Araştırma durum çalışması olarak yürütülmüştür. Araştırmanın çalışma grubunu 2021-2022 eğitim-öğretim yılında Türkiye'nin çeşitli bölgelerindeki okullarda görev yapan 15 gönüllü matematik öğretmeni oluşturmaktadır. Araştırma verilerinin toplanmasında yarı yapılandırılmış görüşme yöntemi kullanılmıştır. Veriler içerik analizi tekniği kullanılarak analiz edilmiştir. Araştırmanın sonuçları matematik öğretmenlerinin ölçme ve değerlendirmenin amaçları konusunda yeterli bilgiye sahip olmadıklarını ve genel olarak ürün odaklı düşündüklerini göstermiştir. Öğretmenlerin yazılı sınavlarda çoğunlukla çoktan seçmeli sorular ve açık uçlu sorular kullandıkları, performans notlarını verirken en çok ders içi katılım durumuna ve ödevlere önem verdikleri belirlenmiştir. Ek olarak öğretmenlerin proje ödevlerini değerlendirirken bir veya birkaç konuya dikkat ettikleri ve değerlendirmeyi tam olarak yapamadıkları sonucuna ulaşılmıştır. Matematik öğretmenlerinin geleneksel ölçme ve değerlendirme tekniklerini kullandıkları, alternatif ölçme ve değerlendirme teknikleri konusunda ise yeterli bilgiye sahip olmadıkları araştırmanın sonuçları arasındadır. Araştırmada ulaşılan sonuçlara dayalı olarak uygulayıcılara ve araştırmacılara çeşitli önerilerde bulunulmuştur.

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INTRODUCTION

Today, education has a very important place. Education is the most effective tool for the development, and progress of nations and for educating people. Therefore, it is difficult to shape the future of a nation without education. The main purpose of education is to create a behavioral change in the person in the desired direction and to reintegrate the person into society (Ertürk, 1982). It is necessary to achieve this goal of education and to determine the behavioral change that occurs in students. Whether the students acquire the desired behaviors or not, and if they do, their level of achievement and direction are determined by the measurement and evaluation process (Bayram, 2011). Education is an interactive process consisting of learning, teaching and measurement-evaluation elements (Özalp & Kaymakcı, 2022). The success of education depends on the efficiency of this process. Measurement and evaluation, which is an important element of education, is very important in determining where students are in terms of developments in line with the specific objectives of the course (Özçelik, 2010) and in determining whether students have gained the expected characteristics of education in the process (Atılgan, 2011) because measurement and evaluation ensure that the decisions made about students' success, guidance, effectiveness of programs, and the teaching process are accurate (Yaşar, 2008). Additionally, accurate assessment and evaluation help teachers make informed instructional decisions and provide targeted support in a timely manner (Black & Wiliam, 1998b; Perrenoud 1998; Ramaprasad, 1983; Sadler, 1989). Therefore, measurement and evaluation are integral parts of the teaching process (Heritage, 2007). In this context, it is very important for both researchers and instructors to understand measurement and evaluation correctly.

Examining the literature, we can encounter different definitions of measurement and evaluation. However, when the common and basic features of measurement definitions are examined, measurement means observing any object or feature and expressing the observation results with numbers or symbols (Turgut, 1986); determining the degree of possession of a quality (Gullo, 2005); and collecting information about the development process (McAfee & Leong, 2012). Evaluation is the process of reaching a value judgment and a conclusion by comparing measurement results with a criterion belonging to the same branch (Yılmaz, 1986). In other words, measurement can be described as collecting information about children's development, learning, and educational activities and making decisions based on this information (McAfee et al., 2004). The subjects of evaluation in education are the success of the student, the goals and behaviors of the program, the effectiveness of the teaching, measurement, and evaluation, and the placement of the students in the appropriate programs (Baykul, 1992). Measurement and evaluation is a feedback mechanism used to learn about student learning and inform stakeholders about the impressiveness of education (Yaman & Karamustafaoğlu, 2011). Also, continuous observation of the education and training process with measurement and evaluation provides the opportunity to identify and correct the problems that occur at every step (MoNE, 2009).

The quality of measurement and evaluation practices in education largely depends on teachers' knowledge, experience, and competencies in this field. Therefore, it is necessary for teachers to have adequate and necessary training in measurement and evaluation and to be able to use this knowledge effectively (Erdemir, 2007). Teachers who can apply this process as desired will have the opportunity to see the capacities of their students and to work on the deficiencies of the teaching process (Birgin & Gürbüz, 2008). Teachers should know the purposes of measurement and evaluation, be able to measure and evaluate as often as necessary and have adequate knowledge about which methods and techniques to use. Besides, teachers are expected not only to be limited to traditional measurement and evaluation methods but also to have knowledge about the alternatives because the constructivist approach strongly affects the measurement and evaluation processes suggested by the curriculum (Fourie & Van Niekerk, 2001). While traditional measurement and evaluation methods are separate from the teaching process and product-oriented, alternative evaluation is process-oriented.

Traditional measurement and evaluation are defined as measuring the learning levels of students

through techniques such as written exams, tests, and oral exams used at all levels of education and making decisions based on the results (Bahar et al., 2006). Examples include multiple-choice tests, true-false, matching and fill-in-the-blank tests, short-answer and long-answer written probes, and oral probes. In traditional evaluation, learning products are mostly evaluated (Genç, 2005), so it is a product-oriented evaluation method. Alternative assessments, on the other hand, take more into account the teaching process and also provide more information about students' success. In addition, it is effective in increasing students' active participation in the lesson and is a type of evaluation that allows them to understand the subjects in detail (Stiggins, 1994; Svinicki, 2004). Alternative (supplementary) evaluation, which takes into account the evaluation of the product along with the process, provides the opportunity to evaluate students' higher-level thinking skills, problem-solving skills, and creativity (Fidan & Sak, 2012). Project and portfolio studies, evaluations with rubrics, concept maps, Vee diagrams, self and peer evaluations, observation, interviews, etc. can be given as examples of alternative evaluation techniques (Genç, 2005). Alternative (supplementary) evaluation is very important in order to evaluate the process as well as the product obtained as a result of education and training because evaluating the student's experiences during the learning process is also very valuable.

Formative evaluation, which is a process-oriented evaluation, can be explained as providing feedback and correction throughout the learning-teaching process (Bloom, 1969; cited by Bennett, 2011). This evaluation can be defined as evaluating student development during teaching, revealing learning deficiencies and needs, providing feedback, and rearranging the teaching appropriately (Ertürk, 1982; Yalaki, 2010). Formative assessment, which does not have the purpose of grading, is carried out at the beginning and throughout the teaching period to support learning and eliminate learning deficiencies (Black & Wiliam, 1998a; Sadler, 1998). Studies have shown that formative assessment positively affects students' learning and motivation (Black & Wiliam, 1998a; Ökten, 2009).

The measurement and evaluation process, which is an important part of the education process, is also very important in mathematics education because mathematics education in the education system has a very important place in industry, technology, and other areas of daily life, even working in the field of mathematics in the training of scientists. The need for mathematics in education and the universality of the language of mathematics are inevitable factors in the development of the information society (Yıldız & Uyanık, 2004). As in the entire education system, measurement and evaluation are of great importance in mathematics education. Since measurement activity and evaluation methods used directly affect the process, it is thought that an effective measurement and evaluation process will increase the quality of teaching (Şimşek et al., 2017). Structuring the learning process by using formative assessment types, especially in mathematics courses where student success is low, can also increase the quality of teaching. There are studies in the literature indicating that formative assessment has positive effects on success, attitude, and remembering what has been learned in mathematics lessons (Tekin 2010b, Tempelaar et al., 2012). In addition, formative assessment contributes to the development of students' metacognitive awareness as it gives them the opportunity to evaluate themselves and monitor their individual development (Jones, 2007). It is also known that metacognitive awareness has a significant effect on mathematics achievement (Schneider & Artelt, 2010).

Assessment, which is an integral part of mathematics teaching, provides deep and qualified learning when integrated into the entire teaching process (Şimşek et al., 2017). Lack of formative evaluation, especially in courses such as mathematics, where prerequisite relationships must be learned, makes it difficult for students who have not acquired the knowledge and skills at the lower levels to acquire the behaviors at the upper levels (Tekin, 2010a). In addition, formative evaluation enables students to reveal their misconceptions (McIntosh, 1997; Wiliam, 1999). By knowing the mathematical concepts that students have intense difficulty with, teachers can determine how to evaluate them and how students who have difficulty should be supported when planning classroom activities (National Council of Teachers of Mathematics [NCTM], 2000). In this context, the importance of formative

assessment in mathematics lessons is quite clear.

Using formative tests in mathematics lessons, how students understand concepts, how they apply rules and formulas, and how they structure solutions can be examined, and mathematical misconceptions that students have can be identified (Mevarech, 1983). As a result of these tests, students are given feedback, additional activities are carried out, and the process can be redesigned in line with the feedback (Tekin, 2010a). Such assessments are used continuously throughout the mathematics learning and teaching process, allowing individual students to be monitored (Baki, 2008). Similarly, Black and Wiliam (2010) emphasized the importance of using short tests frequently. Therefore, in the process of learning and teaching mathematics, formative assessment can be used to identify areas of difficulty in learning, learning deficiencies, and mislearning.

In the literature review, it was seen that there are studies on measurement and evaluation in mathematics. Önel et al. (2020) examined secondary school mathematics teachers' awareness of alternative evaluation methods. In a similar study (Karakuş, 2010), teachers' opinions on measurement and evaluation approaches in the new secondary school mathematics curriculum were examined. On the other hand, Baştürk and Dönmez (2011) examined teacher candidates' knowledge of measurement and evaluation on the subject of limit and continuity. Toptaş (2011) investigated primary school teachers' sense of the use of alternative measurement and evaluation methods in mathematics lessons. It was seen that the limited number of studies on measurement and evaluation in mathematics lessons generally focus on alternative measurement and evaluation methods. The absence of a study that comprehensively examines how measurement and evaluation should be used in mathematics lessons shows the gap in the literature. Mathematics is a course that has always been emphasized from the past to the present and has often taken place as a subject of research. It is a necessity to investigate the measurement and evaluation sides of such an important course.

Purpose of the Research

Measurement and evaluation are critical parts of the education and training process. An educational process without measurement and evaluation is unthinkable. Besides, since mathematics is a cumulative course, it is important that the preliminary acquisitions be fully achieved to learn accurately. For this reason, measurement and evaluation are also important for mathematics in this sense. According to the measurement and evaluation results, it is very important to complete the missing parts and move on to new topics. The aim of this study is to investigate the opinions of mathematics teachers on measurement and evaluation in a comprehensive way. In line with this purpose, an answer to the question “What are the opinions of mathematics teachers about the measurement and evaluation process?” was examined.

METHOD

Research Model

This study, which aims to find out the opinions of mathematics teachers about the measurement and evaluation used in their classes, was conducted as a case study. This model is a research method used to evaluate an event or situation in depth over a certain period. In this method, various data collection tools such as interviews and observations are used to understand, explain and examine the situation in detail (Creswell, 2007). In the study, it was decided that it would be appropriate to structure the research in the case study model since it was aimed at investigating the general opinions of mathematics teachers on the measurement and evaluation they use in their lessons in detail.

Study Group

Convenience sampling was used to determine the research group. This method was preferred for its economy in terms of method, time, money, and labor (Büyüköztürk, 2012). The study group consists of 15 volunteer mathematics teachers working in schools in various regions of Turkey in the 2021–2022

academic year. The demographic structure of the study group and the codes given to the teachers are given in Table 1.

Table 1. *Demographic Characteristics of the Study Group and the Codes Given to the Participants of the Study*

Codes	Gender	Seniority Year	Branch	Education status
$\mathbf{M_1}$	Male	3	S.M.	U.
$\mathbf{M_2}$	Female	6	S.M.	U.
$\mathbf{M_3}$	Female	9	S.M.	P.
$\mathbf{M_4}$	Male	2	S.M.	U.
$\mathbf{M_5}$	Female	5	E.M.	U.
$\mathbf{M_6}$	Male	2	E.M.	P.
$\mathbf{M_7}$	Male	1	E.M.	P.
$\mathbf{M_8}$	Female	4	E.M.	U.
$\mathbf{M_9}$	Female	3	E.M.	U.
$\mathbf{M_{10}}$	Female	2	E.M.	P.
$\mathbf{M_{11}}$	Male	8	S.M.	U.
$\mathbf{M_{12}}$	Male	19	S.M.	U.
$\mathbf{M_{13}}$	Female	15	E.M.	P.
$\mathbf{M_{14}}$	Female	18	E.M.	U.
$\mathbf{M_{15}}$	Male	15	S.M.	P.

Undergraduate: U. Postgraduate: P. Secondary mathematics: S.M. Elementary mathematics: E.M.

The study was conducted with 15 mathematics teachers—eight women and seven men. The participating teachers in the study group were found to have been teaching mathematics for a period ranging from 1 to 19 years. Also, seven of the teachers in the study group teach secondary school mathematics, and eight of them teach elementary school mathematics. Finally, six of the participating teachers received postgraduate education, and nine received undergraduate education. It can be said that the participant teachers showed a homogeneous distribution in terms of the given characteristics. In order to protect the confidentiality of teachers' information, mathematics teachers were coded as M1, M2, M3, ...

Data Collection Tool and Process

Interviewing is a technique that provides in-depth information on a particular topic (Büyüköztürk et.al., 2019). An interview is a two-way communication process designed in the form of asking and answering questions in line with a predetermined purpose (Stewart & Cash, 1985). Interviews can be classified as structured, semi-structured, or unstructured (Türnüklü, 2000). A semi-structured interview method was used to collect the data for the study. In this method, interviews are usually carried out based on an interview form.

Firstly, the literature was reviewed, and an in-depth study was conducted on the interview form. Afterwards, a semi-structured interview form was prepared as a draft by the researchers to be used in the research by taking expert opinions. While preparing the interview form, it was focused on the purposes of measurement and evaluation, how often it is done, question types used, evaluation criteria of project and performance assignments, alternative measurement and evaluation methods, competency and educational status in measurement and evaluation, and measurement and evaluation tools. In order to determine whether the draft interview form is appropriate in terms of scope and clarity, the opinions of two mathematics education experts experienced in measurement and evaluation were taken. The language suitability of the draft form was examined by a linguistics expert. In order to finalize the draft interview form, a final pilot study was done with a mathematics teacher. Finally, an interview form consisting of 10 questions was created. The final version of the form was re-examined by the measurement expert, and approval was obtained.

In semi-structured interviews, questions that are not included in the interview form may also be

asked along with the standard specific questions. Various questions were asked in addition to the 10 questions in the form during the interviews in order to obtain more in-depth information from the participants. Interviews with teachers lasted an average of 50 minutes.

Data Analysis

The content analysis technique was used for the data analysis. This analysis is the categorization of the data obtained and the systematic expression of these categories in smaller structures with coding (Büyüköztürk et al., 2019). For this purpose, firstly, the interviews with the participants were transcribed. After the interviews were transcribed, they were sent to all participants via WhatsApp and e-mail and asked if there was anything they found wrong or missing. None of the participants reported any errors or omissions. Then, the analysis of the data was carried out in four stages as stated in the literature (Yıldırım & Şimşek, 2016). The transcribed texts were read separately by the researchers more than once; important sections of the text were identified, and the researchers made sense of the data. So this is the first stage, which is the coding of the data. The second stage is to find themes according to the common characteristics of the codes found. The third stage is making the determined codes and themes ready for interpretation, and the last stage is the interpretation of the findings. In addition, during the analysis process, all data were coded by two more experts in the field of measurement and evaluation. By examining the similarities and differences in the coding made by different people, the reliability of the coding was evaluated, and themes were created after the final edits. Then, by nature of the content analysis, direct quotations were presented to convey the opinions of the participants. In data presentation, relevance to the theme, clarity, and strikingly different view criteria were taken into account for the selection of direct quotations (Ünver et al., 2010).

Validity and Reliability

Various strategies were used to increase the quality of the research. These strategies are "credibility," "transferability," "consistency," and "confirmability" (Yıldırım & Şimşek, 2016). In order to ensure the credibility of this study, participant confirmation and expert review methods were used. After the interview data were transcribed, these texts were sent to the participants, who were asked to read and give feedback; thus, participant confirmation was provided. Expert opinions were taken in the formation of the data collection tool. In addition, reliability in qualitative research is based on the accuracy of observation (Büyüköztürk et al., 2019). Qualitative research offers the opportunity to obtain rich and in-depth information through interviews, and reliability is very important for accurate results. Fraenkel and Wallen (2009) make some suggestions in order to prevent situations that may reduce reliability. In the interviews conducted in line with these suggestions, the interview period was kept as long as possible in order to make the participants feel comfortable, and the participants chatted for a while about topics other than the research topic before starting the interview. The interviews were recorded both in writing and audio, and the participants were promised that the audio recordings would be used only by the researcher and for this study. In order to ensure the transferability of the study, a detailed descriptive method was used. The detailed description is the transfer of raw data in a rearranged form according to the generated codes and categories, without adding comments to the reader and remaining faithful to the nature of the data (Yıldırım & Şimşek, 2016). In this context, direct citations from the interviews were inclusive. Braun and Clarke (2013) state that, thanks to detailed descriptions supported by direct quotations, the reader can evaluate the potential of applying the research results to different participants. To ensure the consistency of the study, the interviewer conducted the interviews in the same environment and asked the same questions. To ensure the confirmability of the research, the confirmation of a field expert was obtained for the raw data obtained and the conclusions and interpretations made in line with these data. Also, a consensus among the coders was reached for reliability. In the process, the participants were informed about the study, the confidentiality of the participants was ensured, and their consent was obtained for the recording of the interviews.

Ethics Committee Decision

The study was conducted according to ethical principles. The research was conducted within the framework of ethical principles and with the approval of the decision of "Necmettin Erbakan University Social and Human Sciences Scientific Research Ethics Committee" dated 11.11.2022 and numbered 2022/414.

RESULTS

As a result of the content analysis carried out according to the purpose of the study, it was seen that the data obtained from the teachers' opinions were collected under eight themes.

Teachers' Purposes of Measurement and Evaluation in Mathematics Lessons

The results regarding the teachers' purposes of measurement and evaluation in mathematics lessons are presented in Table 2.

Table 2. *Participant Opinions on the Purposes of Measurement and Evaluation in Mathematics Lessons*

Theme	Codes	Participants
Teachers' Purposes of Measurement and Evaluation in Mathematics Lessons	To determine the level of learning of the acquisitions	M_1, M_2, M_4, M_5, M_7, M_{12}, M_{14}, M_{15}
	To determine the level and check readiness	M_3, M_8, M_{10}
	To see deficiencies and misconceptions	M_6, M_9, M_{11}
	To grade	M_{13}

In Table 2, it was seen that half of the participating teachers stated that they performed measurement and evaluation to determine the learning level of the acquisitions. The statements of these teachers are as follows:

"I perform measurement and evaluation to observe the reflections of goals and achievements on students." (M_2)

"I do it to measure the level of the student's learning." (M_7)

"I perform measurement and evaluation to determine the level of learning of the subjects." (M_{12})

The teachers who expressed their opinions under this code stated that the measurement and evaluation they used to determine the level of learning of the acquisitions served this purpose.

There are participant opinions stating that they carried out measurement and evaluation to determine the level and to check the readiness. The statements of these teachers are as follows:

"To determine the level and teach students according to their level" (M_3)

"I perform measurement and evaluation in order to know the levels and subject levels of the students" (M_8)

Three teachers stated that by performing measurement and evaluation at the beginning of the academic year, they determined the levels of the students and taught according to these levels.

There are statements that measurement and evaluation are carried out in order to determine the deficiencies and misconceptions of the students. The statement of the teacher coded M_9, who expressed her opinion in this way, is as follows:

"To see deficiencies and misconceptions of the students." (M_9)

Finally, the teacher with the code M_{13} stated that he performed the measurement and evaluation in order to grade students. The statement of the teacher is as follows:

"I perform the measurement and evaluation to grade students." (M_{13})

Teachers' Measurement and Evaluation Frequency

The results regarding the teachers' frequency of performing measurement and evaluation are presented in Table 3.

Table 3. *Participant Opinions on the Frequency of Measurement and Evaluation*

Theme	Codes	Participants
Teachers' Measurement and Evaluation Frequency	At the end of the unit	M_1, M_3, M_5, M_8, M_{11}, M_{12}, M_{13} M_{14}, M_{15}
	In written exams	M_7, M_{10}
	In every lesson	M_2, M_6
	1 in 15 days	M_4, M_9

In Table 3, it was seen that more than half of the participants stated that they performed measurement and evaluation at the end of each unit. The statements of these teachers are as follows:

"I do it at the end of each unit." (M_1)

"I perform the measurement and evaluation at the end of the unit." (M_5)

The majority of the participants stated that they determined the missing and inaccurate learnings of the unit by using the measurement and evaluation at the end of each unit.

Two of the participating teachers stated that they performed the measurement and evaluation with written exams.

"I perform the measurement and evaluation with the written exams we do during the year. That is two times in one term." (M_{10})

The fact that the measurement and evaluation of a term can be carried out with only two exams in a semester can be considered a concerning result.

While two teachers stated that they performed the measurement and evaluation in each lesson, two teachers stated that they performed the measurement and evaluation once in 15 days. The opinions of these teachers are as follows:

"I do it in every lesson, but I do not always combine measurement tools and evaluation results with visuals and text." (M_2)

"I perform the measurement and evaluation every two weeks." (M_4)

The teacher with the code M_2 stated that she performed the measurement and evaluation in every lesson; however, she did not always do it in written form, but sometimes with verbal questions or with alternative evaluation methods.

Most Used Question Types in Written Exams

The results regarding the question types most frequently used by teachers in written exams are presented in Table 4. Since the answers given by the participants are related to more than one code, the number of frequencies and the number of participants in the tables vary.

Table 4. *Participant Opinions on the Most Used Types of Questions in Written Exams*

Theme	Codes	Participants
Most Used Question Types in Written Exams	Multiple-choice	M_4, M_6, M_7, M_8, M_9, M_{10}, M_{11}, M_{12}, M_{13}, M_{14}, M_{15}
	Open-ended	M_1, M_2, M_3, M_5, M_7, M_8, M_9, M_{10}, M_{14}
	True-False	M_4, M_{12}, M_{13}

When Table 4 was examined, it was seen that teachers mostly use multiple-choice and open-ended

questions in written exams. Also, three teachers stated that they also included true-false questions in their exams in addition to open-ended and multiple-choice questions. Teacher opinions are as follows:

"I generally use an open-ended question style in exams. I think that the mathematics course is more appropriate for measurement and evaluation due to its content. It is easier for me to see what level of skills students have acquired." (M_1)

"Open-ended. Because it allows students to see more clearly where they made mistakes." (M_5)

"To see their open-ended solutions." (M_{14})

Teachers who preferred the open-ended question type stated that the mathematics course was more appropriate due to its structure and they preferred it because it provided the students with the opportunity to see their mistakes.

"I prefer to ask multiple-choice questions together with the optical form to be a preparation for LGS (High School Entrance Exam)." (M_6)

"I use multiple-choice questions for the student to get used to the LGS system." (M_{11})

The teachers who preferred the multiple-choice question type stated that they used this question type in order to prepare their students for the LGS exam.

Two teachers who preferred true-false and multiple-choice questions gave interesting answers.

"Test and true-false. For children to have higher exam grades." (M_4)

"Multiple-choice and true-false. Because there is a possibility that students' fabrications will happen." (M_{13})

M_4 and M_{13} coded teachers stated that they preferred these question types for students to get higher grades. These teachers stated that they work in rural areas and the success level of the students is low, so they prefer such questions in order to get high grades.

Teacher coded M_{12} said that he used all types of multiple-choice, open-ended, true-false questions and he aimed to make the best evaluation by using different question types in measurement. The teacher's statement is as follows:

"Multiple-choice, open-ended, true-false, using different types of measurement to make the best evaluation." (M_{12})

Important Steps in Evaluation of Project Assignments

The results regarding the steps that teachers give importance to in the evaluation of project assignments are presented in Table 5.

Table 5. *Participant Views on the Important Steps in the Evaluation of Project Assignments*

Theme	Codes	Participants
Important Steps in Evaluation of Project Assignments	Time	M_1, M_5, M_8, M_{13}, M_{14}
	Scale	M_2, M_5, M_7, M_{10}, M_{11}
	Originality	M_1, M_2, M_5
	Communication	M_1
	Content	M_3, M_4, M_9, M_{12}, M_{15}
	Attention	M_3, M_5, M_6, M_8, M_9, M_{13}, M_{15}

In Table 5, it was seen that the steps that participant teachers give importance to in the evaluation of project assignments. The majority of the participating teachers mentioned more than one issue that they give importance to. The most common answer was the careful preparation of the assignment.

"I care about the criterion that the homework is carefully prepared." (M_6)

"I value attention." (M_9)

What teachers meant by care are elements such as the beauty of writing, page layout, and the pencil used.

Time and scale were other issues that teachers gave importance to in the evaluation of project assignments.

"I care that homework is delivered on time as a criterion." (M_1)

"I care about homework being delivered on time." (M_5)

"Time is very important. Every month they should show me what they've done. Homework should not be prepared one day before the day they are due." (M_8)

While four of the teachers who give importance to time cared about the fact that the homework should be delivered on time, one of them determined the efficient use of time as a criterion.

"I perform the evaluation using the existing scales." (M_2)

"I apply the project assignment evaluation criteria that I have prepared according to the content of the assignment." (M_7)

Five teachers stated that they used certain scales while evaluating their project assignments. While some of these teachers stated that they prepared the scales according to the content of the homework, some of them stated that they used ready-made evaluation scales.

The answers given by five teachers were gathered under the content code. As a criterion for the evaluation of the homework, these teachers determined whether the student understood the subject of the homework correctly or not. The teachers' opinions are as follows:

"It is important that they understand the subject of the homework." (M_4)

"I give question-solution as homework. The criterion is whether they solve these questions correctly or not." (M_9)

It is an interesting result that the teacher coded M_9 gave question-solution as a project assignment.

Three teachers stated originality and one teacher stated communication as a criterion. The statements of the teachers are as follows:

"I pay attention to originality and communication with me while preparing the project." (M1)

"Originality is an important criterion." (M_2)

A notable result under this theme was that the teachers paid attention to one or a few issues in the evaluation of the project assignments and they could not make the evaluation completely.

Important Steps in Giving Performance Grades

The results regarding the steps that teachers give importance to in giving students' performance grades are presented in Table 6.

Table 6. *Participant Opinions on the Important Steps in Giving Performance Grades*

Theme	Codes	Participants
Important Steps in Giving Performance Grades	In-class interest and participation	M_1, M_3, M_4, M_5, M_6, M_8, M_9, M_{10}, M_{12}, M_{13}, M_{15}
	Homework	M_1, M_5, M_8, M_{12}, M_{15}
	Question answer	M_2, M_{14}
	End-of-unit exams	M_{13}, M_{15}
	Scale	M_7, M_{11}

In Table 6, it was seen that teachers gave the most importance to in-class participation and homework while giving performance grades.

"I give performance grades according to their interest and participation in the course, and to what level they cared about the homework given during the term." (M_1)

"In-class performance, whether or not to do homework. Because students can get excited and forget what they know in the exam. It's important not to think only about exams." (M_8)

The teacher with the code M_8 also emphasized the importance of the performance grade in the answer.

While two teachers stated that they gave performance grades with the question-answer method they used in the lessons, two teachers stated that they gave grades with the end-of-unit exams.

"Good use of time and question-answer traffic at a level that will grasp the size of the acquisition. For students to adopt the acquisitions, they need to perform the transfer well when they encounter a new situation. Based on this, I direct my questions and manage the process." (M_2)

"I give the average of the quizzes I hold at the end of the unit." (M_{13})

Finally, two teachers stated that they gave performance grades using a scale and that it was fair in this way.

"I use scale. Because I think it's fair." (M_{11})

Alternative Evaluation Methods Used

The purpose of the study was to find out the thoughts of mathematics teachers about measurement and evaluation in a comprehensive way, and in this context, questions were asked about alternative evaluation methods. Results related to this theme are presented in Table 7.

Table 7. *Participant Opinions on Alternative Evaluation Methods*

Theme	Codes	Participants
Alternative Evaluation Methods Used	Performance task	M_1, M_2, M_{11}
	Self-Peer evaluation	M_{15}
	Does not use	M_3, M_4, M_5, M_6, M_7, M_{12}, M_{13}
	Does not know	M_8, M_9, M_{10}, M_{14}

It can be said that one of the most valuable results of the research belongs to this theme. Three of the participating teachers stated that they used the performance task and one of them used self-peer evaluation. While seven teachers did not use alternative evaluation methods, four teachers did not know these methods. Statements of the participants are given below.

"I use the performance task. I use performance evaluation for my students to see where they use mathematics in daily life and to adopt the subjects better." (M_1)

The teacher coded M_1 stated that he used the performance task and he used it because it contributed to the student's association with real life and mathematics.

"I have used peer review and self-evaluation on several occasions. Because I want them to experience a sense of responsibility." (M_{15})

The teacher with the code M_{15} stated that he used self-peer evaluation to develop students' sense of responsibility.

"I can't use it because I don't have time." (M_4)

"Unfortunately, I can't use it very often because the student level is not suitable at my school." (M_6)

"Since I am not very used to alternative methods, I do not even think of using them." (M_{13})

Teachers who did not use alternative evaluation methods offered reasons such as time, student level, and not being used to these methods.

Some of the teachers who do not know alternative evaluation methods stated that they do not know these methods, while others stated the traditional measurement and evaluation techniques they use as alternative methods.

"I give tests to students, it becomes practical." (M_8)

"I don't know these methods." (M_{10})

Competency and Educational Status in Measurement and Evaluation

It was investigated whether the teachers felt competent in measurement and evaluation and whether they received any training other than undergraduate education. The results in this regard are presented in Table 8.

Table 8. *Participant's Opinions on Competency and Education in Measurement and Evaluation*

Theme	Category	Codes	Participants
Competency and Educational Status in Measurement and Evaluation	Competency	Competent	M_1, M_{10}, M_{11}, M_{12}, M_{14}
		Incompetent	M_2, M_3, M_4, M_5, M_6, M_7, M_8, M_9, M_{13}, M_{15}
	Educational Status	I received training	M_2, M_6, M_{10}, M_{11}
		I did not receive training	M_1, M_3, M_4, M_5, M_7, M_8, M_9, M_{12}, M_{13}, M_{14}, M_{15}

In Table 8, it was seen that most of the teachers did not feel competent in measurement and evaluation and they did not receive any training on this subject. All of the teachers who shared the same opinion stated that they wanted to receive training on this subject.

"Since I did not receive any training other than the one during my undergraduate education, I do not consider myself very competent in this regard. I would like to receive training because measurement and evaluation are an important part of education." (M_5)

"I do not feel I am competent enough. I did not receive any training. I would like to be more knowledgeable when doing measurements. That's why I want to receive training about it." (M_7)

There are three teachers who did not receive any training other than undergraduate education and who felt competent in this regard. These teachers also stated that they want to receive training on this subject to improve themselves.

"I feel competent. I didn't have any training but I would like to. Because as a teacher, the more competent I am, the better and it helps me to evaluate students' grades and behaviors in a more detailed and healthy way." (M_1)

"Yes, I feel competent. I haven't got any training. I would like to have a training. I would like to learn different measurement topics that can be used in class." (M_{12})

There are opinions of two teachers who both felt competent in measurement and evaluation and stated that they received training on this subject. These teachers also stated that they would like to be trained again.

"I feel competent for now. However, I think it is necessary to be open to new developments. I would like to receive training again even though I have been trained in this subject before." (M_{10})

Finally, there are opinions of two teachers who do not feel competent in this subject even though they have been trained in measurement and evaluation. While one of these teachers stated that he wanted to receive training again, the other teacher stated that he did not want to receive any training.

"I do not feel competent. I think that it is necessary to benefit more from technology and that it should be integrated into the system. There are many problems even in accessing the EBA (official Education Information Network). Information that is accessible in terms of material should become accessible to everyone. Since this is not possible in the current situation, I cannot carry out a rapid measurement and evaluation process that will save the number of students from being disadvantaged. During my post graduate education, I received training on this subject. But I would like to get a training again." (M_2)

The teacher with the code M_2 stated that she thought it was necessary to make more use of technology for measurement and evaluation.

"Yes, I have got the training. I do not feel competent because student level is a very important

criterion and we have to evaluate according to student level. Lower-level students are particularly challenging at this stage. I do not want to receive training again. Because without experiencing it personally during the school period, it does not make a great contribution." (M_6)

The teacher with the code M_6 mentioned that the level of the student is very important in measurement and evaluation, and the difficulties of getting down to the lower level. He is the only teacher who stated that he did not want to receive any training on this subject. Because he thinks that education will not make any contribution without experiencing it in the school environment.

Measurement and Evaluation Tools

In the study, which measurement and evaluation tool the teachers used and which one they found more effective was investigated.

Table 9. *Participant Opinions on Measurement and Evaluation Tools*

Theme	Category	Codes	Participants
Measurement and Evaluation Tools	Effective	Written	M_2, M_3, M_5, M_6, M_7, $M8$, M_9, M_{10}, M_{11}, M_{12}, $M13$, M_{14}, M_{15}
		Oral	M_2, M_4, M_6, M_9, M_{10}, M_{14}
		Homework	M_1, M_2, M_6, M_7, M_9, M_{10}
	Preferred	Written	M_1, M_3, M_4, M_5, M_6, M_7, M_8, M_9, M_{11}, M_{12}, M_{13}, M_{14}, M_{15}
		Oral	M_2, M_6, M_{13}, M_{15}
		Homework	M_5, M_6, M_8, M_{10}, M_{13}, M_{15}

In Table 9, it was determined that teachers preferred written exams, oral exams and homework among measurement and evaluation tools and found them effective. When the participants' opinions were examined, it was determined that the most effective and preferred tool was written.

"I think written exams are more effective. I mostly use written exams and homework." (M_5)

"I find written exams more effective and use them. I think it is more objective and time-effective." (M_{11})

"I think written exams are more effective. I use all written exams, oral exams and homework." (M_{13})

While six teachers found oral exams more effective, six teachers stated that they found the homework more effective. However, some teachers stated that they found all three to be effective separately. The statements of the teachers are as follows:

"Homework is more effective. Because it takes place at a time according to the student's own level and the process is evaluated." (M_1)

"There are areas where they are all effective. For some subjects, an oral exam may be effective, but for a problem that requires a longer time, homework may be effective. It may change depending on the acquisition." (M_2)

"Students express themselves orally the best." (M_4)

"In my opinion, there is no single measurement and evaluation, there may be different situations in which written, oral, and homework are all effective." (M_9)

When the factors in the effectiveness of the homework were examined, it was taken into account that the student was given enough time and the process was evaluated. On the other hand, it was stated that students could express themselves better in the oral exams. Also, it was stated by the teachers that there are areas where not only one but also all of them are effective according to the acquisition and situation.

When the codes related to the most preferred measurement and evaluation tools were examined, four teachers stated that they preferred oral exams and six teachers' homework. Some teachers stated that they use all three. The statements of the teachers are as follows:

"I save time by getting immediate feedback on the oral exam and I can communicate with many more

students at the same time and set the tone in the classroom. Also, direct communication may be more effective in terms of the self-expression of the students." (M_2)

"I prefer homework more because a regular study is important for the student." (M_{10})

"Written exam, oral exam, homework. I can say that I use them all equally. Because they are all effective." (M_6)

There are opinions stating that the oral exam is preferred more in terms of immediate feedback and being able to communicate directly with the student. It was stated that homework was preferred because it allowed the student the opportunity to study regularly.

DISCUSSION, CONCLUSION, RECOMMENDATIONS

In this study, the opinions of mathematics teachers on measurement and evaluation were investigated in detail. Within the scope of the study, firstly, the aims of teachers to perform measurement and evaluation in mathematics lessons were examined. While half of the participating teachers stated that they performed measurement and evaluation to determine the level of learning acquisitions, some participants stated that they performed measurement and evaluation to determine the level and control the readiness. Also, some teachers stated that they performed the measurement and evaluation to determine the deficiencies and misconceptions of the students. A teacher with 15 years of professional experience stated that he performed measurement and evaluation on graded students. In the study conducted by Birgin and Gürbüz (2008) with elementary school teacher candidates, the participants stated that they would do measurement and evaluation to determine the level of obtaining acquisitions, the knowledge level of the students, to direct the teaching and to give grades. Therefore, the results of the two studies are compatible. According to these results, it can be said that mathematics teachers do not have enough knowledge about the purposes of measurement and evaluation. When teachers' opinions were studied, it was seen that they generally thought about the product, and very few teachers gave their opinions on formative evaluation. However, formative evaluation offers important advantages in terms of increasing the quality of teaching, diagnosing and developing student weaknesses and deepening learning (Black & Willam, 1998a; 1998b; Stiggins, 2002).

The frequency of measurement and evaluation by teachers is also within the scope of the study. Most of the teachers stated that they made the measurement and evaluation at the end of each unit. This is a pleasing situation in terms of formative evaluation. Also, some teachers stated that they performed measurement and evaluation only with the written exams held during the year. This situation is quite wrong in terms of measurement and evaluation. Because when the content validity of the two exams held during the semester is considered, it will be very weak in determining the deficiencies of the students. Some teachers stated that they performed the measurement and evaluation every two weeks. Two teachers stated that they performed the measurement and evaluation in every lesson; however, one of them did not always do it in written form, but sometimes with verbal questions or with alternative evaluation methods. It was determined that this teacher used the performance task, which is one of the alternative evaluation methods.

Another subject covered in the research is the types of questions that teachers use most in written exams. It was seen that teachers mostly use multiple-choice and open-ended questions in written exams. This result is the same as the opinions of the teachers who participated in the study by Önel et al. (2020). Also, some teachers stated that they also included true-false questions in their exams in addition to open-ended and multiple-choice questions. Teachers who preferred the open-ended question type stated that the mathematics course was more appropriate due to its structure and they preferred it because it provided the students with the opportunity to see their mistakes. The teachers who preferred the multiple-choice question type stated that they used this question type in order to prepare their students for the LGS (High School Transition System) exam. The answers of two teachers who preferred true-false and multiple-choice questions are interesting. These teachers stated that they preferred multiple-choice and true-false types of questions for students to get higher grades. These teachers stated that they work in rural areas and the success level of the students is low, so they prefer such questions in order to get high grades.

Examining the results regarding the steps that teachers give importance to in the evaluation of project assignments, the majority of the participating teachers mentioned more than one issue to which they attach importance. The most common answer was the careful preparation of the assignment. Time and scale were other issues that teachers gave importance to in the evaluation of project assignments. While four of the teachers who give importance to time cared about the fact that the homework should be delivered on time, one of them determined the efficient use of time as a criterion. This may be because teachers want to develop their students' sense of responsibility. Some teachers stated that they used certain scales while evaluating their project assignments. While some of these teachers stated that they prepared the scales according to the content of the homework, some of them stated that they used ready-made evaluation scales. Along with these, there are teacher opinions that give importance to the content and originality of the assignment. The mathematics teachers who participated in the study by Esen and Güneş (2012) stated that they gave importance to criteria such as time, scale, content, and order when evaluating project assignments. It is consistent with the results of the present study. Another result achieved under this theme is that students are given question-solving as a project assignment. Considering the purpose and functions of the project assignments, it can be said that an assignment in the form of a ready-made question-solution is quite wrong, and because the purpose of the project assignments is to develop students' cognitive, affective, and psychomotor skills such as examining, researching, interpreting, developing opinions, reaching new information, producing and inferring with original thoughts, problem-solving, reading comprehension, and using creativity, and to provide a product at the end of the process (MoNE, 2013). In this context, informative trainings on project assignments can be organized for teachers. Finally, it was understood that the teachers paid attention to one or a few issues in the evaluation of the project assignments and could not complete the evaluation.

Examining the results related to the steps that teachers give importance to in giving students' performance grades, it was seen that they mostly care about in-class participation and homework. Consistent with the results of this study, another study in which homework was used to give in-class participation grades was conducted by Yıldırım (2018). There are teachers who use the question-answer technique in the lessons and give performance grades on a scale because it is fair.

The study aimed to examine the thoughts of mathematics teachers about measurement and evaluation in a comprehensive way, and in this context, questions were asked about alternative evaluation methods. It can be said that one of the most valuable results of the research belongs to this theme. Three of the participating teachers stated that they used the performance task and one of them used self-peer evaluation. While seven teachers did not use alternative evaluation methods, four teachers did not know these methods. It has been determined by various studies (Birgin, 2006; Çakan, 2004; Erdal, 2007; Gözütok, Akgün & Karacaoğlu, 2005; Güven, 2001; Güven & Eskitürk, 2007; Yaşar et al., 2005) that most of the teachers working in Turkey do not have sufficient knowledge about alternative measurement and evaluation techniques. As a result of this study, it was found that teachers generally use traditional measurement and evaluation techniques. This result is compatible with Şimşek's (2011) study results. However, it is difficult because it is not possible to evaluate the students in a multi-dimensional way with traditional measurement and evaluation (Şimşek, 2011). On the other hand, the fact that alternative measurement and evaluation techniques allow for multidirectional evaluation leads to the fact that the abilities of the students are easily understood by the teachers. Therefore, with alternative measurement and evaluation techniques, students can be better known, which makes teachers' work easier (Şimşek, 2009). Teachers should give importance to the use of alternative measurement and evaluation techniques.

The teacher who used the performance task as one of the alternative evaluation methods stated that he used it because it contributed to the student's association with real life and mathematics. Similarly, in a survey applied to 38 people by Sağlam-Arslan, Avcı and İyibil (2008), a significant number of the participants stated that performance tasks are the most effective method that can be used in physics teaching. In his research with history teachers, Karakuş (2020) stated that the most frequently used alternative

measurement-evaluation methods are performance tasks and projects. The teacher, who used self-peer evaluation, stated that he used self-peer evaluation to develop students' sense of responsibility. Teachers who did not use alternative evaluation methods offered reasons such as time, student level, and not being used to these methods. Similar reasons given by teachers who do not use alternative measurement and evaluation methods were also presented by teachers in Şimşek's (2011) study. Some of the teachers who do not know alternative evaluation methods stated that they do not know these methods, while others stated the traditional measurement and evaluation techniques they use as alternative methods. As a result, it was seen that mathematics teachers were not interested in alternative measurement and evaluation approaches and did not use these methods. However, it was seen that the mathematics teachers who participated in the study by Önel et al. (2020) showed a positive approach towards alternative measurement-evaluation methods.

It was investigated whether the teachers felt competent in measurement and evaluation and whether they received any training other than undergraduate education. It was seen that most of the teachers did not feel competent in measurement and evaluation and they did not receive any training on this subject. In the study conducted by Birgin and Gürbüz (2008) with classroom teacher candidates, the majority of teacher candidates stated that they did not feel competent in measurement and evaluation. Therefore, the results of the two studies are compatible. All of the teachers who stated that they did not feel competent said that they wanted to receive training on this subject. In this regard, it can be said that teachers are willing to improve themselves. All but one of the teachers participating in the study stated that they wanted to receive training on this subject. Teachers stated that measurement and evaluation are important parts of education, and they want to improve themselves in this regard. The only teacher who stated that he did not want to receive any training on this subject expressed that by stating that training would not have any contribution without experiencing it in a school environment.

In the study, which measurement and evaluation tool the teachers used and which one they found more effective were investigated. It was determined that teachers preferred written exams, oral exams, and homework among measurement and evaluation tools and found them effective. This result is compatible with the results of Gök and Şahin (2009). Examining the participants' opinions, it was determined that the most effective and preferred tool was writing. There are opinions of teachers who found each of them effective and used them separately, as well as opinions of teachers who stated that they found all three effectives separately. No teacher mentioned alternative techniques as the most preferred or most effective tool. Therefore, with this theme, it was determined again that teachers prefer traditional methods.

Recommendations for research results,

- Empirical observations indicate that educators employ both multiple-choice and open-ended question formats in written examinations. Targeted instructional programs aimed at enhancing teachers' proficiency in utilizing diverse question types could be strategically organized.
- To ensure objectivity in the evaluation of project assignments and giving performance grades, it is recommended to use evaluation scales more effectively and to inform teachers about this issue.
- The findings of the study reveal that mathematics educators exhibit insufficient familiarity with alternative measurement and evaluation methodologies. Consequently, it is recommended that comprehensive integration of these alternative techniques be incorporated into mathematics pedagogical programs and textbooks.
- In addition to the 'measurement and evaluation' course, which has different names in undergraduate programs, a course for 'alternative measurement and evaluation methods' can be opened. In these courses, practical activities should be emphasized in addition to theoretical knowledge.

Recommendations for researchers

- Research on the reasons for not applying the alternative measurement and evaluation techniques should be expanded, and practices should be made to eliminate these reasons.

- The same study can be carried out with more teachers and teachers from different branches in a larger sample group.
- The opinions of mathematics teacher candidates, who are the teachers of the future, on measurement and evaluation can be examined.

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GENİŞLETİLMİŞ ÖZET

Giriş: Ölçme ve değerlendirme eğitim öğretim sürecinin ayrılmaz bir parçasıdır. Ölçme ve değerlendirmenin olmadığı bir eğitim süreci düşünülemez. Eğitim sürecinin önemli bir parçası olan ölçme ve değerlendirme süreci matematik eğitiminde de oldukça önemlidir. Matematik dersi yığmalı bir ders olduğundan öğrenmenin tam olarak gerçekleşebilmesi için ön kazanımların tam olarak elde edilmiş olması önem arz etmektedir. Bu nedenle yapılacak olan ölçme ve değerlendirme de bu anlamda matematik için önem arz etmektedir. Ölçme ve değerlendirme sonucuna göre eksik olan kısımlar tamamlanarak yeni konulara geçilmesi oldukça önemlidir. Bu kapsamda bu araştırmanın amacı matematik öğretmenlerinin ölçme değerlendirmeye ilişkin görüşlerini kapsamlı bir şekilde incelemektir.

Yöntem: Araştırma durum çalışması olarak yürütülmüştür. Araştırmanın çalışma grubunu 2021-2022 eğitim-öğretim yılında Türkiye'nin çeşitli bölgelerindeki okullarda görev yapan 15 gönüllü matematik öğretmeni oluşturmaktadır. Araştırmanın verilerinin toplanmasında yarı yapılandırılmış görüşme yöntemi, verilerin analizinde içerik analizi tekniği kullanılmıştır.

Bulgular ve Tartışma: Araştırma kapsamında ilk olarak öğretmenlerin matematik derslerinde ölçme değerlendirme yapma amaçları incelenmiştir. Kazanımların öğrenilme düzeyini belirlemek, seviye, eksiklik ve kavram yanılgılarını belirlemek, hazırbulunuşluğu kontrol etmek ve not vermek için ölçme değerlendirme yaptığını belirten katılımcı görüşleri mevcuttur. Benzer olarak Birgin ve Gürbüz'ün (2008) sınıf öğretmeni adayları ile yürüttüğü çalışmada öğretmen adayları ölçme değerlendirmeyi kazanımların elde edilme düzeyini belirlemek, öğrencilerin bilgi seviyesini tespit etmek, öğretimi yönlendirmek ve not vermek amacıyla yapacaklarını belirtmişlerdir. Öğretmenlerin görüşleri incelendiğinde genel olarak ürün hakkında düşündükleri ve çok az sayıda öğretmenin biçimlendirici değerlendirme konusunda görüş bildirdiği görülmüştür. Ancak biçimlendirmeye yönelik değerlendirme, öğretimin niteliğinin arttırılması, öğrencinin zayıf yönlerinin teşhis edilip geliştirilmesi ve öğrenmeyi derinleştirmesi açısından önemli avantajlar sunmaktadır (Black ve Willam, 1998a; 1998b; Stiggins, 2002).

Öğretmenlerin ölçme ve değerlendirme sıklığı da çalışmanın kapsamındadır. Öğretmenlerin çoğu ölçme ve değerlendirmeyi her ünite sonunda yaptıklarını belirtmişlerdir. Bu durum biçimlendirici değerlendirme açısından sevindirici bir durumdur. Ayrıca bazı öğretmenler ölçme ve değerlendirmeyi sadece yıl içinde yapılan yazılı sınavlarla yaptıklarını belirtmişlerdir. Bu durum ölçme ve değerlendirme açısından oldukça yanlıştır. Çünkü yarıyıl içinde yapılan iki sınavın kapsam geçerliği dikkate alındığında öğrencilerin eksiklerinin tespit edilmesi oldukça zayıf olacaktır.

Öğretmenlerin yazılı sınavlarda çoğunlukla çoktan seçmeli ve açık uçlu sorular kullandıkları belirlenmiştir. Bu sonuç Önel ve arkadaşlarının (2020) araştırmasına katılan öğretmenlerin görüşleri ile aynıdır. Bunun yanı sıra açık uçlu ve çoktan seçmeli sorulara ilave olarak sınavlarında doğru yanlış türünde sorulara da yer verdiklerini belirten görüşler mevcuttur. Açık uçlu soru türünü tercih eden öğretmenler matematik dersinin yapısı gereği daha uygun olduğunu ve öğrencilerin hatalarını görme imkânı sağladığı için tercih ettiklerini belirtmişlerdir. Çoktan seçmeli soru türünü tercih eden öğretmenler öğrencilerinin LGS sınavına hazırlıklı olması açısından bu soru türünü kullandıklarını belirtmişlerdir. Doğru yanlış ve çoktan seçmeli soru türünü tercih eden iki öğretmenden gelen cevaplar ise dikkat çekicidir. Bu öğretmenler çoktan seçmeli ve doğru yanlış tarzında soru türlerini öğrencilerin daha yüksek not alması için tercih ettiklerini belirtmişlerdir. Bu öğretmenler kırsal bölgede çalıştıklarını ve öğrencilerin başarı düzeylerinin düşük olduğunu ve yüksek not almaları için bu soru türlerini tercih ettiklerini belirtmişlerdir.

Öğretmenlerin proje ödevlerinin değerlendirilmesinde önem verdikleri basamaklara ilişkin bulgular incelendiğinde ödevin özenli hazırlanması, zaman ve ölçek cevapları gelmiştir. Zaman konusunda bahseden öğretmenler ödevin zamanında teslim edilmesi ve zamanın verimli kullanmasını kriter olarak belirlemişlerdir. Bu durum öğretmenlerin öğrencilerinin sorumluluk bilincini geliştirmeyi istemesinden kaynaklı olabilir. Benzer şekilde Esen ve Güneş'in (2012) araştırmasına katılan matematik öğretmenleri proje ödevlerini değerlendirirken zaman, ölçek, içerik ve düzen gibi kriterlere önem verdiklerini belirtmişlerdir. Bu tema altında ulaşılan bir diğer bulgu proje ödevi olarak öğrencilere soru çözümü verilmesidir. Proje ödevlerinin amacı ve işlevleri düşünüldüğünde hazır soru çözümü şeklinde bir ödevin oldukça yanlış olduğu söylenebilir. Çünkü proje ödevlerinin amacı öğrencilerde inceleme, araştırma, yorum yapma, görüş geliştirme, yeni bilgilere ulaşma, özgün düşüncele üretme ve çıkarımda bulunma, problem çözme, okuduğunu anlama, yaratıcılığını kullanma gibi öğrencinin bilişsel, duyuşsal ve psikomotor alandaki becerilerini geliştirmek ve süreç sonunda ürün ortaya koymasını sağlamaktır (MEB, 2003).

Öğretmenlere alternatif değerlendirme yöntemleri ile ilgili sorular yöneltilmiştir. Araştırmanın en değerli bulgularından birinin bu temaya ait olduğu söylenebilir. Katılımcı öğretmenlerin üçü performans görevini, biri öz-akran değerlendirmeyi kullandığını belirtmiştir. Yedi öğretmenin alternatif değerlendirme yöntemlerini kullanmadığı görülürken dört öğretmenin ise bu yöntemleri bilmediği tespit edilmiştir. Türkiye'de görev yapmakta olan çoğu öğretmenin alternatif ölçme ve değerlendirme teknikleri konusunda yeterli bilgi sahibi olmadıkları çeşitli araştırmalarla (Güven, 2001; Çakan, 2004; Gözütok, Akgün ve Karacaoğlu, 2005; Birgin, 2006; Güven ve Eskitürk, 2007) saptanmıştır. Bu araştırma sonucunda

da öğretmenlerin genel olarak geleneksel ölçme ve değerlendirme tekniklerini kullandıkları bulgusuna ulaşılmıştır. Ancak geleneksel ölçme değerlendirme de öğrencilerin çok yönlü değerlendirilmesi mümkün olmadığı için öğrenciyi değerlendirmek zordur (Şimşek, 2011). Buna karşılık alternatif ölçme ve değerlendirme teknikleri; öğrencileri çok yönlü değerlendirmeye fırsat tanıdığı için, öğrencilerin yeteneklerinin öğretmenler tarafından kolaylıkla anlaşılmasına imkân sunar. Dolayısıyla alternatif ölçme değerlendirme teknikleri ile öğrenciler yakından tanınabilmekte, bu durum ise öğretmenlerin işlerini kolaylaştırmaktadır. (Şimşek, 2009).

Öğretmenlerin ölçme değerlendirme araçlarından yazılı, sözlü ve ödevi tercih ettikleri ve bunları etkili buldukları belirlenmiştir. Bu sonuç Gök ve Şahin'in (2009) araştırma sonuçları ile uyumludur. Katılımcı görüşleri incelendiğinde en etkili bulunanın ve en çok tercih edilenin yazılı olduğu belirlenmiştir. En çok tercih edilen veya en etkili bulunan araç olarak alternatif tekniklerden bahseden öğretmen olmamıştır. Dolayısıyla bu tema ile de öğretmenlerin geleneksel yöntemleri tercih ettikleri tekrar tespit edilmiştir.

Son olarak katılımcı öğretmenlerin çoğunluğunun ölçme ve değerlendirme konusunda kendileri yeterli hissetmedikleri ve bu konuda herhangi bir eğitim almadıkları tespit edilmiştir. Kendisini yeterli hissetmediği şeklinde görüş bildiren öğretmenlerin tamamı bu konuda eğitim almak istediklerini belirtmişlerdir. Bu kapsamda öğretmenlerin kendilerini geliştirme noktasında istekli oldukları söylenebilir.

Sonuç ve Öneriler:

Araştırma sonuçlarına yönelik öneriler

• Öğretmenlerin yazılı sınavlarda çoğunlukla çoktan seçmeli ve açık uçlu sorular kullandıkları tespit edilmiştir. Öğretmenlere farklı soru türlerinin kullanımına yönelik bilgilendirme eğitimleri düzenlenebilir.

• Araştırma sonucunda matematik öğretmenlerinin alternatif ölçme ve değerlendirme teknikleri konusunda yeterli bilgiye sahip olmadıkları görülmüştür. Bu bakımdan matematik öğretim programlarında ve matematik ders kitaplarında alternatif tekniklere ilişkin kapsamlı uygulamalara yer verilebilir.

• Lisans programlarında farklı adlarla anılan 'ölçme ve değerlendirme' dersine ek olarak 'alternatif ölçme ve değerlendirme yöntemleri' dersi de açılabilir. Bu derslerde teorik bilgilerin yanı sıra pratik faaliyetlere de ağırlık verilebilir.

Araştırmacılar için öneriler

• Alternatif ölçme ve değerlendirme tekniklerinin uygulanmama nedenlerine ilişkin araştırmalar artırılmalı ve bu nedenlerin ortadan kaldırılmasına yönelik uygulamalar yapılmalıdır.

• Geleceğin öğretmenleri olan matematik öğretmeni adaylarının ölçme ve değerlendirmeye ilişkin görüşleri incelenebilir.