Pre-Service Maths Teachers' Conceptions Regarding Assessment

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Abstract

Evaluation practices are among the most important parts of education and training activities. Teacher candidates' understanding of assessment is also considered important for future education activities. The main purpose of this research is to determine the opinions of mathematics teacher candidates regarding the concept of assessment. This study was carried out using the survey model, one of the quantitative research methods. The research sample consists of 467 teacher candidates studying in primary mathematics teaching programs at two different universities. The study used a scale developed by Kyttälä et al. (2021) to determine teachers' understanding of the concept of evaluation. The scale consists of 20 items and three sub-dimensions (assessment as a harmful action, assessment of learning, and assessment for teaching and learning). In this study, the scale was adapted to the Turkish language by the researchers. Descriptive statistics, t-test for independent samples, and single-factor analysis of variance methods were used to analyze the data. According to the findings, teacher candidates' understanding of assessment differed according to gender and grade level.

Keywords: Assessment conceptions; mathematics teacher; teacher education

Introduction

It is possible to say that the developments in developing countries in fields such as science, technology, and industry depend mainly on the improvement and development activities to be carried out in people's education. Educational life, which begins for individuals in informal educational environments such as family and society, turns into a formal process by educational institutions with specific purposes starting from primary school. These institutions, namely schools, aim to bring about desired changes in a person's behavior in line with the goals of the education system they are in (Ertürk, 1972). As in all systems, the education system consists of input, process, output, and control steps, and the control here is made through assessments made in the process (Karaca et al., 2011).

The most important function of assessment is to observe and give information about teaching and learning, where necessary (Remesal, 2011). The focus of assessment has recently expanded from summative assessment of learning to formative assessment of learning (Black & Wiliam, 2018). Hill and Eyers (2016) found that teachers' assessment competencies are intertwined with concepts of individual assessment, and together, they govern how and what the teacher assesses and how they interpret and

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use the assessment results. This also has an impact on teacher training because, in addition to theoretical and practical assessment knowledge and the application of assessment skills, assessment concepts must also be identified and reflected upon to support long-term conceptual change. (Remesal, 2011).

Assessment practices and skills applied by teachers have a significant impact on students' learning and well-being. (Coutts et al., 2011; Veldhuis & van den Heuvel-panhuizen 2013). Assessment skills and perceptions are developed during teacher training (Xu & He 2019). However, the improvement of assessment knowledge does not necessarily mean a change in assessment perception (Deneen & Brown 2016). Teacher candidates begin their training with varying levels of knowledge and experience in the field of assessment.

However, the perceptions and practices of teachers in education in relation to assessment continue to vary (Brown, 2004). Therefore, although perceptions and skills are shaped in the teacher training process, this process and its results are individual.

Teacher Assessment Concepts

Assessment concepts are evolving representations of an individual's intuitive understanding of assessment (Brown 2008). Xu and Brown (2016) suggest that the concept of assessment consists of both a cognitive and emotional dimension that regulates how sensitive it is to change. The cognitive dimension refers to the interaction between information and individual beliefs about this information, which affects the process of accepting, adopting, and structuring new information. This interaction also intertwines the affective dimension of the concept of assessment, which includes positive/negative, and strong/weak emotional experiences related to the previous assessment (Crossman, 2007). The stronger teachers' assessment experiences are, the stronger their ability to sustain changes in their understanding of assessment (Xu & Brown 2016).

The concept of assessment is shaped by the interaction between personal, professional, and external political contexts (Mockler, 2011). Moreover, understandings of the assessment of both working teachers (Brown et al., 2011) and pre-service teachers (Brown & Remesal, 2012) reflect social and cultural practices and are therefore closely related to these contexts. The personal context includes assessment experiences and teaching experiences before and outside teacher education and training, while the professional context refers to theoretical and practical experiences during teacher education and working as a teacher. Studies have shown that personal experiences of being evaluated before teacher training play an important role in structuring one's concept of assessment (Crossman, 2007). The external political context includes a framework that guides the concept of teachers' assessment through public debates (mostly through the media) and political decisions. Social debates, as well as social and political decisions about teacher employment, assessment, and teacher education, shape teachers' understanding of what is expected of them as evaluators.

Brown defines three main purposes of assessment: He expressed it as improving teaching and learning, making students accountable, and holding schools responsible for student success (Brown 2008). Although various studies show that the most obvious purpose of assessment for teachers and teacher candidates is to improve their teaching and students' learning (Levy-Vered & Alhija 2018), it is common that teachers and teacher candidates have different understandings of assessment (Barnes et al., 2017). However, studies have shown that teachers' understandings differ depending on whether they emphasize assessment for learning or assessment for learning (Kyttälä et al., 2021). In this context, it is

seen that the role of assessment has changed in recent years and the focus of assessment has expanded from level determination assessment in learning to formative assessment for learning, emphasizing the ongoing interaction between assessment and learning (Black & Wiliam, 2018; Remesal, 2011). In line with the changes in assessment, teacher assessment consists of formative (feedback given in short periods in lessons, listening and interpreting student questions, observing students' gestures and facial expressions, etc.) and level-determining "summative" (quizzes, tests, written exams at the end of learning, etc.). exams, laboratory reports, homework, etc.) are handled in two dimensions (Türnüklü, 2003).

In developing teacher candidates' understanding of assessment, it is recommended to associate the concept of assessment with teaching approaches (Daniels & Poth 2017). Daniels and Poth (2017) stated that experienced teachers' understanding of assessment, teaching, and assessment performances also improve students' learning (Arter, 2003; Gibbs & Simpson, 2005). Studies have shown that although pre-service teachers have a strong understanding of the concept of assessment for learning and are theoretically aware of different assessment methods, they do not apply them in practice (Siegel & Wissehr, 2011).

Importance of the Study

The assessment understandings and assessment skills that teachers use for the above-mentioned purposes are shaped during teacher training (Smith et al., 2014). Teacher candidates begin their training with varying levels of assessment knowledge and experience. However, beginning teachers' understandings and practices regarding assessment continue to differ (Brown, 2004). Improving teachers' assessment knowledge and ensuring that they are informed about assessment procedures does not necessarily mean that there will be a change in their understanding of assessment (Deneen, & Brown, 2016). The current study aims to reveal the assessment understandings and different understanding profiles of mathematics teacher candidates in Turkey. To understand the processes behind teachers' assessment practices, information is needed about the understandings that guide these practices. This study aimed to investigate the level of assessment understanding of mathematics teacher candidates. In line with the purpose of the study, answers were sought to the following research questions:

1. What are teacher candidates' understanding of assessment?
2. Do teacher candidates' understanding of assessment vary significantly according to gender?
3. Do teacher candidates' understanding of assessment vary significantly according to grade levels?

Method

Research Model

The research was carried out in the survey model, one of the quantitative research methods. Survey studies are studies in which the opinions of a group on a certain subject are collected through surveys or interviews (Büyüköztürk et al., 2018). In this study, by using the survey model, it was tried to describe

the assessment understanding of mathematics teacher candidates and whether this varies according to gender and grade levels with the help of the data collection tool used.

Participants and Data Collection

The sample of the research consists of 467 teacher candidates studying in primary mathematics teaching programs at two different universities. Demographic information about the sample is given in Table 1.

Table 1

Demographic Information Regarding the Participants

Group	f	%
Female	298	64
Male	169	36
Total	467	100

According to Table 1, the sample of the study consists of 298 female [64%] and 169 male [36%] teacher candidates studying in the primary mathematics teaching programs of two different universities.

Data collection tool

In the study, Kyttälä et al. determine mathematics teacher candidates' understanding of the concept of assessment. (2021) and adapted to Turkish by the researchers in this study, a 7-point Likert-type scale consisting of 20 items and three sub-dimensions (assessment of learning, assessment of teaching and learning, and assessment as a harmful action) was used. The KMO value calculated according to the EFA test conducted to adapt the "Assessment Understanding Scale" to the Turkish language was found to be significant at the .89 level and the Bartlett Test of Sphericity was found to be significant at the .01 level. When the factor loadings of the scale in three dimensions were examined; It was found that the factor loading values of the scale items varied between .44 - .72 and the total variance explained was 60.58%. The internal consistency Cronbach's alpha value of the scale was calculated as .86. Confirmatory Factor Analysis (CFA) was applied to the measurement tool to determine whether the structure resulting from exploratory factor analysis (EFA) was appropriate. LISREL 8.71 program was used to perform the analysis. The fit index values determined according to the CFA results appear as (RMSEA = .071, SRMR = .067, GFI = .90, AGFI = .91, NNFI = .96, and CFI = .92). The ratio of chi-square to degrees of freedom (X^2 /sd) was calculated as 2.13. This value being below 3 indicates that the model has good fit values (Kline, 2005). RMSEA and SRMR values being less than 0.1 indicate that the obtained model has a suitable model structure (Yılmaz & Çelik, 2009).

Analysis of Data

As a result of the normality tests (kurtosis and skweness values and Kolmogorov Smirnov test), it was determined that the data showed normal distribution. Independent samples t-test and single-factor analysis of variance were used to analyze the data.

Findings

In this part of the research, the findings obtained from the scale applied to measure the assessment understanding of teacher candidates will be explained in line with the research questions.

Table 2

Normality Test Results for the scores obtained from the "Assessment Conceptions Scale"

	Kolmogorov-Smirnov			
	Statistics	*p*	Kurtosis	Skewness
Assessment of teaching and learning	.145	.200	-.856	.652
Assessment of learning	.165	.200	-.485	.312
Assessment as a harmful action	.182	.200	-.601	.477

According to the normality test, the significance level of the Kolmogorov-Smirnov test of the scores obtained from the sub-dimensions of the scale is greater than .05, and the kurtosis and skewness values are calculated within the range of (-1, +1), indicating that the scores show a normal distribution.

First Research Question:

"What are mathematics teacher candidates' understanding of assessment?" The results of the descriptive statistical analysis conducted to answer the research question are given in Table 3.

Table 3

Descriptive findings regarding teacher candidates' understanding of assessment

Subdimensions	N	$\bar{X}$	Sd
Assessment of teaching and learning	467	5.67	6.11
Assessment of learning	467	6.08	8.23
Assessment as a harmful action	467	4.12	5.27

1-1.86 Completely disagree; 1.87-2.71 Mostly disagree; 2.72-3.57 Partially disagree; 3.58-4.43 Undecided; 4.44-5.29 Partially agree; 5.30-6.14 Mostly agree; 6.15-7.00 Completely agree.

According to Table 3, the average score of the teacher candidates from the "evaluation of teaching and learning" sub-dimension of the scale was calculated as $\bar{X}_{(N=467)}$ = 5.67. Also, the average score they received from the "evaluation of learning" sub-dimension was calculated as $\bar{X}_{(N=467)}$ = 6.08. In addition, the average score they received from the "evaluation as a harmful action" sub-dimension of the scale was calculated as $\bar{X}_{(N=467)}$ = 4.17. According to these results, teacher candidates stated that their understanding of teaching and learning and assessment of learning were positive (5.30-6.14 Mostly agree). It was determined that teacher candidates were undecided (3.58-4.43 Undecided) regarding their understanding of assessment as a harmful action.

Second Research Question:

"Do mathematics teacher candidates' understanding of assessment vary significantly according to gender?" The results of the t-test for independent samples conducted to find an answer to the research question are given in Table 3.

Table 3

T-test findings regarding the examination of the meaningfulness of teacher candidates' understanding of assessment according to gender

Subdimensions	Gender	N	$\bar{X}$	*t*	*p*
Assessment of teaching and learning	Male	169	5.12	6.683	.032*
	Female	298	5.88		
Assessment of learning	Male	169	5.36	-5.123	.002**
	Female	298	6.01		
Assessment as a harmful action	Male	169	5.89	6.011	.012*
	Female	298	4.98		

*p<.05; **p<.01

It was observed that the gender factor created a statistically significant difference in teacher candidates' views on the concept of assessment (p<.05; p<.01). According to the t-test results, it was found that female teacher candidates' understanding of assessment regarding the assessment of teaching and learning, assessment of learning and assessment as a harmful action were more positive than male teacher candidates.

Third Research Question:

"Do mathematics teacher candidates' understanding of assessment vary significantly according to grade levels?" The results of one-way analysis of variance (One-way ANOVA) for independent samples conducted to answer the research question are given in Table 5.

Table 4

ANOVA findings regarding the examination of the meaningfulness of teacher candidates' understanding of assessment according to grade levels

Sub-dimensions		Sum of squares	Mean squares	F	p
Assessment of teaching and learning	Between group	232.12	122.12	4.937	.002**
	Within groups	12.55	25.88		4>1,2,3; 3>2
Assessment of learning	Between group	216.22	15.45	11.145	.014*

	Within groups	15.67	26.65		4>1,2,3
Assessment as a harmful action	Between group	186.51	18.79	10.01	.023*
	Within groups	13.78	24.18		2>3,4

It was observed that the classroom factor created a significant difference in teacher candidates' understanding of the concept of assessment. According to the Tukey pairwise comparison test used to determine which grade levels there is a significant difference, it was found that there were results in favor of the senior teacher candidates in their understanding of the assessment of teaching and learning and the assessment of learning, and also that the views of the third-year teacher candidates towards the assessment of teaching and learning were more positive than the second year teacher candidates. Regarding the understanding that assessment is not useful, it can be said that second-year teacher candidates' understanding is higher than fourth and third-grade teachers.

Discussion

While some studies conducted in the field of teacher training state that teachers' beliefs affect their teaching behaviors, others state that teaching behaviors have an impact on beliefs (McGalliard, 1983; Buzeika, 1996). The teaching behaviors in question include the teacher's experiences as well as the understanding of assessment (Baştürk & Dönmez, 2011). With the Self-Assessment Inventory of Teacher Assessment Conceptions developed by Brown (2011) and applied in many countries, it was concluded that the context, culture, and local factors shape teachers' assessment understandings. Similar studies in the literature have examined teachers' understanding of assessment, and it has been stated that teachers' understanding of assessment has a very complex structure and more research should be done in this direction (Remesal, 2011). In this context, considering the complex structure of teachers' understanding of classroom assessment and its variability according to culture and beliefs, it becomes important to investigate the assessment understanding of teacher candidates as teachers of the future.

This research tried to determine the level of assessment understanding of mathematics teacher candidates. Assessment has become one of the most critical parts of the learning process today, and it has been deemed important to determine teacher candidates' understanding of assessment.

In this study, the first finding was to determine that teacher candidates were undecided about their understanding of assessment as a positive action assessment of teaching and learning assessment of learning, and assessment as a harmful action. Similar to the results of our study, Ogan-Bekiroğlu (2006) determined the competencies of teachers and teacher candidates in measurement and assessment and found that their attitudes and thoughts towards having knowledge and skills in measurement and assessment were positive. The fact that teacher candidates have positive thoughts about assessment can indicate that they are open to using alternative assessment methods. However, positive affective factors alone are not sufficient to provide quality education during the education process. In addition to this skill, it is also necessary to have the cognitive and psychomotor skills required by the profession (Yaman & Karamustafaoğlu, 2011).

The second finding regarding gender was concluded that female teacher candidates' understanding of assessment regarding the assessment of teaching and learning, assessment of learning, and assessment as a harmful action are more positive than male teacher candidates. This situation can be expressed as the fact that the teaching profession, and especially the mathematics teaching program, is mainly preferred by female students. Accordingly, the conscious use of assessment methods as an indicator of the teaching profession being stronger in terms of quality is carried out by female candidates. Similar to the results of our study, Şahin and Karaman (2013), in their study examining the beliefs of classroom teacher candidates regarding measurement and assessment, found that the belief levels of female teacher candidates were more developed than those of males. As a similar result, Şahin and Uysal (2013) examined the self-efficacy perceptions of teacher candidates regarding measurement and assessment and found no significant difference between the self-efficacy perceptions of female teacher candidates and male teacher candidates regarding measurement and assessment. Aslan (2020) examined teacher candidates' attitudes towards measurement and assessment in terms of various variables and concluded that there is a significant difference between teacher candidates' attitudes towards measurement and assessment in favor of female teacher candidates. The study conducted by Göktaş and Şad (2021) showed that mathematics teachers' opinions regarding measurement-assessment approaches did not differ significantly according to their gender. Additionally, many studies have found that there is no significant relationship between teachers' measurement and assessment practices and variables such as gender and length of service (Özenç, 2013; Şaşmaz Ören et al., 2014).

The last finding regarding the grade level was that there were results in favor of the senior teacher candidates in their understanding of the assessment of teaching and learning and the assessment of learning, and also that the understanding of the third-year teacher candidates towards the assessment of teaching and learning was more positive than the second-year teacher candidates. Regarding the understanding that assessment is not useful, it can be said that second-year teacher candidates' understanding is higher than fourth and third-grade teachers. In his study, Aslan (2020) stated that the averages of teacher candidates studying in the third and fourth grades toward measurement and assessment were close. In other words, teacher candidates' attitudes toward measurement and assessment were similar. Azrak and Yalçınkaya (2019) examined the measurement-assessment literacy levels of Social Studies teacher candidates regarding various variables. In their study, although the teacher candidates in their final year received more training on measurement-assessment than those in their third year, they did not have a measurement-assessment literacy level. It was found that literacy levels were lower than those of teacher candidates studying in the third grade. In the same study, they stated that the measurement-assessment literacy levels of first-year teacher candidates were lower than other grade levels because they had encountered measurement-assessment practices less than other grade levels. Like the results of our study, it can be said that the reason why senior mathematics teacher candidates' understanding of assessment is more positive than other grade levels is that they have encountered more measurement-assessment practices.

References

Angelo, T. A., & Cross, K. P. (2012). *Classroom assessment techniques*. Jossey Bass Wiley.

Arter, J. A. (2003). Assessment for Learning: Classroom Assessment to Improve Student Achievement and Well-Being. Retrieved from https://files.eric.ed.gov/fulltext/ED480068.pdf on 15.02.2024.

Aslan, S. (2020). Öğretmen adaylarının ölçme değerlendirmeye yönelik tutumlarının çeşitli değişkenler açısından incelenmesi. *OPUS International Journal of Society Researches, 16*(Eğitim ve Toplum Özel sayısı), 6047-6068. https://doi.org/10.26466/opus.755991

Azrak, Y., & Yalçınkaya, E. (2019). Sosyal Bilgiler Öğretmen Adaylarının Ölçme-Değerlendirme Okuryazarlık Düzeylerinin Çeşitli Değişkenler Açısından İncelenmesi. *Anadolu Journal of Educational Sciences International, 9*(1), 27-55. https://doi.org/10.18039/ajesi.520816

Baştürk, S., & Dönmez, G. (2011). Matematik öğretmen adaylarının pedagojik alan bilgilerinin ölçme ve değerlendirme bilgisi bileşeni bağlamında incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 12*(3), 17-37. Retrieved from https://dergipark.org.tr/en/download/article-file/1492266 on 17.02.2024.

Black, P., & Wiliam, D. (2018). Classroom assessment and pedagogy. Assessment in education: Principles, policy & practice, *25*(6), 551-575. https://doi.org/10.1080/0969594X.2018.1441807

Brown, G. T. (2011). Teachers' conceptions of assessment: Comparing primary and secondary teachers in New Zealand. *Assessment Matters*, *3*, 45-70. Retrieved from https://search.informit.org/doi/abs/10.3316/informit.515755939850862 on 15.02.2024.

Brown, H. D. (2004). *Language Assessment Principles and Classroom Practices*. New York: Pearson Education. Inc.

Büyüköztürk, Ş., Kılıç-Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2018). *Bilimsel Araştırma Yöntemleri* (24. bs.) Pegem Akademi.

Chappuis, S., & Stiggins, R. J. (2002). Classroom assessment for learning. *Educational leadership*, *60*(1), 40-44. Retrieved from http://hssdnewteachers.pbworks.com/w/file/fetch/50394085/classroom.assessment.for.learning.chappuis.pdf on 15.02.2024.

Coutts, R., Gilleard, W., & Baglin, R. (2011). Evidence for the impact of assessment on mood and motivation in first-year students. *Studies in Higher education*, *36*(3), 291-300. https://doi.org/10.1080/03075079.2010.523892

Crossman, J. (2007). The Role of Relationships and Emotions in Student Perceptions of Learning and Assessment. *Higher Education Research and Development 26*, 313–327. https://doi.org/10.1080/07294360701494328

Deneen, C. C., & Brown, G. T. (2016). The impact of conceptions of assessment on assessment literacy in a teacher education program. *Cogent Education*, *3*(1), 1225380. https://doi.org/10.1080/2331186X.2016.1225380

Ertürk, S. (1984). *Eğitimde Program Geliştirme*, Ankara: Meteksan Litd.

Gibbs, G., & Simpson, C. (2005). Conditions under which assessment supports students' learning. *Learning and teaching in higher education*, (1), 3-31. Retrieved from https://eprints.glos.ac.uk/3609/ on 14.02.2024.

Göktaş, Ö., & Şad, S. N. (2021). Matematik öğretmenlerinin ölçme ve değerlendirme yaklaşımlarına ilişkin algılarının incelenmesi. *Abant izzet baysal üniversitesi eğitim fakültesi dergisi, 21*(2), 402-415. https://doi.org/10.17240/aibuefd.2021.21.62826-578152

Hill, M. F., & Eyers, G. E. (2016). Moving from student to teacher: Changing perspectives about assessment through teacher education. In *Handbook of human and social conditions in assessment*. 57-76.

Karaca, E., Özbek, Ö. Y., & Yaşar, M. (2011). *Ölçme ve Değerlendirme*. Pegem Akademi.

Kyttälä, M., P. Björn, M. Rantamäki, V. Närhi, & M. Aro. 2021. Assessment Conception Patterns of Finnish Pre-service Special Needs Teachers: The Contribution of Prior Studies and Teaching Experience. *European Journal of Special Needs Education* 1–15. https://doi.org/10.1080/08856257.2020.1853972

López-Pastor, V., & Sicilia-Camacho, A. (2017). Formative and shared assessment in higher education. Lessons learned and challenges for the future. *Assessment & Evaluation in Higher Education, 42*(1), 77-97. https://doi.org/10.1080/02602938.2015.1083535

Mahendra, I. (2016). Contextual learning approach and performance assessment in mathematics learning. *International Research Journal of Management, IT & Social Sciences*, *3*(3), 7-15. Retrieved from https://sloap.org/journals/index.php/irjmis/article/view/347 on 10.02.2024.

McMillan, J. H., Myran, S., & Workman, D. (2002). Elementary teachers' classroom assessment and grading practices. *The journal of educational research*, *95*(4), 203-213. https://doi.org/10.1080/00220670209596593

Remesal, A. (2011). Primary and secondary teachers' conceptions of assessment: A qualitative study. *Teaching and teacher education*, *27*(2), 472-482. https://doi.org/10.1016/j.tate.2010.09.017

Şahin, Ç., & Karaman, P. (2013). Sınıf öğretmeni adaylarının ölçme ve değerlendirmeye ilişkin inançları. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *28*(28-2), 394-407. Retreved from https://dergipark.org.tr/en/download/article-file/87183 on 15.02.2024.

Şahin, M., & Uysal, İ. (2013). Öğretmen adaylarının ölçme ve değerlendirme konusundaki öz-yeterlik algılarının incelenmesi. *Bartın University Journal of Faculty of Education*, *2*(2), 190-207. Retrieved from https://www.proquest.com/docview/1514363270?fromopenview=true&pq-origsite=gscholar&sourcetype=Scholarly%20Journals on 10.02.2024.

Siegel, M. A., & C. Wissehr. 2011. Preparing for the Plunge: Pre-service Teachers' Assessment Literacy. *Journal of Science Teacher Education 22*(4): 371–391. Retrieved from https://link.springer.com/article/10.1007/s10972-011-9231-6 on 10.02.2024.

Smith, L.F., Hill, M.F., Cowie, B., & Gilmore, A. (2014). Preparing teachers to use the enabling power of assessment. In C. Wyatt-Smith, V. Klenowski, & P. Colbert (Eds.), *Designing assessment for quality learning* (pp. 303–323). NY: Springer. Retrieved from https://link.springer.com/book/10.1007/978-94-007-5902-2 on 10.02.2024.

Turgut, M. F., & Baykul, Y. (2010). *Eğitimde ölçme ve değerlendirme* (Bs. 2). Pegem Akademi.

Türnüklü, E. B. (2003). Türkiye ve İngilteredeki matematik öğretmenlerinin değerlendirme biçimleri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *24*(24). Retrieved from https://dergipark.org.tr/en/download/article-file/87831 on 02.02.2024.

Veldhuis, M., Heuvel-Panhuizen, M. V. D., Vermeulen, J. A., & Eggen, T. J. (2013). Teachers' use of classroom assessment in primary school mathematics education in the Netherlands. *Teachers' use of classroom assessment in primary school mathematics education in the Netherlands*, 35-53. DOI: 10.3280/CAD2013-002004.

Wiliam, D. (2006). *Mathematics inside the black box: Assessment for learning in the mathematics classroom*. Granada Learning. Retrieved from https://danhaesler.com/wp-content/uploads/2016/08/Inside-the-Black-Box-Mathematics.pdf on 02.02.2024.

Xu, Y., & He, L. (2019). How pre-service teachers' conceptions of assessment change over practicum: Implications for teacher assessment literacy. In *Frontiers in Education*, 4. 145. https://doi.org/10.3389/feduc.2019.00145

Yaman, S., & Karamustafaoğlu, S. (2011). Öğretmen adaylarının ölçme vedeğerlendirme alanına yönelik yeterlik algı düzeylerinin incelenmesi. *Journal of Faculty of Educational Sciences, 44*(2). https://openurl.ebsco.com/EPDB%3Agcd%3A2%3A25397746/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A66294464&crl=c&link_origin=scholar.google.com on 02.02.2024.

Appendix 1: Scale for Determining Teacher Candidates' Assessment Conceptions

	Maddeler	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Değerlendirme öğrenmeyi destekler.	1	2	3	4	5	6	7
2	Değerlendirme, farklı öğrenme ihtiyaçları hakkında bilgi sağlar.	1	2	3	4	5	6	7
3	Değerlendirme, farklı öğrencilerin farklı talimatlar almasını sağlar.	1	2	3	4	5	6	7
4	Değerlendirme, öğrencilerin öğrenmelerini geliştirmelerine yardımcı olur.	1	2	3	4	5	6	7
5	Değerlendirme, öğrencilerin devam eden öğretimini değiştirir.	1	2	3	4	5	6	7
6	Değerlendirme, öğrenme ikliminin geliştirilmesine yardımcı olur.	1	2	3	4	5	6	7
7	Değerlendirme, sağlanan desteğin öğrenciye nasıl fayda sağladığı hakkında bilgi sağlar.	1	2	3	4	5	6	7
8	Değerlendirme, öğretim uygulamasıyla bütünleştirilir.	1	2	3	4	5	6	7
9	Değerlendirme, öğretimin planlanmasına rehberlik eder.	1	2	3	4	5	6	7
10	Değerlendirme, öğrencilere performansları hakkında geri bildirim sağlar.	1	2	3	4	5	6	7
11	Değerlendirme, öğrencinin güçlü ve zayıf yönlerini belirler.	1	2	3	4	5	6	7
12	Değerlendirme, öğrencinin öğrenmesini özetler.	1	2	3	4	5	6	7
13	Değerlendirme öğrencilerin ne öğrendiğini belirler.	1	2	3	4	5	6	7
14	Değerlendirme, öğrenci performansını tahmin eder.	1	2	3	4	5	6	7
15	Değerlendirme gelecekteki öğrenci performansını tahmin eder.	1	2	3	4	5	6	7
16	Değerlendirme, öğrencilerin kendilerine ilişkin algılarını olumsuz etkiler.	1	2	3	4	5	6	7
17	Değerlendirme adil değil.	1	2	3	4	5	6	7
18	Değerlendirme öğretimi engeller.	1	2	3	4	5	6	7
19	Değerlendirme, öğrencileri birbirlerinin performansını karşılaştırmaya maruz bırakır.	1	2	3	4	5	6	7
20	Değerlendirme, öğretmenlerin çalışma zamanını çok fazla alıyor.	1	2	3	4	5	6	7

1-10: Assessment of teaching and learning (α = .88),

11-15: Assessment of learning (α = .82),

16-20: Assessment as a harmful action (α = .77)