

Teacher Educators' Assessment Approaches in Mathematics Method Courses for Prospective Primary Teachers

Bilge Yılmaz Aslan¹

M. Fatih Özmantar²

Bilge Kuşdemir Kayıran³

To cite this article:

Yılmaz Aslan, B. , Özmantar, M. F. & Kuşdemir Kayıran, B. (2025). Teacher educators' assessment approaches in mathematics method courses for prospective primary teachers. *e-Kafkas Journal of Educational Research*, 12, 557-575. doi:10.30900/kafkasegt.1651843

Research article

Received:05.03.2025

Accepted:28.08.2025

Abstract

This study aims to investigate the assessment practices of teacher educators (TEs) in mathematics methods courses within primary teacher education programs in Türkiye. Utilizing a general survey design, data were collected through a nationwide questionnaire administered to 90 TEs from 71 universities. The data were analyzed using descriptive statistics. The findings indicate a strong preference for traditional forms of assessment, particularly written exams, while performance-based tasks and project evaluations were used to a moderate extent. It was also observed that many TEs develop their own personalized assessment tools, adopting practice-oriented and context-specific approaches. The analysis of assessment practices was structured around three overarching dimensions: the originality of assessment tools, prospective primary teachers' involvement in the assessment process, and quality assurance in implementation. The results reveal that conventional methods still dominate; however, there is an increasing need for diverse and reflective approaches that align with the multifaceted nature of the teaching profession. The study suggests that improving assessment practices can enhance prospective primary teachers' engagement with mathematical concepts and instructional strategies, thereby enriching the quality of teacher education. Overall, the findings contribute to ongoing discussions on assessment in teacher education and underscore the importance of adopting a process-oriented and flexible assessment framework that balances standardization with adaptability.

Keywords: Assessment, teacher educators, mathematics method courses, prospective teachers, teacher education

* This paper was produced from the doctoral thesis titled "Examination of the structuring process of the mathematics teaching course in the primary school teaching program according to the views of teacher educators", written by the first author and completed under the supervision of the second and third authors.

¹  Corresponding Author, bilgeyilmaz@gantep.edu.tr, Department of Mathematics and Science Education, Gaziantep University, Gaziantep, Türkiye

²  Author, Department of Mathematics and Science Education, Gaziantep University, Gaziantep, Türkiye

³  Author, Department of Basic Education, Gaziantep University, Gaziantep, Türkiye

Introduction

Primary education is one of the most critical stages of education in which individuals acquire essential skills and undergo cognitive, affective, and social development (Tong, 2022). During this period, primary school teachers are responsible for delivering instruction across multiple disciplines, including literacy, science, social studies, and mathematics. Given this broad instructional responsibility, it is crucial for prospective primary teachers to develop pedagogical competencies across all subject areas, particularly in mathematics (Twohill et al., 2023; Vesga-Bravo et al., 2022).

Research in teacher education has revealed significant insights into how assessment practices are implemented in higher education institutions worldwide. Studies conducted in countries such as the Netherlands (Schellekens et al., 2023), Ethiopia (Sewagegn, 2019), Norway (Dahlback et al., 2020), the Philippines (Galang et al., 2021), and Australia (Murphy et al., 2017) have emphasized the need for improvement in the originality, student engagement, and quality assurance dimensions of assessment approaches in teacher preparation programs. However, there remains a limited understanding of how teacher educators (TEs) employ assessment practices to support the development of preservice teachers' instructional competencies.

In the context of Türkiye, although there are a number of studies focusing on assessment practices for preservice teachers, there is a noticeable gap in large-scale research that directly examines the assessment approaches used by TEs in mathematics methods courses. Previous studies have shown that preservice teachers are more accustomed to traditional assessment tools (e.g., multiple-choice tests, written exams) and are less exposed to alternative forms of assessment (Demir, 2015). This highlights the need to explore teacher educators' assessment strategies in greater depth to better support the professional development of preservice teachers.

Given the central role of mathematics methods courses in teacher education programs, a nationwide study focusing on these courses was conducted in Türkiye. These courses are designed to help prospective primary teachers learn how to teach fundamental mathematical concepts and to enhance their pedagogical competencies through practice-oriented instruction (Bosica et al., 2021). While the broader study addressed various aspects such as course structure, content delivery, learning environment design, collaborative activities, and research processes, this article specifically focuses on assessment practices.

The main objective of this study is to understand how teacher educators structure assessment processes in mathematics methods courses. The study seeks to answer questions such as: Which assessment tools do TEs use? What criteria guide their selection? To what extent do they involve prospective primary teachers in the assessment process? And how do they integrate assessment with instruction? Accordingly, the study is guided by the following research question: How do teacher educators conduct assessment in mathematics methods courses?

By exploring this question, the study aims to reveal the pedagogical orientations and practices of TEs regarding assessment from a multidimensional perspective. The findings are expected to contribute to the development of a more reflective and high-quality assessment culture within teacher education programs.

Literature Review

This study examines the assessment approaches of teacher educators within the context of the mathematics teaching methods courses they deliver, and how they assess prospective primary teachers. In this study, teacher educators (TEs) refer to educators who teach mathematics teaching methods courses at the undergraduate level, while prospective primary teachers refer to third-year undergraduate students enrolled in these courses. The literature review of the study is structured under three main themes: assessment approaches for prospective primary teachers; the relationship between mathematics teaching methods courses and assessment approaches; and assessment approaches for prospective primary teachers in the Turkish context. These themes provide a comprehensive perspective on assessment approaches in teacher education, aligned with the focus of our study.

Assessment approaches of prospective teachers

In teacher education, the current focus of assessment lies in the realistic and holistic evaluation of prospective primary teachers' knowledge and skills. Initially, with the influence of behaviorist tendencies, the emphasis was on teachers' observable behaviors; however, since the 1970s, the cognitive processes and decision-making dimensions of the teaching profession have increasingly been highlighted. This transformation has necessitated a shift for teacher educators from a culture of testing candidates toward a culture of learning-oriented assessment. Nevertheless, the practical reflection of this historical shift has brought certain challenges. In this context, Gulikers et al. (2008) identified three fundamental challenges in teacher education practices.

First, it is essential to move from traditional and decontextualized tests to performance- and project-based assessments that realistically reflect classroom environments and teaching tasks in the evaluation of teacher candidates. Such workplace-based examination practices help bridge the gap between theoretical knowledge and practice, enabling teacher candidates to develop their professional competencies in a multidimensional way.

Second, candidates' active participation in the assessment process must be ensured. This includes encouraging teacher candidates to collaboratively determine assessment criteria, engage in peer assessment, and provide structured feedback. Such a democratic approach supports candidates' more responsible and active engagement in their learning processes.

Lastly, ensuring quality assurance in assessment processes is imperative. Quality should not be limited to traditional criteria like validity and reliability; it must also encompass transparency, clarity, and the contribution of assessment practices to student learning. However, research conducted among educators reveals that many teacher educators still define assessment quality predominantly within the traditional framework of validity and reliability, while aspects such as transparency and learning impact tend to be overlooked. Therefore, it is of great importance to address these three core elements comprehensively when assessing teacher candidates.

These challenges are not only local but also manifest globally in teacher education. For instance, research conducted in Alberta shows that traditional written exams and multiple-choice tests continue to dominate university-level teacher education, whereas authentic assessment practices remain limited (Rawlasyk, 2018). Yet, it has been demonstrated that authentic assessment methods more effectively support teacher candidates' cognitive, affective, and social development. Indeed, a systematic review by Fox et al. (2023) emphasizes that authentic assessment practices enhance active learning, conceptual achievement, and long-term knowledge retention in teacher candidates, while also strengthening student engagement and social participation.

Similarly, a vocational education-focused study in Norway reported that teacher education courses incorporating workplace-based examinations enabled teacher candidates to integrate both theoretical knowledge and practical skills, thereby developing a broad set of competencies specific to the teaching profession (Dahlback et al., 2020).

All these findings suggest that assessment processes concerning teacher candidates should not be viewed merely as an "exam conducted at the end of instruction," but rather as an integral and continuous component of learning. In this context, effective assessment should be structured within a framework consistent with instruction, supporting candidates' active participation and guiding their development as a dynamic process (Schellekens et al., 2023). In this way, assessment processes become a comprehensive educational tool that reflects not only the candidates' level of knowledge but also their ways of thinking, decision-making competencies, and pedagogical flexibility.

Assessment approaches and mathematics method courses

Mathematics teaching methods courses are among the core courses where prospective primary teachers integrate their mathematical content knowledge with pedagogical content knowledge (PCK) and construct their professional competencies. The assessment practices implemented in these courses should not only measure candidates' level of knowledge but also make visible their abilities to integrate

theoretical knowledge with classroom practices, analyze students' thinking processes, and develop instructional strategies (Hill et al., 2012; Maher & Muir, 2013; Kastberg et al., 2013).

As increasingly emphasized in the literature, assessment should not be treated as a process separate from instruction but rather as a holistic structure that guides and reinforces learning (Gulikers et al., 2008). In this regard, portfolios, performance tasks, self- and peer-assessment are highlighted as multidimensional and contextually sensitive methods. These practices enable teacher candidates to deepen their Mathematical Knowledge for Teaching (MKT) and to monitor their professional development reflectively (Bruna, 2025; Santagata & Lee, 2021).

Moreover, mathematics methods courses provide opportunities for jointly determining assessment criteria, providing structured feedback, and engaging in application-based decision-making processes. This enables candidates not only to analyze their own learning but also to critically evaluate potential teaching approaches. In this respect, these courses cultivate prospective primary teachers as individuals who do not merely observe learning processes but actively participate in, make decisions about, and improve these processes (Deborah et al., 2010; Bosica et al., 2021).

In conclusion, the assessment approaches employed in mathematics teaching methods courses are not merely components of instructional activities but constitute a fundamental learning domain that enhances prospective primary teachers' professional competencies, self-awareness, and instructional decision-making skills. In this context, addressing assessment and instructional processes as complementary, dynamic, and holistic is an indispensable condition for effective teacher education.

Assessment approaches for prospective primary teachers in the Turkish context

Research conducted in Türkiye indicates that preservice teachers still predominantly rely on traditional assessment methods. For example, in the study by Birgin and Gürbüz (2008), it was found that prospective primary teachers assessed student achievement using conventional tools such as written exams, multiple-choice tests, and oral question-and-answer sessions, while their knowledge of alternative methods such as portfolios and performance-based assessments remained limited. Similarly, other studies have reported that candidates tend to prefer traditional/classical assessment tools. In the current educational context, teacher candidates appear inclined to replicate traditional methods in their professional lives, as they feel more competent using these tools. These findings reveal that the traditional understanding of assessment in the Turkish education system has deep roots among teacher candidates.

However, in recent years, awareness of alternative assessment methods has been increasing. Some studies emphasize that teacher candidates are showing interest in process-oriented assessment approaches. For instance, Şaşmaz-Ören et al. (2014) found that candidates preferred complementary assessment tools such as portfolios, performance assessments, concept maps, observations, and concept cartoons. Similarly, in a qualitative study by Şahin and Öztürk (2014), teacher candidates emphasized the importance of process-oriented assessment and stated their intention to use alternative tools such as portfolios, self-assessment, and projects. This trend suggests that candidates perceive a need for assessment approaches that cater to different learning styles and provide a more holistic picture of students' cognitive development.

Teacher candidates' self-efficacy perceptions regarding assessment methods have also been examined in the literature. Sabancı and Yazıcı (2017) revealed that primary teacher candidates generally feel "moderately" prepared. Moreover, a positive relationship was found between candidates' perceptions of the assessment education they received and their perceived competencies; those who took courses on assessment techniques considered themselves more competent. Accordingly, candidates who are introduced to diverse assessment methods during their undergraduate education exhibit higher levels of self-confidence and perceived competency in assessment. Similarly, Yenice et al. (2017) found that primary teacher candidates' self-efficacy beliefs regarding the use of alternative assessment methods were generally "close to good." This suggests that candidates perceive themselves as capable of employing process-oriented tools such as portfolios and projects.

In summary, although traditional methods continue to dominate assessment practices among prospective primary teachers in Türkiye, there is an observable increase in interest and awareness toward process-oriented alternative methods. It has also been observed that as candidates gain exposure to diverse assessment techniques during their education, their knowledge and confidence grow, making them more inclined to use multidimensional tools such as portfolios in their professional careers after graduation.

Overall, while there is a considerable body of research in Türkiye on teacher candidates' assessment preferences and self-efficacy perceptions, these studies primarily highlight the dominance of traditional methods alongside the rising awareness of alternative approaches. However, the literature lacks sufficient exploration of how these diverse assessment approaches are integrated into teacher candidates' pedagogical development, particularly in mathematics teaching methods courses. For instance, how mathematics-specific assessment strategies influence teacher candidates' professional decision-making remains an open question. The unique contribution of this study lies in its examination of both alternative and traditional assessment methods specifically within the context of mathematics teaching in primary teacher education programs in Türkiye. The aim is to address a gap in the literature by providing an in-depth analysis of candidates' assessment approaches both in general and specifically in the context of mathematics education.

Method

This study was designed using the general survey model within the framework of the quantitative research approach. The general survey model is a type of research that aims to describe the current state of a particular subject as it is by collecting data from a large group of participants (Karasar, 2009). The primary reason for selecting this model was to reveal the current state of assessment and evaluation approaches employed by teacher educators in mathematics teaching methods courses within primary teacher education programs in Türkiye and to provide a topographical overview in this context.

This article is derived from a broader study conducted through a mixed-method survey that included both open-ended and closed-ended questions. The developed survey was designed to gain a detailed understanding of the various dimensions of mathematics teaching methods courses delivered by teacher educators (TEs). However, in this article, only the "assessment and evaluation" dimension of the survey was addressed, and the practices of teacher educators in primary teacher education programs across Türkiye regarding this dimension were analyzed.

The study sample was determined using the purposeful sampling method. Purposeful sampling ensures the deliberate selection of individuals who are the most appropriate sources of information for the research objective (Büyüköztürk et al., 2015). Accordingly, the sample consisted solely of teacher educators who teach mathematics teaching methods courses. This strategy ensured direct access to the target population, thereby enhancing the relevance and significance of the findings.

This section provides detailed information about the survey method used for data collection and the teacher educators who participated in the study. However, before presenting these details, a brief explanation is provided regarding the structure and implementation of mathematics teaching methods courses in primary teacher education programs in Türkiye to establish the context of the study.

Context of the study: Mathematics method courses in primary teacher education programs in Türkiye

The study is set within the framework of primary teacher education programs in Türkiye, specifically focusing on mathematics method courses. In Türkiye, primary teacher education is a four-year undergraduate program, structured into two semesters each academic year – fall and spring. Teacher candidates undergo a comprehensive curriculum totaling 240 ECTS credits over these four years. These teacher education programs are centrally regulated by the Higher Education Council within a standardized framework. The curriculum for primary teacher education is divided into three core areas: general culture, subject matter education, and professional education courses. The assessment of teacher candidates is conducted in accordance with the academic regulations of their respective universities. Generally, it is expected that each course includes at least two evaluations per semester (Kilimci, 2006).

The mathematics method courses within the primary teacher education programs are conducted over two semesters. The first semester course, “Mathematics Teaching 1,” focuses on the foundational aspects of mathematics teaching. This includes the objectives and principles of mathematics instruction, the history of mathematics education both globally and in Türkiye, and the strategies for teaching and learning mathematics. It also delves into the primary school mathematics curriculum, discussing its scope, objectives, and key learning theories that inform mathematics education. Additionally, the course covers essential mathematical skills like problem-solving, reasoning, and the use of information technologies in mathematics teaching, along with the development of number sense in children.

The second semester course, “Mathematics Teaching 2,” builds on these foundations and explores more specific content areas such as fractions, decimal fractions, geometry, and measurement. It addresses the pedagogical challenges in teaching these topics, the developmental understanding of these concepts in children, and practical aspects like classroom activities and exercises. Also included are discussions on assessment and evaluation in mathematics education, emphasizing multiple methods and techniques suited to primary education.

The data collection tool

In this study, the data collection tool was a multi-dimensional survey form developed by the researcher as part of a doctoral dissertation. The survey was designed to understand the instructional design approaches and structuring of mathematics teaching method courses delivered by teacher educators in primary education programs. The survey was constructed based on an extensive literature review and a conceptual framework, aiming to collect data across multiple dimensions regarding the instructional practices of teacher educators. However, in this article, only the “assessment and evaluation” dimension of the survey was utilized, and the analyses were conducted based on the data collected from this dimension.

The development process of the data collection tool involved several steps. First, a comprehensive literature review was conducted to identify relevant concepts and focus areas, and a concept map was created accordingly. Survey items were drafted based on this conceptual structure. The draft survey was then reviewed by two dissertation advisors—one specialized in mathematics education and the other in curriculum and instruction—and by two independent mathematics education experts to ensure content validity. Additionally, a curriculum development expert from a different university assessed the items for representativeness and clarity. The language of the survey was also reviewed by a language expert to ensure linguistic clarity and precision. To test the applicability of the survey, a pilot study was conducted, and based on the feedback obtained, necessary revisions were made to finalize the instrument.

The assessment and evaluation dimension of the survey consists of four main questions designed to reveal the diversity of assessment methods used by teacher educators and the ways in which these tools are implemented:

The first question focuses on how prospective primary teachers’ progress is assessed. Participants were asked to indicate the frequency with which they used various assessment methods such as written exams, oral exams, performance assessments, project evaluations, and portfolios. They were also given the opportunity to specify and explain any other methods they used, such as designing mathematical problems or preparing lesson plans specific to mathematics teaching. Responses were recorded on a four-point Likert scale ranging from ‘never’ to ‘always’.

The second question aimed to identify the alternative assessment methods used by teacher educators beyond standard techniques to evaluate teacher candidates’ success in method courses. Participants were asked whether they employed approaches such as student presentations, report writing, class participation, attendance, microteaching practices, and direct observations in real classroom settings. This was structured as a binary response option (‘yes’ or ‘no’), with an open-ended space for participants to mention any other methods they employed.

The third question explored the specific assessment tools used by teacher educators to measure whether teacher candidates achieved the learning objectives of the courses. Participants were provided with a list of tools, including open-ended questions, fill-in-the-blank (short answer) questions, matching activities,

true/false items, multiple-choice tests, rubrics, structured grids, diagnostic branching trees, and concept maps. They were asked to indicate the frequency of using each tool on a scale ranging from ‘never’ to ‘always’. An open-ended option was also included for participants to list any additional tools they used.

The fourth question investigated how teacher educators acquired the assessment tools they used in their courses. Participants were asked to specify for each tool whether they used ready-made materials, developed the tools themselves, or adapted existing tools to meet their needs. The survey design allowed participants to skip items for tools they did not use, ensuring that the data reflected actual practices. Participants were also invited to describe any other tools they utilized and how they sourced them. This question aimed to reveal the extent to which teacher educators customized or adapted their assessment tools.

Through this comprehensive structure, the survey captured detailed information on the variety, frequency, and acquisition methods of assessment tools employed by teacher educators in mathematics teaching method courses. The content validity and clarity of the instrument were ensured through expert reviews, and its applicability was verified through a pilot study, making it ready for data collection.

The sample and data collection procedure

In our research, the process of defining the sample was carefully planned to encompass a comprehensive range of TEs involved in primary teacher education programs in Türkiye. The primary target group for our study consisted of all TEs working in higher education institutions who were actively engaged in delivering method courses. To accurately identify our target group, we first determined all universities and education faculties in Türkiye that offered a primary teacher education license program. This initial step was crucial in narrowing down the pool of potential participants. Following this, the web pages of these primary teacher education programs were thoroughly scrutinized. During this scrutiny, we identified academic staff responsible for conducting the courses. Their email addresses were then gathered for further communication. To ensure the accuracy and currency of the information obtained, we cross-referenced our findings with the national academic database of the Higher Education Council (<https://akademik.yok.gov.tr>).

As of 2020, the year when our data collection was performed, we identified 90 TEs across 71 universities (69 public and 2 private) in Türkiye, who were responsible for the delivery of method courses. We initiated the data collection procedure by establishing communication with the 90 TEs we had identified. Each TE was contacted via email, where they were provided with detailed information about the research, its objectives, and the nature of their participation. Along with this initial contact, we sent our survey as an attachment, inviting their participation in our study. To enhance response rates and ensure adequate follow-up, we employed a systematic reminder strategy. After the initial survey distribution, we sent out reminder emails at two-week intervals. This reminder process was repeated three times to maximize engagement and response rates. This strategy resulted in 73 TEs responding to our emails. Among these, 65 TEs completed the survey in its entirety. The remaining 8 respondents expressed their inability to participate in the survey, citing reasons such as being new to the field or still in the process of familiarizing themselves with the relevant teaching methods. Consequently, the final sample size for our study consisted of 65 TEs (which represents 72% of the entire population), whose complete responses formed the basis of our data set. This high participation rate underscores the representativeness and comprehensiveness of our sample.

To further ensure the representativeness of our sample, we employed additional measures by examining the distribution of participants across two key variables: academic rank and gender. These variables were selected as they were the only available features from the national academic database that could provide us with a meaningful comparison to the wider population of TEs in Türkiye. This analysis was crucial to ascertain that our sample was not biased towards any particular academic rank or gender. The distribution of our participants across these variables is presented in Table 1.

Table 1.
Distribution of Participants and Population by Gender and Academic Rank

Academic Rank	Male			Female			Total		
	Part. n	Pop. N	% (n/N)	Part. n	Pop. N	% (n/N)	Part. n	Pop. N	% (n/N)
Professor (with PhD)	6	8	75	3	3	100	9	11	81.8
Associated professor (with PhD)	7	14	50	6	8	75	13	22	59.09
Assistant professor (with PhD)	21	27	77.78	19	25	76	40	52	76.92
Dr (PhD)	0	1	0	3	4	75	3	5	60
Total	34	50	68	31	40	77.5	65	90	72.22

At the professorial level (including both full and associate professors), we observe high representativeness, with the sample capturing 75% of male professors and 100% of female professors in the population. This is particularly noteworthy for female professors, where our sample perfectly reflects the population. Associate professors have a slightly lower representativeness for males at 50% but a robust 75% for females. For assistant professors, the sample is highly representative, with 77.78% of males and 76% of females from the population being included. The category of 'Dr. (PhD)' without a professorial rank shows a divergence, with no male representation in our sample compared to the population and a 75% representation for females. However, this category has the smallest N values, which suggests that the impact of this discrepancy on the overall representativeness is limited.

Overall, the total participant representation is 68% for males and 77.5% for females, with a combined representativeness of 72.22%. This indicates a strong and balanced representation across both gender and academic ranks, with the sample including a substantial proportion of the TE population across these dimensions. The data from Table 1 suggests that our sample has a robust ability to represent the population of TEs in terms of gender and academic ranking.

Data analysis

During the data analysis phase, we employed descriptive statistical analysis to examine the distribution of responses for each item in our survey. For the first question about various assessment types, frequency distribution involved calculating the real counts of participants who selected each frequency option ('never', 'occasionally', 'often', 'always') for each assessment type. If TEs mentioned other methods in the open-ended part of the question, these responses were categorized and included in the frequency count to ensure a complete analysis of all assessment types utilized.

In the second question, which was binary ('yes' or 'no'), we calculated the number of TEs employing each listed evaluative approach. For those who indicated 'yes', we further analyzed the frequency of use as indicated in their response to the first question. For 'no' responses, we simply recorded the absence of these methods in TE approaches.

For the third question, which also utilized a frequency scale, we replicated the analysis method used for the first question. We noted the actual counts of TEs using each listed assessment tool and the frequency of their use. We aggregated the frequencies to reflect the overall prevalence and patterns of use for each assessment tool across the sample.

For the fourth question, which concerned the sourcing of assessment tools, we not only calculated how often TEs used each type of assessment tool but also how they sourced them: whether they used ready-made tools, developed their own, or adapted existing ones. Here, the analysis was tripartite for each tool—looking at the proportions of 'ready-made', 'self-prepared', and 'adapted'—and any additional tools mentioned were individually analyzed for sourcing patterns. In all cases, the frequency distribution provided a quantitative measure of the prevalence of each assessment method and tool among the TEs in our study.

Findings

In this section, we present an examination of the current assessment approaches among TEs in Türkiye. Our findings are organized under four distinct headings: (1) preferred assessment methods, (2) frequency of alternative assessment usage, (3) diversity and prevalence of assessment tools, and (4) sourcing of assessment tools. Under each heading, we will share the trends and patterns that have emerged from our data.

Preferred assessment methods

The survey results indicate notable variations in the assessment approaches employed by TEs. As shown in Figure 1, written exams are the most frequently used assessment method, with 42 TEs (65%) reporting that they ‘always’ use them. In stark contrast, oral examinations are rarely utilized, as 54 TEs (83%) stated that they ‘never’ incorporate them into their assessment practices. This significant discrepancy highlights a strong preference for traditional written assessments over oral evaluations in method courses. Performance and project evaluations are implemented with moderate frequency. The most commonly selected responses for these methods are ‘often’ and ‘occasionally,’ indicating their intermittent use. Specifically, 22 TEs (34%) reported using performance evaluations ‘often.’ Project evaluations, while slightly less prevalent than performance assessments, still maintain a considerable level of adoption, with 13 TEs (20%) indicating that they ‘always’ employ this approach. The use of portfolios presents an interesting pattern. A large proportion of educators (48 TEs, 74%) reported that they ‘never’ use portfolios in their assessment practices. However, a smaller subset (7 TEs, 11%) indicated that they ‘always’ utilize portfolios, suggesting that while portfolios are not widely adopted, a select group of educators consider them an essential component of their assessment strategy.

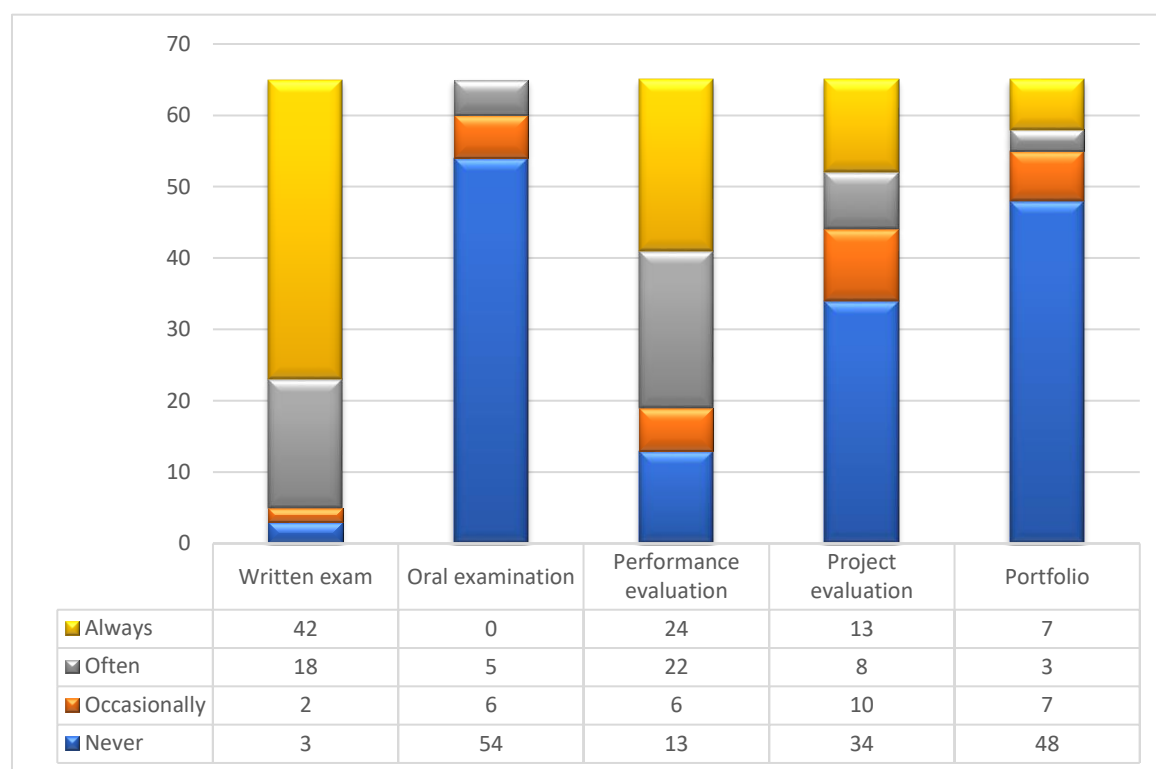


Figure 1. Frequency Distribution of Assessment Methods

Frequency of Alternative Assessment Usage

Figure 2 illustrates the frequency with which TEs integrate alternative assessment methods into their courses. The findings indicate a strong preference for presentations and class participation, with 41 TEs (63%) and 38 TEs (58%), respectively, incorporating these methods into their assessment strategies. Notably, class participation plays a dual role, both as an engagement tool and as a means of evaluating teacher candidates' performance. Class attendance and microteaching are also utilized as assessment

measures, though with slight differences in preference. Class attendance is employed by 27 TEs (42%), whereas microteaching is slightly more favored, with 29 TEs (45%) incorporating it into their evaluation practices. Report writing emerges as another commonly used assessment method, with 26 TEs (40%) considering it a key component of their evaluation strategies. This aligns with the usage patterns observed for microteaching and class attendance, suggesting that these methods collectively contribute to a diversified assessment approach. Interestingly, observation in real classroom settings is used less frequently, with only 8 TEs (12%) incorporating it into their assessment framework. This limited adoption of observation as an evaluation tool may indicate challenges in its implementation within teacher education programs.

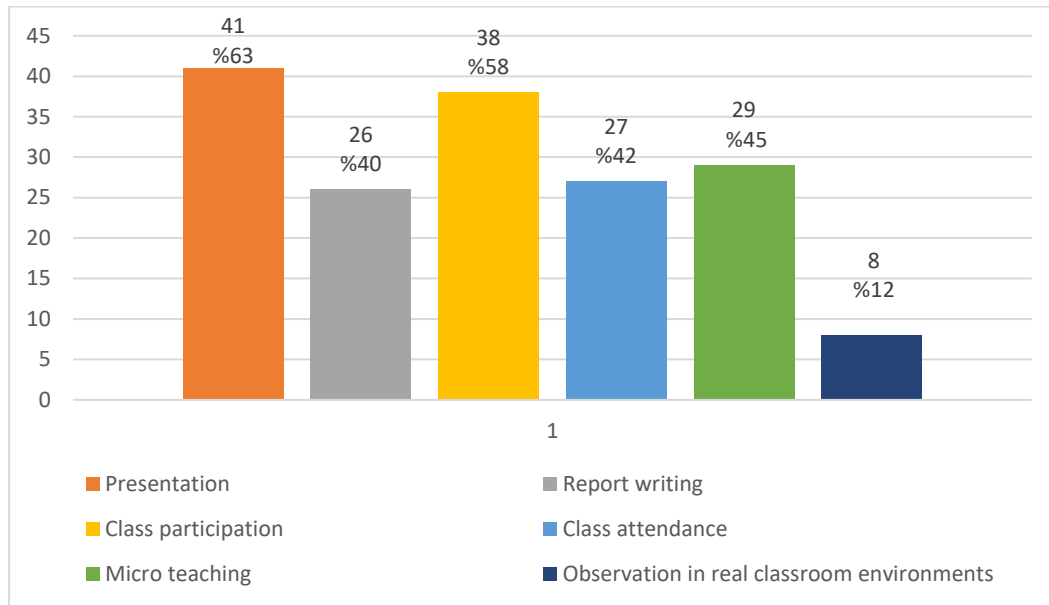


Figure 2. Utilization of Alternative Assessment Methods

Assessment Tool Diversity and Prevalence

Figure 3 presents the preferred assessment tools used by TEs, as identified in the survey. The findings indicate that open-ended questions are the most favored assessment tool, with 35 TEs (54%) using them ‘always’ and an additional 20 TEs (31%) employing them ‘often.’ In contrast, gap-filling exercises and matching items are significantly less utilized. A considerable number of educators, 34 TEs (52%) and 48 TEs (74%) respectively, reported ‘never’ incorporating these methods into their assessments. True/false questions and multiple-choice items exhibit a notable divergence in usage. While some educators employ them ‘often’ or ‘occasionally,’ a substantial proportion avoids them entirely. Specifically, 48 TEs (74%) reported ‘never’ using true/false questions, while 30 TEs (46%) indicated the same for multiple-choice items. The usage patterns of rubrics, structured grids, and concept maps vary. Rubrics are employed ‘always’ by 11 TEs (17%), yet structured grids and concept maps are seldom or never utilized by the majority of educators. The least used assessment tools are structured grids and branched trees. An overwhelming majority of educators, 62 TEs (95%) and 63 TEs (97%), respectively, stated that they ‘never’ use these methods. This suggests that while some assessment tools remain widely accepted, others are rarely integrated into teacher education programs.

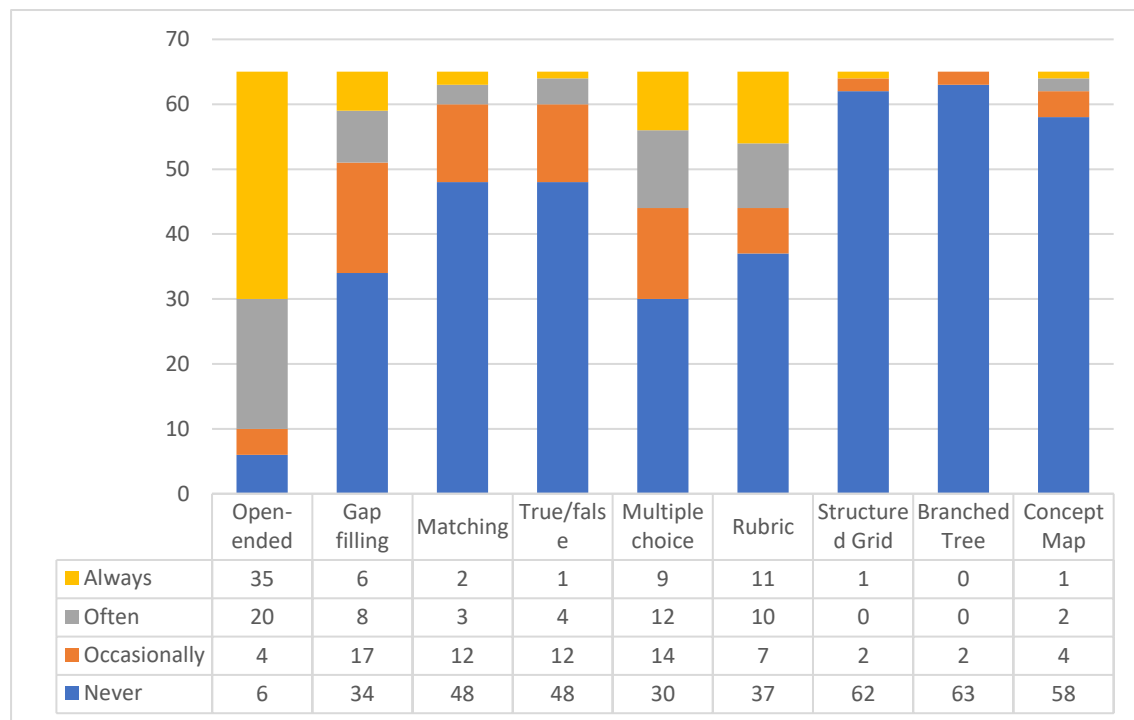


Figure 3. Distribution of Assessment Tool Usage

Sourcing of Assessment Tools

Figure 4 examines the origins of assessment tools used by TEs, providing insights into whether these tools are self-prepared, ready-made, adapted from existing sources, or a combination of these approaches. The most prominent finding is the strong preference for self-prepared open-ended questions, with 54 TEs (83%) indicating that they create these questions themselves. This highlights a tendency towards customization in assessment design, as opposed to relying on ready-made tools, which are used sparingly across all assessment types. Gap-filling exercises and matching items also exhibit a preference for self-preparation, with 29 TEs (45%) and 16 TEs (25%), respectively, reporting that they develop these tools themselves. In addition, a considerable number of TEs indicated that they adapt existing multiple-choice questions and rubrics, suggesting an effort to tailor these tools to better align with course-specific needs. The sourcing of true/false questions appears to be more balanced, with educators almost equally divided between preparing them independently and using or adapting ready-made versions. This suggests that while customization is preferred, ready-made true/false questions are still considered useful in certain contexts. For more complex assessment tools, such as structured grids and branched trees, the low usage rates across all sourcing methods indicate a lack of engagement with these tools. This could be attributed to their complexity or limited perceived effectiveness in teacher education. Although concept maps are not widely used, those who incorporate them tend to either prepare them independently or adapt existing versions. This suggests that TEs recognize the potential of concept maps as valuable tools for assessing students' understanding in a more interconnected and holistic manner.

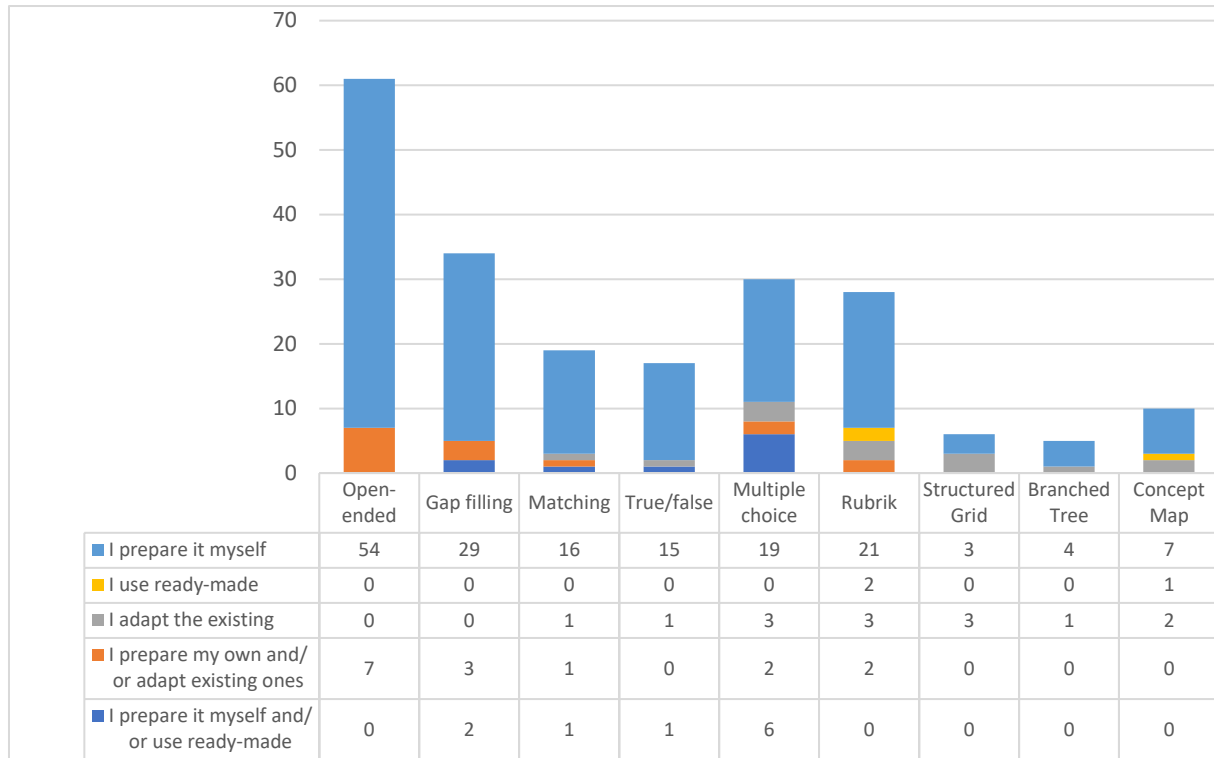


Figure 4. Sourcing of Assessment Tools

Discussion, Conclusion, and Suggestions

The exploration of assessment approaches in mathematics method courses presents a complex picture of current trends and the necessary shifts to align with research based educational advancements. The fundamental role of these courses in developing prospective teachers is widely acknowledged by scholars such as Deborah (2010), who emphasize the crucial intersection of subject knowledge with pedagogical approaches. Yet, there is a discernible disconnect between these established educational imperatives and the findings from our study regarding the assessment approaches of TEs.

In our discussion, we contextualize our findings within the framework of the three challenges proposed by Gulikers (2008). This perspective offers a comprehensive lens through which to analyze and interpret the assessment approaches of TEs in mathematics method courses. By examining these challenges, we aim to unravel the complexities and nuances of current assessment approaches and their alignment with the evolving needs of prospective primary teachers. The first challenge by Gulikers highlights the need for a transition from de-contextualized tests to authentic assessments. Our data, revealing a predominant use of written exams by 42 TEs who 'always' utilize them and an additional 18 often doing so, indicates a strong adherence to traditional methods. Additionally, the combined usage of short answer types such as gap-filling by 14 TEs (6 'always' and 8 'often'), matching by 5 TEs (2 'always' and 3 'often'), true/false by 5 TEs (1 'always' and 4 'often'), and multiple-choice by 21 TEs (9 'always' and 12 'often') demonstrates a significant inclination toward an assessment that requires mainly recall of information (Karakuş & Kösa, 2009; Yıldız & Uyanık, 2004).

These preferences among TEs suggest an ongoing reliance on traditional assessment methods that may not fully capture the authentic and contextual relevance necessary in contemporary teacher education. Our findings echo those of Rawlasyk (2018), who observed a limited implementation of authentic tasks in educational settings. This gap potentially hinders the active engagement and learning enhancement of teachers candidates, as TEs may not be fully leveraging the potential of more authentic, experiential assessment forms. The notable absence of portfolios, a tool typically linked with self-reflection and ongoing feedback (Farahian & Avarzamani, 2018; Simpson, 2016) in the approaches of a significant number of educators (48 TEs never using them) further underscores this issue. The underutilization of such tools indicates a potential missed opportunity for deeper learner involvement in the assessment process, which is crucial for fostering a more comprehensive and reflective learning experience.

The observed assessment approaches among TEs, heavily favoring traditional methods, appear incongruent with Gulikers' (2008) conceptualization of assessment as a dynamic instrument for learning and growth. This reliance on conventional assessments predominantly gauges content knowledge, potentially overlooking the development of critical and reflective thinking in teacher candidates. As Tigelaar and Tartwijk (2010) emphasize, teaching is a multifaceted activity that requires teachers to not only possess subject knowledge but also actively construct their understanding and adapt to evolving classroom dynamics. The predominance of traditional assessment forms might inadequately address these broader aspects of teacher competency. Therefore, our findings suggest a need for reevaluating current approaches to more effectively cultivate these vital competencies in future educators. Such a shift would align more closely with the contemporary demands of teacher education, focusing on developing a skill set that transcends mere content recall and moves towards fostering deeper cognitive and reflective capacities in teacher candidates.

The presence of a subset of TEs who incorporate more authentic forms of assessment, as indicated by the usage of project evaluation (13 TEs always, 8 often), portfolios (7 always, 3 often), microteaching (29 TEs use), and real classroom observations (8 TEs), sheds light on an emerging trend towards authenticity in evaluation. However, the simultaneous use of traditional methods like written exams by some within this group suggests a complex interplay of assessment strategies. This scenario is indicative of a struggle among TEs to fully embrace authentic assessment methods. Despite recognizing the value of such approaches, there seems to be a hesitance to depart entirely from traditional methods. The co-existence of traditional and authentic assessments in their approaches might reflect an ongoing transition phase, where TEs are gradually exploring and adapting to more contextual and experiential forms of evaluation. The persistence in utilizing conventional methods, however, might stem from factors such as established institutional norms, the ease of administering traditional exams, or their perceived objectivity (Bunderson et al., 1988; Başol et al., 2013).

In addressing Gulikers' (2008) second challenge on enhancing teachers candidates' involvement in the assessment process, our study reveals a multi-faceted scenario. The dominant use of traditional exams by a majority of TEs (60 out of 65 TEs using them 'often' or 'always') points to a prevailing comfort with teacher-centered assessment methods. Simultaneously, our findings indicate an emerging interest in more participatory strategies, as evidenced by the use of project evaluations (employed 'often' or 'always' by 21 TEs), prospective primary teachers presentations (used by 41 out of 65 TEs), and report writing (used by 26 out of 65 TEs). These methods, which require a certain level of prospective primary teachers involvement, suggest an inclination towards integrating teacher candidates-centric approaches alongside traditional assessments.

A significant trend observed among TEs is the preference for self-developed assessment tools, particularly open-ended questions, favored by 54 TEs. This approach implies an effort by TEs to customize assessments to fit their specific instructional objectives and the unique requirements of their courses. However, the extent to which these self-crafted tools promote prospective primary teachers involvement in the assessment process remains questionable.

Rubrics offer significant opportunities to inform teacher candidates about the evaluation process and to encourage development based on performance indicators (Brookhart & Chen, 2015; Dickinson & Adams, 2017; Muhammad et al., 2018; Camarata & Slieman, 2020). However, our study reveals that 37 TEs reported 'never' using rubrics, suggesting a missed opportunity to involve teacher candidates more actively in the evaluation process. Rubrics can be instrumental in clarifying expectations and guiding student learning, yet their underuse suggests that teacher candidates may not be receiving the full benefits of structured feedback and self-assessment. Additionally, Lorente and Kirk's (2013) critique of traditional assessment processes resonates with our observation of limited use of student-involved methods like portfolios, projects, and microteachings. Our findings indicate that 48 TEs 'never' use portfolios, 34 'never' use projects, and only 44.6% employ microteaching in their approaches. These methods are essential for promoting student engagement and align with a pedagogical approach grounded in democratic principles and shared responsibility in the learning process (He & Qi, 2022). The infrequent use of portfolios, projects, and microteachings, which are conducive to self- and peer-assessment, points to a disconnect between the ideals of teacher candidates-centered assessments and

the current approaches of TEs. This is especially concerning in light of Rawlusk's (2018) findings, which suggest that traditional exams may hinder student learning and engagement.

These observations are indicative of the need for TEs to reassess and evolve their current assessment strategies, highlighting the importance of transitioning from traditional, teacher-centered methods to more student-involved approaches. While there seems to be a recognition of the value of student-involved assessments among TEs, the actual integration of these methods into approach is still wanting. Encouraging TEs to adopt and implement diverse assessment methods, such as rubrics, portfolios, and microteaching, is essential for creating a more inclusive, participatory, and dynamic learning environment. This transition is not only about diversifying assessment methods but also about fostering a more inclusive and participatory learning environment that actively engages teacher candidates in their own assessment and learning processes.

The third challenge, as outlined by Gulikers (2008), centers on the quality criteria in teacher assessment, a crucial aspect that our study aims to address. Schellekens et al. (2023) contribute to this discourse, emphasizing the shift towards an 'assessment for learning' culture. This approach transcends traditional norms of validity and reliability, focusing instead on transparency and learning impact. Our findings that TEs predominantly create their own assessment tools, often without substantial input from teacher candidates, echoes the need for transparency as highlighted by Schellekens et al. The lack of student involvement in tool development may lead to a limited understanding of quality assessment approaches among future teachers. Furthermore, this preference for self-preparation of tools risks perpetuating a narrow, TE-centric perspective on assessment. For instance, among the 28 TEs who use rubrics (occasionally, often, or always), 21 report developing these rubrics themselves, pointing towards a self-contained approach to defining assessment criteria. This insularity may hinder the development of comprehensive and transparent quality criteria.

Moreover, the prevalent use of class participation (38 TEs) and class attendance (27 TEs) as assessment methods in our study is concerning in light of the focus on quality assurance. These methods, while indicative of some level of engagement, might not provide sufficient depth to evaluate teacher candidates' true capabilities. They could also fall short in terms of transparency and robustness, which are essential for quality assurance. Murphy et al. (2017) shed light on this issue by discussing the implementation of authentic assessments in Australian higher education. Their study underscores the importance of aligning assessments with learning objectives and real-world applications, a crucial factor for maintaining quality assurance. This perspective is particularly pertinent given our findings, which show a preference among TEs for self-prepared assessments and the use of methods with vague evaluation criteria such as class participation and attendance. These findings suggest a need for TEs to ensure that their assessment tools are not only contextually appropriate but also adhere to stringent quality standards. This alignment is vital for preparing future teachers capable of implementing effective and transparent assessment strategies in their classrooms.

Our discussion on Gulikers' (2008) three challenges finds notable parallels with studies focused on the assessment approaches of preservice classroom teachers in the Turkish context. The clear preference for traditional assessment methods observed in our survey aligns with tendencies highlighted in the work of Yeşilyurt and Yaraş (2011) and Birgin and Gürbüz (2008). This correspondence suggests that the assessment culture within mathematics method courses may significantly influence the assessment preferences of preservice teachers, as these courses often serve as a model for their future teaching approaches. However, attributing the assessment preferences of preservice primary school teachers exclusively to the strategies encountered in mathematics method courses would be an oversimplification. While our survey indicates a notable alignment, other elements such as personal beliefs about teaching and learning, experiences in other courses or practicum settings, and individual teaching styles also play a critical role in shaping these preferences (Aydın et al., 2009; Razi, 2023).

Our survey findings indicate a notable trend towards traditional assessment methods, yet they also reveal the emergence of alternative methods and tools such as portfolios, projects, branched trees, and concept maps. This observation mirrors the findings of Şaşmaz Ören et al. (2014), who noted a growing interest in alternative assessment tools among preservice teachers. Such a trend indicates a burgeoning shift in the Turkish educational context towards more comprehensive assessment approaches that encompass a

broader spectrum of student abilities and learning outcomes. The parallel interest in these methods among both TEs and preservice classroom teachers suggests a growing recognition of the value and effectiveness of diverse assessment strategies in the educational process.

However, the persistent prevalence of traditional tools and methods in mathematics method courses suggests that this transition may unfold slowly over time. Despite the emerging interest in alternative approaches, the dominant use of traditional assessments indicates that the shift towards more holistic and innovative approaches is likely to be gradual. This slow transition underscores the complexity of altering entrenched educational approaches and highlights the need for sustained efforts to promote and integrate a wider range of assessment strategies in teacher education.

In light of the challenges put forth by Gulikers (2008) and the findings of our study, it is clear that while TEs are making strides toward more authentic and contextualized assessment strategies, the progress towards this direction is far from being complete. Traditional exam methods and tools remain prevalent, suggesting a need for a sustained push towards integrating authentic assessments into TE approaches. This transition is crucial for assessments to go beyond knowledge measurement and prepare teacher candidates for the realities of the teaching profession.

The emphasis on student-involvement in assessments, while recognized as valuable, has yet to be fully actualized in approach. Our study suggests that while there are TEs who value the notion, there remains a gap in effectively implementing participatory methods. Despite TEs' commitment to crafting tailored assessment tools, there remains a significant disconnect in student involvement. Future efforts should focus on strategies that elevate the role of teacher candidates in developing and choosing assessment tools. Such collaborative approaches can transform assessment into a more inclusive activity, better preparing teacher candidates for diverse educational settings.

In light of these findings, it is evident that restructuring the culture of assessment within teacher education programs in Türkiye is an inevitable necessity. For this transformation to be achieved, teacher educators need to critically review their existing assessment approaches and develop comprehensive and multidimensional assessment strategies that are aligned with instructional processes. It is equally important that these strategies comply with quality standards while remaining sensitive to the teaching context, thereby playing a critical role in preparing teacher candidates to tackle the complexities of real classroom settings. Moreover, achieving such a transformation requires not only methodological changes but also a cultural shift within educational institutions. This cultural change would encourage teacher candidates to actively and meaningfully engage in assessment processes, while supporting teacher educators in enhancing the quality, transparency, and instructional coherence of their assessment practices.

In particular, there is a pressing need to increase the use of alternative and authentic assessment tools, such as portfolios, performance tasks, rubrics, self-assessment, and peer assessment, within teacher education programs. These tools enable teacher candidates to monitor their learning processes and engage in reflective self-assessment to support their professional growth. Additionally, the development of quality assurance-based standards and the planning of comprehensive and sustainable in-service training programs for teacher educators are critical to ensuring that this transformation is institutionalized. Furthermore, the implementation of structural and policy measures that promote greater participation of teacher candidates in assessment processes is essential for enhancing the overall quality of teacher education.

Alongside these initiatives, it is crucial to strengthen teacher candidates' self-efficacy perceptions regarding assessment, boosting their confidence in applying diverse assessment methods and fostering their higher-order cognitive skills such as critical thinking and decision-making. As a result, candidates are more likely to adopt and effectively utilize multidimensional assessment tools in their professional careers after graduation.

Future research should examine in greater depth the characteristics, content, and pedagogical foundations of the assessment tools used by teacher educators when evaluating prospective primary teachers. In addition, studies should comprehensively investigate the impact of these tools on teacher candidates' pedagogical development, professional decision-making processes, and classroom

implementation skills, providing concrete indicators for enhancing educational practices. Comparative analyses of assessment strategies across different teaching methods courses would also support interdisciplinary transferability and contribute to developing a more holistic assessment approach.

Such research would offer data-driven, concrete, and applicable recommendations to teacher educators and policymakers for the restructuring of teaching methods courses, ultimately contributing to the enhancement of teacher education quality. Consequently, in teacher education programs, assessment would transcend its role as a mere measurement activity and evolve into a strategic tool that guides learning, supports professional growth, and integrates seamlessly with instructional processes.

Acknowledgment

Copyrights: The works published in the e-Kafkas Journal of Educational Research are licensed under a Creative Commons Attribution-Non-commercial 4.0 International License.

Ethics statement: In this study, we declare that the rules stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with and that we do not take any of the actions based on "Actions Against Scientific Research and Publication Ethics". At the same time, we declare that there is no conflict of interest between the authors, which all authors contribute to the study, and that all the responsibility belongs to the article authors in case of all ethical violations.

Author Contributions: Conceptualization, M. Fatih Özmantar; methodology, M. Fatih Özmantar and Bilge Yılmaz Aslan; validation, Bilge Yılmaz Aslan and M. Fatih Özmantar; analysis, Bilge Yılmaz Aslan and M. Fatih Özmantar; writing, review and editing, Bilge Yılmaz Aslan and M. Fatih Özmantar; supervision, M. Fatih Özmantar, Bilge Yılmaz Aslan and Bilge Kuşdemir Kayıran

Funding: This research received no funding.

Institutional Review Board Statement: All necessary permissions were obtained from the Gaziantep University Social and Human Sciences Ethics Committee Educational Sciences Unit Ethics Committee with the ethical approval dated 19.11.2021 and numbered E-39083294-050.99-116106.

Data Availability Statement: Data generated or analyzed during this study should be available from the authors on request.

Conflict of Interest: Authors should declare that there is no conflict of interest among authors.

References

- Aydın, M., Baki, A., Köğce, D., & Yıldız, C. (2009). Mathematics teacher educators' beliefs about assessment. *Procedia-Social and Behavioral Sciences*, 1(1), 2126-2130. [doi:10.1016/j.sbspro.2009.01.372](https://doi.org/10.1016/j.sbspro.2009.01.372)
- Başol, G., Çakan, M., Kan, A., Özbek, Ö. Y., Özdmir, D., & Yaşar, M. (2013). *Eğitimde ölçme ve değerlendirme [Measurement and evaluation in education]*. Ankara: Pegem Akademi Yayınları.
- Birgin, O., & Gürbüz, R. (2008). Examining the level of knowledge of prospective primary school teachers about measurement and evaluation. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (20), 163-179.
- Bosica, J., Pyper, J. S., & MacGregor, S. (2021). Incorporating problem-based learning in a secondary school mathematics preservice teacher education course. *Teaching and Teacher Education*, 102, 103335. [doi:10.1016/j.tate.2021.103335](https://doi.org/10.1016/j.tate.2021.103335)
- Brookhart, S. M., & Chen, F. (2015). The quality and effectiveness of descriptive rubrics. *Educational Research Review*, 67(3), 343-368. [doi:10.1080/00131911.2014.929565](https://doi.org/10.1080/00131911.2014.929565)
- Bruna, C. R. (2025). Enhancing Primary Teacher Training through Academic Portfolios in Advanced Mathematics Courses. *arXiv preprint arXiv:2504.06159*. doi.org/10.48550/arXiv.2504.06159
- Bunderson, C. V., Inouye, D. K., & Olsen, J. B. (1988). The four generations of computerized educational measurement. *ETS Research Report Series*, 1988(1), i-148. [doi:10.1002/j.2330-8516.1988.tb00291.x](https://doi.org/10.1002/j.2330-8516.1988.tb00291.x)
- Büyüköztürk, Ş., Akgün, Ö. E., Demirel, F., Karadeniz, Ş., & Çakmak, E. K. (2015). *Scientific research methods*. Ankara: Pegem Academy.
- Camarata, T., & Slieman, T. A. (2020). Improving student feedback quality: A simple model using peer review and feedback rubrics. *Journal of medical education and curricular development*, 7, 2382120520936604. [doi:10.1177/2382120520936604](https://doi.org/10.1177/2382120520936604)
- Dahlback, J., Olstad, H. B., Sylte, A. L., & Wolden, A. C. (2020). The importance of authentic workplace-based assessment: A study from VET teacher education. *International Journal for Research in Vocational Education and Training (IJRVET)*, 7(3), 302-324. [doi:10.25656/01:21232](https://doi.org/10.25656/01:21232)
- Deborah, L. J., Baskaran, R., & Kannan, A. (2010). A survey on internal validity measure for cluster validation. *International Journal of Computer Science & Engineering Survey*, 1(2), 85-102. [doi:10.5121/ijcses.2010.1207](https://doi.org/10.5121/ijcses.2010.1207)
- Demir, M. (2015). *Comparative investigation of alternative assessment methods used in Türkiye and United States elementary 4th grade mathematics curriculum*. (Unpublished doctoral dissertation). İnönü University, Malatya.
- Dickinson, P., & Adams, J. (2017). Values in evaluation—The use of rubrics. *Evaluation and program planning*, 65(2017), 113-116. [doi:10.1016/j.evalprogplan.2017.07.005](https://doi.org/10.1016/j.evalprogplan.2017.07.005)
- Farahian, M., & Avarzamani, F. (2018). The impact of portfolio on EFL learners' metacognition and writing performance. *Cogent Education*, 5(1), 1450918. [doi:10.1080/2331186X.2018.1450918](https://doi.org/10.1080/2331186X.2018.1450918)
- Galang, A. D., Conde, R. L., & Sudarsana, I. K. (2021). Mga kwento ng guro at kwentong mag-aaral: student assessment processes, challenges and solutions In the New Normal Setup Leading To Quality Assurance Inputs. *Jurnal Penjaminan Mutu*, 7(2), 171-187. [doi:10.25078/jpm.v7i2.2351](https://doi.org/10.25078/jpm.v7i2.2351)
- Gulikers, J. T., Kester, L., Kirschner, P. A., & Bastiaens, T. J. (2008). The effect of practical experience on perceptions of assessment authenticity, study approach, and learning outcomes. *Learning and Instruction*, 18(2), 172-186. [doi:10.1016/j.learninstruc.2007.02.012](https://doi.org/10.1016/j.learninstruc.2007.02.012)
- He, S., & Qi, C. (2022). The perceived impact of PBL program learning on shifting prospective teachers' beliefs: A case study in China. *Eurasia Journal of Mathematics, Science and Technology Education*, 18(12), em2195. [doi:10.29333/ejmste/12693](https://doi.org/10.29333/ejmste/12693)
- Hill, H., Umland, K., Litke, E. & Kapitula, L. (2012). Teacher Quality and Quality Teaching: Examining the Relationship of a Teacher Assessment to Practice. *American Journal of Education*, 118(4), 489-519. [doi:10.1086/666380](https://doi.org/10.1086/666380)
- Karakuş, F., & Kösa, T. (2009). Primary Teachers' Views Concerning the Assessment Methods Used by Them. *Milli Eğitim*, 38(181), 184-197.

- Kastberg, G., & Siverbo, S. (2013). The design and use of management accounting systems in process oriented health care—an explorative study. *Financial Accountability & Management*, 29(3), 246-270. [doi:10.1111/faam.12014](https://doi.org/10.1111/faam.12014)
- Karasar, N. (2009). *Scientific research method: Concepts, principles, techniques*. Ankara: Nobel Publishing.
- Kilimci, S. (2006). *The comparison of initial teacher training programmes of germany, france, england and Türkiye* (Unpublished doctoral dissertation). Çukurova Üniversitesi, Adana.
- Lorente, E., & Kirk, D. (2013). Alternative democratic assessment in PETE: an action-research study exploring risks, challenges and solutions. *Sport, Education and Society*, 18(1), 77-96. [doi:10.1080/13573322.2012.713859](https://doi.org/10.1080/13573322.2012.713859)
- Maher, N., & Muir, T. (2013). " I Know You Have to Put Down a Zero, but I'm Not Sure Why": Exploring the Link between Pre-Service Teachers' Content and Pedagogical Content Knowledge. *Mathematics Teacher Education and Development*, 15(1), 72-87.
- Muhammad, A., Lebar, O., & Mokshein, S. E. (2018). Rubrics as assessment, evaluation and scoring tools. *International journal of academic research in business and social sciences*, 8(10), 1417-1431. [doi:10.6007/IJARBS/v8-i10/5309](https://doi.org/10.6007/IJARBS/v8-i10/5309)
- Murphy, L., Wilson, J., & Greenberg, S. (2017). Equine-assisted experiential learning in occupational therapy education. *Journal of Experiential Education*, 40(4), 366-376 [doi:10.1177/1053825917712732](https://doi.org/10.1177/1053825917712732)
- Raji, M. O. (2023). *Conceptions and Practices of Assessment: Case Studies of Nigerian Teacher Educators*. (Doctoral dissertation). University of Ottawa.
- Rawlusyk, P. E. (2018). Assessment in higher education and student learning. *Journal of Instructional Pedagogies*, 21
- Sabancı, O., & Yazıcı, K. (2017). Examining Pre-service Teachers' Efficacy Perceptions towards Measurement and Evaluation. *Trakya Üniversitesi Eğitim Fakültesi Dergisi*, 7(1) 128-153.
- Santagata, R., & Lee, J. (2021). Mathematical knowledge for teaching and the mathematical quality of instruction: a study of novice elementary school teachers. *Journal of Mathematics Teacher Education*, 24, 33-60. [doi:10.1007/s10857-019-09447-y](https://doi.org/10.1007/s10857-019-09447-y)
- Schellekens, L. H., Kremer, W. D., Van der Schaaf, M. F., Van der Vleuten, C. P., & Bok, H. G. (2023, June). Between theory and practice: educators' perceptions on assessment quality criteria and its impact on student learning. *In Frontiers in Education*. 8(2023), 1-9. [doi:10.3389/educ.2023.1147213](https://doi.org/10.3389/educ.2023.1147213)
- Sewagegn, A. A. (2019). A Study on the Assessment Methods and Experiences of Teachers at an Ethiopian University. *International Journal of Instruction*, 12(2), 605-622. [doi:10.29333/iji.2019.12238a](https://doi.org/10.29333/iji.2019.12238a)
- Simpson, A. (2016). Designing pedagogic strategies for dialogic learning in higher education. *Technology, Pedagogy and Education*, 25(2), 135-151. [doi:10.1080/1475939X.2015.1038580](https://doi.org/10.1080/1475939X.2015.1038580)
- Şahin, Ç., & Öztürk, Y. A. (2014). Opinions of prospective teachers on alternative assessment-evaluation methods. *Kastamonu Eğitim Dergisi*, 22(1), 123-142.
- Şaşmaz Ören, F., & Meriç, G. (2014). Seventh Grade Students' Perceptions of Using Concept Cartoons in Science and Technology Course. *Online Submission*, 2(2), 116-136. [doi:10.18404/ijemst.86308](https://doi.org/10.18404/ijemst.86308)
- Tigelaar, D. E. H., & van Tartwijk, J. (2010). The Evaluation of Prospective Teachers in Teacher Education. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International Encyclopedia of Education* (3rd ed., pp. 511-517). [doi:10.4236/ce.2015.610093](https://doi.org/10.4236/ce.2015.610093)
- Tong, F. (2022). Psychological and pedagogical effects on engagement and achievement: implications for literacy and maths learning. *Educational Psychology* 42, 931 - 933. [doi:10.1080/01443410.2022.2140275](https://doi.org/10.1080/01443410.2022.2140275)
- Twohill, A., NicMhuirí, S., Harbison, L., & Karakolidis, A. (2023). Primary preservice teachers' mathematics teaching efficacy beliefs: The role played by mathematics attainment, educational level, preparedness to teach, and gender. *International Journal of Science and Mathematics Education*, 21(2), 601-622. [doi:10.1007/s10763-022-10259-5](https://doi.org/10.1007/s10763-022-10259-5)
- Vesga-Bravo, G. J., Angel-Cuervo, Z. M., & Chacón-Guerrero, G. A. (2022). Beliefs about mathematics, its teaching, and learning: Contrast between pre-service and in-service

- teachers. *International Journal of Science and Mathematics Education*, 20(4), 769-791.
[doi:10.1007/s10763-021-10164-3](https://doi.org/10.1007/s10763-021-10164-3)
- Yeşilyurt, E., & Yaraş, Z. (2011). Assessment of classroom teacher candidates' perception of knowledge level about measurement and evaluation methods. *Journal of Kirsehir Education Faculty*, 12(4), 95-118.
- Yenice, N., Özden, B., & Tunç, G. A. (2017). The Investigation of Preservice Teachers' Self-Efficacy in Using Alternative Assessment and Evaluation Approaches. *Amasya Üniversitesi Eğitim Fakültesi Dergisi*, 6(2), 367-397.
- Yıldız, İ., & Uyanık, N. (2004). Matematik eğitiminde ölçme-değerlendirme üzerine [On measurement and evaluation in mathematics education]. *Gazi Üniversitesi Kastamonu Eğitim Dergisi*.12(1) 97-104.