The New Educational Review



*Aleksandra M. Mihajlović,*
*Nenad R. Vulović,*
*Milan P. Milikić*
Serbia

# The Teaching Efficacy of Preservice Mathematics Teachers: Research in the Republic of Serbia

DOI: 10.15804/tner.2020.61.3.05

**Abstract**

This research aims to study the psychometric properties and theoretical structure of the Serbian version of the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) which was developed by Enochs, Smith and Huinker (2000). The sample consisted of 252 preservice primary and preschool teachers from teacher education faculties in Serbia. The original MTEBI indicated acceptable reliability (α=0.779). The results of confirmatory factor analysis indicate that the fit of the original MTEBI model to the data is not acceptable, but the re-specified model (MTEBI12) shows good fit and acceptable reliability (α=0.742). These findings indicate that a short 12 item version of MTEBI possesses adequate psychometric properties and is applicable to the sample of respondents in the Republic of Serbia.

**Key words:** *Teaching efficacy, mathematics teaching, preservice primary and preschool teachers, MTEBI.*

## Introduction

Since education is one of the most powerful initiators of progress in a society, there is a need to equip students with essential 21st century skills in order to meet social and economic challenges. 21st century skills like critical questioning and problem solving constitute part of mathematical competences, and they have been recognized as increasingly important. Consequently, special attention needs to be paid to the education of future teachers and to the development of their competences to teach mathematics. One of the challenges teacher educators face is the fact that teachers' own schooling experiences shape their beliefs about teaching and how they interact with students, and so future-teachers' beliefs are hard to change through teacher education programs (Borko & Putnam, 1996). Consequently, it is not enough to prepare future teachers of mathematics in the areas of content, pedagogy and subject-specific pedagogy, but they also have to acquire new beliefs in these domains (Borko & Putnam, 1996; Enochs, Smith & Huinker, 2000).

## Theoretical background

Teachers' beliefs directly affect the quality of their teaching (Maasepp & Bobis, 2014) and classroom practices, from curriculum implementation to changes in pedagogy (Takunyaci & Takunyaci, 2014). Several studies investigating teacher efficacy beliefs indicate that individual differences in teacher effectiveness may be related to these beliefs (Enochs, Smith & Huinker, 2000). Teacher efficacy belief is defined as the extent to which the teachers believe they can have a positive effect on students' performance (Gavora & Wiegerová, 2017; Tschannen-Moran & Hoy, 2001). It consists of two dimensions: personal (or self-efficacy) and outcome expectancy. Personal teaching efficacy is defined as a belief in individual's own ability to teach effectively, while teaching outcome expectancy is the belief that effective teaching will affect students' learning positively, regardless of external factors (Enochs, Smith, & Huinker, 2000). Although these two dimensions are interrelated, they are conceptually distinct (Bandura, 1986; Cetinkaya & Erbas, 2011).

Research studies on teacher efficacy indicate that it influences teachers' behaviours such as persistence on a task, risk taking, and use of innovations, and that it contributes to more student-centered teaching strategies, the effort invested in teaching and the goals teachers set (Enochs, Smith, & Huinker, 2000; Gavora & Wiegerová, 2017; Tschannen-Moran & Hoy, 2001). Teachers with a higher sense of efficacy exhibit greater enthusiasm for and commitment to teaching (Martins, Costa & Onofre, 2015; Tschannen-Moran & Hoy, 2001), and they are flexible in their teaching approaches, and open to new ideas and skills (Cetinkaya & Erbas, 2011). They persist when things do not go smoothly; they effectively plan and organize instruction and use innovations to meet the needs of their students

(Mostofo, 2013). Teacher efficacy is also related to student outcomes such as achievement and motivation (Tschannen-Moran & Hoy, 2001), but it is also a reliable predictor of student achievement (Bandura, 1995). Bandura's theory of self-efficacy suggests that efficacy may be most easily influenced early in the learning (Bandura, 1995; Mostofo, 2013). Some of the most powerful influences on teacher efficacy may therefore be experiences in the early years of teaching, such as those during preservice teaching practice classes and field placements (Mihajlović, 2019).

The majority of studies in teacher efficacy have focused on general teaching efficacy beliefs, not on subject-specific teaching efficacy beliefs. However, it has been reported that most of the studies in teaching efficacy showed that general teaching efficacy beliefs may not be associated with subject-specific teaching efficacy (Enochs & Riggs, 1990; Enochs, Smith & Huinker, 2000). Yet Bandura pointed out that teachers' sense of instructional efficacy does not have to be uniform across different subjects. He indicated that "teachers who judge themselves highly efficacious in mathematics or science instruction may be much less assured of their efficacy in language instruction and vice versa" (Bandura, 1997, p. 243). This, as Bandura (1997) further emphasises, means that teacher efficacy scales should be linked to different knowledge domains. The specificity is very important when studying the teaching beliefs and behaviour of elementary teachers "since elementary teachers teach all subjects and may not be equally effective in teaching all of them" (Enochs & Riggs, 1990, p. 695).

Although measurement of teacher efficacy has a long history (McGee & Wang, 2014; Tschannen-Moran & Hoy, 2001), most of the existing instruments have been designed to measure general and not domain-specific teacher efficacy. However, as previously indicated, it is important to take into account differences in the context that teachers experience, since teachers can hold differential self-efficacy beliefs across subject areas, experience, course load, and area of expertise (Wilhelm & Berebitsky, 2019). When it comes to measuring mathematics teaching efficacy, some researchers have developed more domain-specific measures of teacher efficacy (Enochs, Smith & Huinker, 2000; McGee & Wang, 2014; Wilhelm & Berebitsky, 2019).

A widely used measure of mathematics teaching efficacy beliefs is the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI). The instrument was developed by Enochs, Smith, and Huinker (2000) and its purpose is to assess preservice primary teachers' efficacy in teaching mathematics. It measures teachers' beliefs toward their abilities to teach mathematics for student understanding. The MTEBI was derived from the Science Teaching Efficacy Beliefs Instrument (STEBI), which was developed by Riggs and Enochs (1990). The MTEBI has been selected for this study because it focuses specifically on mathematics teaching efficacy, and it was used with preservice teachers in previous research.

There are a few studies that examine the use of a translated instrument in different cultural settings (Korea, Turkey, Australia, South Africa, Taiwan, Jordan). Since only a few researchers have reported that the MTEBI has an acceptable reliability and construct validity, more studies are needed to assess validity and reliability of MTEBI in different populations (Cetinkaya & Erbas, 2011; McGee & Wang, 2014).

MTEBI is comprised of two subscales: Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE) scale (Figure 1). The scores on the MTEBI scale range from 21 to 105. Reliability analysis has reported an alpha coefficient of 0.88 for PMTE and 0.77 for MTOE (Enochs, Smith & Huinker, 2000). Confirmatory factor analysis shows that the PMTE and MTOE are independent, which is in line with Bandura's theory (Bandura, 1986).

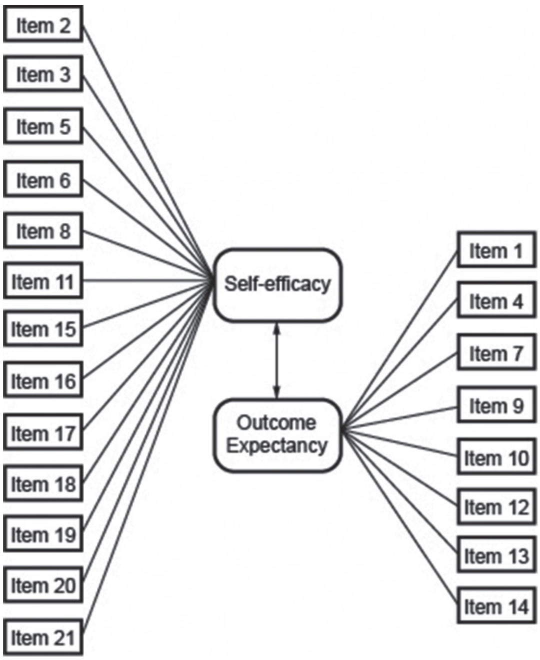


**Figure 1.** Factor structure of the MTEBI items (Enochs, Smith, & Huinker, 2000)

## Methodology of Research

The main aim of this research was to study the psychometric properties and the theoretical structure of MTEBI (Enochs, Smith & Huinker, 2000) used in Serbia for the first time. Since there is an absence of validated instruments to measure this construct in Serbia, this research contributes to the existing body of knowledge related to measuring the mathematics teaching efficacy of preservice preschool and primary teachers. It is expected that there are two plausible and interpretable teacher efficacy factors which express preservice teachers' mathematics teaching efficacy beliefs according to the MTEBI and research results.

### Research Sample

The participants of the study were 252 preservice preschool and primary teachers drawn from three faculties of education in Serbia (located in Jagodina, Užice, and Sombor). All student teachers were at the beginning of their final year of undergraduate study (Year 4). They all attended a theoretical course in Methodology of Teaching Mathematics the previous year (Year 3). The syllabi of the courses titled Methodology of Teaching Mathematics at all three faculties of education are almost identical, making these institutions compatible for research. Apart from that, the courses Practicum in Methodology of Teaching Mathematics at these institutions are placed in the final year of study, so the sample student teachers had had no previous experience in preparing and teaching lessons in Mathematics. The average age of the participants was 23.34 (SD=1.11). There were 231 (91.67%) female and 21 (8.33%) male students. There were 112 (44.4%) student teachers involved in the preschool teaching program, and 140 (55.6%) student teachers involved in the primary teaching program. There were 113 (44.8%) students from the Faculty of Education in Jagodina, 75 (29.8%) students from the Faculty of Education in Užice, and 64 (25.4%) students from the Faculty of Education in Sombor.

### Instrument

As previously indicated, the MTEBI for preservice teachers is a 21 item self-report scale developed to measure preservice teachers' mathematics teaching efficacy beliefs and their outcome expectancy (Table 1). The instrument was translated from English into Serbian by a professional translator. The aim of the translation was to maintain the original denotation and connotation of items, not literal or syntactic equivalence.

**Table 1.** MTEBI items (Enochs, Smith, & Huinker, 2000)

| Item codes | Content |
|---|---|
| E1 | When a student does better than usual in mathematics, it is often because the teacher exerted a little extra effort. |
| E2 | I will continually find better ways to teach mathematics. |
| E3 | Even if I try very hard, I will not teach mathematics as well as I will most of the subjects. |
| E4 | When the mathematics grades of students improve, it is often due to their teacher having found a more effective teaching approach. |
| E5 | I know how to teach mathematics concepts effectively. |
| E6 | I will not be very effective in monitoring mathematics activities. |
| E7 | If students are underachieving in mathematics, it is most likely due to ineffective mathematics teaching. |
| E8 | I will generally teach mathematics ineffectively. |
| E9 | The inadequacy of a student's mathematics background can be overcome by good teaching. |
| E10 | When a low-achieving child progresses in mathematics, it is usually due to extra attention paid by by the teacher. |
| E11 | I understand mathematics concepts well enough to be effective in teaching elementary mathematics. |
| E12 | The teacher is generally responsible for the achievement of students in mathematics. |
| E13 | Students' achievement in mathematics is directly related to their teacher's effectiveness in mathematics teaching. |
| E14 | If parents comment that their child is showing more interest in mathematics at school, it is probably due to the performance of the child's teacher. |
| E15 | I will find it difficult to use manipulatives to explain to students why mathematics works. |
| E16 | I will typically be able to answer students' questions. |
| E17 | I wonder if I will have the necessary skills to teach mathematics. |
| E18 | Given a choice, I will not invite the principal to evaluate my mathematics teaching. |
| E19 | When a student has difficulty understanding a mathematics concept, I will usually be at a loss as to how to help the student understand it better. |
| E20 | When teaching mathematics, I will usually welcome student questions. |
| E21 | I do not know what to do to turn students on to mathematics. |

## Data Analysis

Statistical analysis was conducted using SPSS 17.0, and for confirmatory factor analysis AMOS 7 was used. The reliability and internal consistency (item-total item correlation) for MTEBI and subscales PMTE and MTOE were assessed using

Cronbach's alpha coefficient. The multivariate normality of the MTEBI was tested by calculating Mardia's coefficient. To evaluate and confirm the factorial structures that had been found in the previous studies (Enochs, Smith & Huinker, 2000), confirmatory factor analysis was performed with the use of AMOS. The Comparative Fit Index (CFI), the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Bollen–Stine bootstrap p (BS p) were used to evaluate the fit of the models using the following criteria: GFI>.90, AGFI>.90, CFI>.95, RMSEA<.06 (Kline, 2011), SRMR<0.08 (Hu & Bentler, 1999), BS p>0.05 (Bollen & Stine, 1992). The correlation between the original MTEBI and the modified MTEBI were calculated with the use of Pearson's correlation coefficient.

## Results and Discussion

All data were examined for missing values. Since there were none, all responses were analysed. Descriptive statistics of the variables were determined by the use of SPSS (Table 2 and Table 3). The skewness and kurtosis indicated an acceptable degree of normality, since the data may be assumed to be normal if the skewness and kurtosis are within the accepted level of 3 and 10 respectively (Brown, 2006; Kline, 2011).

Table 2 and Table 3 summarize the reliability analysis results of the MTEBI for preservice teachers based on the two-factor model that was suggested in the previous studies (Enochs, Smith & Huinker, 2000; Enochs & Riggs, 1990). The Cronbach alpha of α=0.779 indicates good and acceptable reliability for the MTEBI in general. The computed Cronbach alpha for both the PMTE and MTOE subscales also express good and acceptable reliability. Item 20 has low item-total correlation, but since deletion of this item would not increase significantly Cronbach alpha, we decided to keep it for further analysis.

**Table 2.** Descriptive statistics and item-total correlations for PMTE items, α=0.778

| Item code | Mean | Standard Deviation | Skewness | Kurtosis | Item-total correlations |
|---|---|---|---|---|---|
| E2 | 4.48 | 0.69 | -1.18 | 0.96 | 0.37 |
| E3* | 3.70 | 1.13 | -0.49 | -0.76 | 0.50 |
| E5 | 3.32 | 0.81 | -0.05 | 0.04 | 0.43 |

| Item code | Mean | Standard Deviation | Skewness | Kurtosis | Item-total correlations |
|---|---|---|---|---|---|
| E6* | 3.77 | 0.98 | -0.39 | -0.63 | 0.47 |
| E8* | 4.37 | 0.75 | -0.88 | -0.07 | 0.57 |
| E11 | 3.73 | 0.84 | -0.43 | 0.32 | 0.41 |
| E15* | 3.66 | 1.03 | -0.38 | -0.53 | 0.39 |
| E16 | 3.85 | 0.84 | -0.27 | -0.57 | 0.49 |
| E17* | 2.84 | 1.18 | 0.18 | -0.74 | 0.40 |
| E18* | 3.21 | 1.20 | -0.22 | -0.68 | 0.27 |
| E19* | 3.86 | 1.11 | -0.75 | -0.36 | 0.41 |
| E20 | 4.04 | 0.93 | -1.05 | 1.20 | 0.13 |
| E21* | 4.06 | 0.99 | -0.92 | 0.27 | 0.55 |
| PMTE_total | 48.86 | 6.61 | -0.08 | -0.68 | |

Items marked with * were negatively worded and were recoded

**Table 3.** Descriptive statistics and item-total correlations for MTOE items, α=0.780

| Item code | Mean | Standard Deviation | Skewness | Kurtosis | Item-total correlations |
|---|---|---|---|---|---|
| E1 | 3.66 | 1.01 | -.252 | -0.72 | 0.43 |
| E4 | 3.86 | 0.82 | -.298 | -0.24 | 0.56 |
| E7 | 3.22 | 1.02 | .018 | -0.47 | 0.53 |
| E9 | 3.87 | 0.94 | -.801 | 0.66 | 0.34 |
| E10 | 3.90 | 0.93 | -.855 | 0.90 | 0.40 |
| E12 | 3.59 | 0.89 | -.059 | -0.24 | 0.56 |
| E13 | 3.80 | 0.82 | -.266 | 0.00 | 0.63 |
| E14 | 3.47 | 0.89 | -.002 | -0.08 | 0.47 |
| MTOE_total | 29.37 | 4.60 | 0.15 | 0.31 | |

The average MTEBI score was 78.23 (SD=8.58), while average scores on the Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE) scales were 48.86 (SD=6.61) and 29.37 (SD=4.60), respectively. Kurtosis and skewness scores for both sub-scales and the total MTEBI all fell within – 2 and 2 (Byrne, 2010). However, assessment of multivariate normality revealed that the Mardia kurtosis coefficient is 56.362 with a critical ratio of 14.394, which indicates that the data were multivariate non-normal and this could result in standard error biases (Bentler & Wu, 2005; Mardia, 1970). Therefore, the analysis used the Maximum Likelihood (ML) estimation with bootstrapping (2000 resamples) as suggested by Nevitt and Hancock (2001). The Bollen–Stine bootstrap p assessed fit in addition to indices of $\chi^2$, ratio of $\chi^2$ and its degree of freedom ($\chi^2$/df), CFI, GFI, AGFI and RMSEA (Bollen & Stine, 1992). The Bollen–Stine estimates fit without limitations of normal theory, where $p>0.05$ suggests excellent global fit.

Confirmatory factor analysis (CFA) was conducted to examine the construct validity of the two-factor model of the MTEBI scale (Model 1). Model 1 indicated a poor level of fit to the given data in terms of $\chi^2$, $\chi^2$/df, CFI, GFI, AGFI, RMSEA and SRMR (Table 4). The Bollen–Stine p also suggested poor fit ($p = 0.000$). The items E1, E2, E9, E10, E15, E17, E18, E19 and E20 were excluded from the model and deleted due to the low values of factor loadings (lower than 0.5). Confirmatory analysis for the 12 item model (Model 2) (Table 4) obtained unsatisfactory results in terms of $\chi^2$, CFI and RMSEA indices, although $\chi^2$/df, SRMR, GFI and AGFI indices fell within the acceptable range (Kline, 2011). The Bollen–Stine p (BS p) also indicated poor fit of the model. Modification indices suggested that correlating error variances of some items would increase model fit. Based on the modification indices and taking into account theoretical relevance, the links between item 5 and items 8, 11 and 16 were allowed (Figure 2). Since all those items were on the PMTE scale, correlated errors among them were not an uncommon occurrence (Enochs, Smith, & Huinker, 2000). We believe that the error variances between some of the items were probably caused by similarities in their content. For example, items 5, 11 and 16 are directly connected with teachers' beliefs about their own mathematical knowledge. Similar results were obtained by Enoch, Smith and Huinker (2000) regarding items 5 and 11. There is a similarity in items 5 and 8 when translated into Serbian (item 8 in Serbian has a similar content as the reversed item 5), so we believe that this semantic likeness might be the reason for error covariances between these items. Cetinkaya and Erbas (2011) also reported that after translating the instrument into their native language, some items had content overlap due to the specifics of the language.

After modifications, the re-specified model was tested (Model 3). Allowing errors to co-vary significantly improved model fit. The values of $\chi^2$/df, CFI, TLI, GFI, AGFI, RMSEA and SRMR suggested that Model 3 has an acceptable fit to the data. Although the chi-square statistics $\chi^2$ of Model 3 remained significant ($p=0.017$), it was lower than that of the non-modified model, but the Bollen–Stine bootstrap ($p>0.05$) suggested that the model should be accepted (Table 4). The chi-square and its p-value are the basic measures of the goodness-of-fit, but they alone should not be used as measures of goodness-of-fit, as the existence of mul-

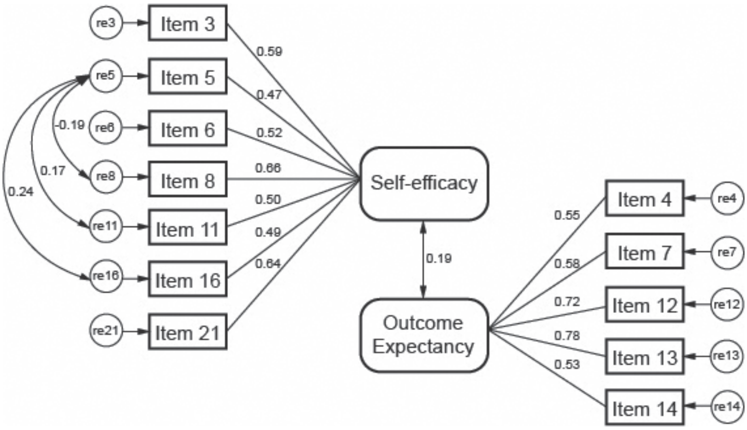


**Figure 2.** Two factor model MTEBI12 with correlated errors

tivariate non-normal data might produce invalid estimates. Therefore, the p-value of Bollen–Stine is used to assess the goodness-of-fit of the model. As indicated by the Bollen–Stine p-value, which is greater than 0.05 (0.126), the proposed model fits the data well.

**Table 4.** Summary of test statistics for CFA for Model 1, Model 2 and Model 3

| | χ2/p | χ2/df | BS p | RM-SEA | SRMR | GFI | AGFI | CFI |
|---|---|---|---|---|---|---|---|---|
| Model 1 | 407.670/0.000 | 2.168 | 0.000 | 0.680 | 0.085 | 0.860 | 0.828 | 0.804 |
| Model 2 | 104.947/0.000 | 1.980 | 0.008 | 0.062 | 0.062 | 0.933 | 0.901 | 0.920 |
| Model 3* | 73.483/0.017 | 1.470 | 0.126 | 0.043 | 0.057 | 0.955 | 0.930 | 0.964 |

GFI=Goodness-of-Fit Index; AGFI=Adjusted Goodness-of-Fit Index; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; SRMS=Standardized Root Mean Square Residual; BS p Bollen–Stine p.Criterion: *Criteria: GFI>.90, AGFI>.90, CFI>.95, RMSEA<.06 (Kline 2011), SRMR<0.08 (Hu and Bentler 1999), χ2/df<2.00 (Tabachnik and Fidell 2007), BS p>0.05 (Bollen and Stine 1992).

Factor correlation between PMTE-7 and MTOE-5 was statistically significant, but low(r=0.193), which suggested that latent factors represent distinct constructs (Brown, 2006). This is in line with previous research, that the two scales (PMTE and MTOE) are independent (Enochs, Smith, & Huinker, 2000). The item total correlations of all items with the rest of the items was in the range from 0.43 to 0.53 for the PMTE-7, and from 0.46 to 0.64 for the MTOE. The Cronbach alpha for the MTEBI-12 is 0.742, while for the PMTE-7 it is 0.756 and for the MTOE-5 it is 0.765. Correlation with the original 21 item version of the MTEBI is r=0.93.

## Conclusions

The main purpose of this study was to contribute to international research on evaluating the psychometric properties of the MTEBI. Confirmatory factor analysis suggested that the original two-factor model showed poor fit, but the re-specified 12-item model (with correlated errors) had acceptable levels of fit to the model. The MTEBI12 also showed good and acceptable reliability and internal consistency, both for the scale in general, and for the subscales. The results of confirmatory factor analysis and reliability analysis point out that MTEBI12 possesses adequate psychometric properties and construct validity, and that it is applicable to the sample of respondents in Serbia. The value of this study can be recognized in the fact that this is the first time that an instrument for assessing mathematics teaching efficacy beliefs was used in Serbia. Nevertheless, some further research work on examining validity and reliability of the MTEBI in Serbian educational settings is needed. The research on mathematics teaching efficacy beliefs has significance for educators involved in teacher education programmes who are constantly working on preparing future teachers to be able to teach mathematics effectively.

**Acknowledgements**
The authors would like to thank DeAnn Huinker for permission to use the research instrument MTEBI in their research.

## References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1–45). New York: Cambridge University Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
Bentler, P.M., & Wu, E.J.C. (2005). *EQS 6.1 for Windows user's Guide*. Encino, CA: Multivariate Software.
Bollen, K.A., & Stine, R.A. (1992). Bootstrapping goodness-of-fit measures in structural equation models. *Sociological Methods and Research*, *21*(2), 205–229.
Borko, H., & Putnam, R.T. (1996). Learning to teach. In D.C. Berliner and R.C. Calfee (Eds.), *Handbook of educational psychology* (pp. 673–708). New York: Macmillan.
Brown, T.A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.
Byrne, B.M. (2010). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming.* New York, NY: Routledge.
Cetinkaya, B., & Erbas, A.K. (2011). Psychometric properties of the Turkish adaptation of the Mathematics Teacher Efficacy Belief Instrument for in-service teachers. *The Spanish Journal of Psychology, 14*(2), 956–966.
Enochs, L.G., & Riggs, I.M. (1990). Further Development of an Elementary Science Teaching Efficacy Belief Instrument: A Preservice Elementary Scale. *School Science and Mathematics*, *90*(8), 694–706.
Enochs, L.G., Smith, P.L., & Huinker, D. (2000). Establishing factorial validity of the mathematics teaching efficacy instrument. *School Science and Mathematics*, *100*(4), 194–202.
Gavora, P. & Wiegerová, A. (2017). Self-efficacy of students in a pre-school education programme: the construction of a research instrument. *The New Educational Review*, *47*(1), 125–138.
Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55.
Kline, R.B. (2011). *Methodology in the Social Sciences. Principles and practice of structural equation modeling (3rd ed.).* New York, NY: Guilford Press.
Mardia, K.V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika*, *57*(3), 519–530.
Martins, M., Costa, J., & Onofre, M. (2015). Practicum experiences as sources of pre-service teachers' self-efficacy. *European Journal of Teacher Education*, *38*(2), 263–279.
Maasepp, B., & Bobis, J. (2014). Prospective primary teachers' beliefs about mathematics. *Mathematics Teacher Education and Development*, *16*(2), 89–107.
McGee, J.R., & Wang, C. (2014). Validity-supporting evidence of the self-efficacy for teaching mathematics instrument. *Journal of Psychoeducational Assessment*, *32*(5), 390–403.
Mihajlović, A. (2019). Increasing Pre-service Kindergarten Teachers' Mathematics Teaching Efficacy through Lesson Study. *The New Educational Review*, *55*(1), 89–99.
Mostofo, J. (2013). *Using lesson study with preservice secondary mathematics teachers: Effects on instruction, planning, and efficacy to teach mathematics* (Doctoral dissertation). Arizona State University, USA. Retrieved from https://repository.asu.edu/items/16460
Nevitt, J., & Hancock, G.R. (2001). Performance of bootstrapping approaches to model test statistics and parameter standard error estimation in structural equation modeling. *Structural Equation Modeling*, *8*(3), 353–377.

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics (5th ed.).* New York: Allyn and Bacon.

Takunyaci, M., & Takunyaci, M. (2014). Preschool teachers' mathematics teaching efficacy belief. *Procedia – Social and Behavioral Sciences*, *152*, 673–678.

Tschannen-Moran, M., & Hoy, A.W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783–805.

Wilhelm, A.G., & Berebitsky, D. (2019). Validation of the mathematics teachers' sense of efficacy scale. *Investigations in Mathematics Learning*, *11*(1), 29–43.