

A Longitudinal Examination of Preservice Primary School Teachers' Readiness for Teaching, Teaching Motivation and Mathematics Teaching Competencies

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Abstract

This study aimed to examine the development of preservice primary school teachers' readiness for teaching, teaching motivation and mathematics teaching competencies throughout their four-year undergraduate education, and to explore the relationships among these variables over time. The study employed a longitudinal research design in which data were collected at four measurement points corresponding to each year of the teacher education program. The sample included 46 preservice primary school teachers enrolled in a faculty of education in Istanbul, Türkiye. Data were collected using the Readiness for Teaching Scale, Teaching Motivation Scale and Mathematics Teaching Competency Scale. Correlational analyzes were conducted to examine the relationships among the variables across study years. The results revealed a positive moderate correlation between readiness for teaching and mathematics teaching competencies in the first, second and fourth year, and a strong positive correlation in the third year. Overall, significant positive relationships were identified among readiness for teaching, teaching motivation and mathematics teaching competencies across the four-year period. These results indicate an increase in professional readiness.

Key words: longitudinal design; teacher competencies; teaching motivation; teacher education programmes

Introduction

Nurturing individuals in education entails significant teacher responsibilities that align with the objectives set forth by education systems. Beyond facilitating students' academic growth and achievement, teachers play a crucial role in supporting their personal, social and emotional development and in guiding them on their way of becoming productive members of society (Heinz, 2015). As a result, teaching has become one of the most sought-after professions, and individuals aspiring to enter the profession are expected to possess a high level of motivation towards the teaching role they will assume (Yenilmez et al., 2018).

In Turkey, future teachers are educated at faculties of education, where they receive both theoretical and practical training related to the profession (Özoğlu et al., 2013). Admission to these programmes requires secondary school graduates to achieve the required scores in the two-stage higher education entrance examinations, followed by the completion of a four-year undergraduate education (Önen et al., 2023). Globally, teacher education programmes are responsible for equipping teacher candidates with the skills and knowledge necessary to become successful educators (Aynas & Yar Sevmiş, 2024; Cho & Shim, 2013). However, numerous studies indicate that teacher preparation programmes are often insufficient in addressing students' low academic performance and their inability to meet yearly standards (Roberts, 2016; Van Ingen et al., 2016). Consequently, many countries have introduced standards aimed at improving teacher qualifications and enhancing educational quality (Eret-Orhan et al., 2018). Within this context, the development of competent teachers through preservice education is considered essential for fostering students' academic proficiency (Dotters et al., 2016). Preservice teacher education is therefore expected to support the development of professional competencies that enable teacher candidates to facilitate effective learning processes (Rajić et al., 2015).

Teacher candidates' readiness for the profession, their teaching motivation and mathematics teaching competencies are expected to change positively throughout teacher education programmes. For this reason, examining whether these affective and professional characteristics change over the course of teacher education is considered important. Given the central role of primary school teachers in children's educational experiences and future academic trajectories, examining changes in these constructs over time is essential. Therefore, this study aimed to examine changes in preservice primary school teachers' readiness for teaching, teaching motivation and mathematics teaching competencies over the four-year period, from university enrolment to graduation.

Theoretical background

Readiness for the teaching profession

Teacher candidates' sense of readiness for the profession significantly influences their ability to fulfill teaching responsibilities and cope with professional challenges

throughout their careers (Brown et al., 2015). Readiness for teaching has been associated with success in professional practice, underscoring the importance of evaluating teacher candidates' readiness levels as well as the effectiveness of preservice education programmes (Aynas & Yar Sevmiş, 2024). Previous studies have examined readiness in various contexts, indicating that it is a dynamic construct that evolves throughout teacher education (Alsaleh & Anthony, 2018; Alsaleh, 2019; Ataş Akdemir, 2019; Aybek & Aslan, 2019; Chaves, 2018; Güner & Aslan, 2023; Yıldırım & Kalman, 2017; Twohill et al., 2023).

Teaching motivation

In addition to professional readiness, teaching motivation is considered a crucial factor in enhancing the quality and effectiveness of education systems. Motivation plays a pivotal role when enrolling in teacher education programmes and starting a teaching career (Dikmen et al., 2023; Zincirli, 2021). According to Ryan and Deci (2000), teachers' motivation significantly influences the attainment of educational goals. Societies that strive to advance therefore require teachers who demonstrate a desire for self-improvement and possess high levels of teaching motivation. Research has emphasized the importance of examining both the levels and sources of teaching motivation among teacher candidates enrolled in faculties of education, as well as identifying factors that influence this motivation (Yenilmez et al., 2018). Conversely, low levels of teaching motivation were found to have negative personal consequences for teachers (Cece et al., 2022). Teaching motivation is regarded as a key component of the educational process and is influenced by factors such as interest in and aptitude for the teaching profession, along with various related variables (Zincirli, 2021). Empirical studies have explored motivation among teacher candidates, highlighting the significance of this construct in both preservice and in-service contexts (Deringöl, 2020; Kauffman et al., 2011; Sinclair et al., 2006; Rutten & Badiali, 2024; Whitaker & Valtierra, 2018).

Self-efficacy and teaching competence

Another important construct for understanding teacher candidates' motivation is self-efficacy. This concept was introduced by Bandura within the framework of Social Learning Theory, suggesting that perceived competence informs motivation towards specific goals (Bandura, 1977, 1989). From a broader perspective, student motivation is contingent upon teachers' motivation as well as their professional competencies (Uzunçam et al., 2024). The received university education constitutes a critical stage in the development of teacher competence, and teachers themselves perceive this process as influencing their competence levels (Akbayır & Akça, 2021). Rooted in Social Cognitive Theory, teacher efficacy is defined as a form of self-efficacy, referring to individuals' beliefs about their capability to perform at a certain level of competence (Bandura, 1977, p. 480). Teaching competence informs teachers' instructional practices, expectations and beliefs regarding their teaching abilities, with teachers who perceive themselves as competent employing a wider range of instructional strategies during

both preservice and in-service experiences (Enochs et al., 2000). Teaching proficiency supports the development of effective instructional strategies and enhances teacher performance, efficacy and productivity (Dibapile, 2012).

Mathematics teaching competence

In the context of providing meaningful and effective mathematics education, teacher competence involves understanding mathematical concepts, continuously assessing students' progress, identifying individual learning needs and engaging in careful instructional planning (Allshop et al., 2018, acc. to Karalı, 2022). The belief in one's ability to teach mathematics successfully is defined as mathematics teaching competence (Giles et al., 2016). Teachers who demonstrate high levels of mathematics teaching competence are characterized by the ability to create student-centered learning environments, support students' development through individualized attention, assist students in developing skills and implement high-quality mathematics instruction (Boyd et al., 2014). Mathematics teaching competencies are expected to develop during preservice education (Akbayır & Akça, 2021; Davis et al., 2022; Hong & Han, 2018; Hourigan & Leavy, 2022; Karalı, 2022; Kim & Connelly, 2019; Krejci et al., 2022; Segarra & Julià, 2022; Ünlü & Ertekin, 2018).

This research is expected to fill the gap in the domain literature and thus strengthen our teacher training programmes and pinpoint the topics that new teachers need support in. For this reason, the study aimed to examine the changes in teacher preparation, teacher motivation and mathematics education qualifications during the four-year period – from the first year at university to the year of graduation. The sub-problems of the research are given below:

1. What are the levels of preservice primary school teachers' readiness for teaching, teaching motivation and mathematics teaching competencies with regard to the study year?
2. What changes have occurred over time (study year) in the preservice primary school teachers' readiness for teaching, teaching motivation and mathematics teaching competencies?
3. How have the teacher candidates' readiness for teaching, teaching motivation and mathematics teaching competencies changed over time regarding their self-perceptions of 'being a good teacher'?
4. Has the relationship between preservice primary school teachers' mathematics teaching competence, teaching motivation and readiness for teaching changed over time?

Methodology

Model of the research

Longitudinal method was used to collect data from the same sample group in different situations and times (Lynn, 2009). Longitudinal surveys involve survey

procedures that enable the collection of data on changes in a panel group of the same individuals to measure trends in the same group (Creswell, 2017). In this study, preservice primary school teachers were examined longitudinally for four years. By making repeated measurements at each study level, starting from the first year of university, the changes in the teacher candidates' readiness for the teaching profession, teaching motivation and mathematics teaching proficiency were examined.

Sample group

The research group consisted of preservice primary school teachers enrolled at a state university in Istanbul in Türkiye. The participants were selected via a random sampling method. As the physical, social and educational conditions were assumed to be comparable, the participants were deliberately chosen from a single university. Verbal informed consent was obtained from all participants; no written consent was collected. This study was designed as a longitudinal research, and the data collection instruments were administered to all preservice teachers at the beginning of each academic year. However, over the course of the study, some students transferred to other universities or discontinued their university education. The research initially began with 59 preservice teachers in the first year, and due to the reasons mentioned above, the number of participants gradually decreased to 46 in the final year. Therefore, students who withdrew from the study or discontinued their university education were not included in the analyses; only the data of preservice teachers who remained enrolled in the primary school teacher education programme across all four years were used. Participation in the research was voluntary. The research sample included 41 female participants (89.1 %) and five male participants (10.9 %). The perception and conclusion that most of preschool and classroom teachers are women have been the subject of many studies (Smedley, 2007). In Türkiye, teaching is perceived as a female profession and mostly chosen by females, which is confirmed in this research since the majority of preservice primary school teachers in the sample were female.

Data collection tools

Teacher Candidate Information Form, Preparedness to Teach Scale, Motivation to Teach Scale and Mathematics Teaching Competencies Scale were used as data collection tools.

Teacher Candidate Information Form: This form, developed by the researcher, entails questions on the study year, gender and the participants' perception of being a good teacher in the future. Gender included 'female' and 'male' answers, and the perceptions of being a good teacher 'yes' and 'no' answers.

Preparedness to Teach Scale-PTS: The scale developed by Yıldırım and Kalman (2017) was used to measure preservice primary school teachers' readiness for teaching. In total, a minimum of 20 and a maximum of 100 points were received. The reliability coefficient of the scale is set at .92, and in this study, the reliability coefficient was found to be .94.

Motivation to Teach Scale-MTS: In order to determine the teaching motivation of preservice primary school teachers, the scale developed by Kauffman et al. (2011), and adapted into Turkish by Ayık et al. (2015), was used. It is a five-point Likert type measurement tool consisting of 12 items in two dimensions: internal and external. Accordingly, the highest score on the scale was 60 and the lowest score was 12. The reliability coefficient of the scale is set at .86, and the reliability coefficient in this study was found to be .78.

Mathematics Teaching Competencies Scale-MTCS: The scale developed by Esendemir et al. (2015) was used to measure the competencies of preservice primary school teachers in teaching mathematics. The scale items were formed based on the dimensions of developing problem solving, communication, association and reasoning skills. This 5-point Likert scale entailed 20 items – 17 positive and 3 negative. Accordingly, the highest score on the scale was 100 and the lowest was 20. The reliability coefficient of the Mathematics Teaching Competencies Scale is set at .95, and the reliability coefficient in this study was found to be .91.

The research process

As this study was longitudinal in nature, it covered a four-year period. Participation in the research was voluntary. In the first year, following the orientation week, the preservice teachers were informed about the study. They were informed that the collected data would not be shared with any third parties and would be used solely for research purposes, and their consent was obtained accordingly. Throughout the entire research process, all procedures were conducted in accordance with ethical and scientific principles.

In the second week of each academic year, the measurement instruments were administered to the preservice primary school teachers within a 60-minute session. This procedure was repeated at the beginning of the second, third and fourth academic year. Each year, some students transferred to other universities or discontinued their university education; the data of these students were not included in the analyses. Data were collected at the beginning of each academic year, namely during the second week of the term, to ensure consistency between measurement stages and to capture developmental changes independent of short-term teaching or assessment-related effects. Because the study followed the same group of prospective primary school teachers for four years, participant loss occurred due to transfers to other universities or dropping out of university. To maintain longitudinal validity and ensure comparability between measurement stages, only data from participants who remained enrolled in the primary school teacher training programme all four academic years were included in the analyses. This approach is thought to allow for a more accurate examination of individual developmental trends over time. Following data collection, they were analyzed.

Data analysis

Data collection adhered to ethical principles, and voluntary participation was ensured. SPSS 25.0 was used for data analysis. To check whether the data followed a normal distribution, the Shapiro-Wilk test was used due to the small sample size (Razali & Wah, 2011). According to the Shapiro-Wilk normality analysis, it was found that Preparedness to Teach Scale ($p = .00 < .01$), Motivation to Teach Scale ($p = .91 > .05$), and Mathematics Teaching Competencies Scales ($p = .00 < .01$) all deviated from normal distribution. As teaching motivation emerged with normal values, another method, namely skewness and kurtosis, was utilized to assess the distribution's normality for the other scales. Accordingly, Preparedness to Teach Scale (skewness: $-.559$; kurtosis: $.812$), Motivation to Teach Scale (skewness: $-.008$; kurtosis: $-.255$) and Mathematics Teaching Competencies Scales (skewness: $-.199$; kurtosis: 1.984) were determined. Since skewness and kurtosis values fell within the range of -2 and $+2$ (George, & Mallery, 2010), it was concluded that the data were normal, and parametric tests including One-Way Analysis of Variance (ANOVA), Independent Samples t-test, and Pearson Correlation analysis were employed for further analysis.

Results

The results of the study are presented with regard to the research sub-problems. Accordingly, the findings of the first and second sub-problem are given in Table 1.

Table 1
Examination of the means for the utilized scales of preservice primary school teachers by study year

Scales	Year	N	Mean	Std. Deviation	Sum of squares	Mean square	F	p	Sign Diff. Groups
PTS	(1)1st Year	46	3.64	.72	2.975	.992	3.079	.029	4 > 1, 3 2 > 1
	(2)2nd Year	46	3.88	.48	57.977	.322			
	(3)3rd Year	46	3.71	.54	60.952				
	(4)4th Year	46	3.96	.48					
	Total	46	3.64	.72					
MTS	(1)1st Year	46	2.74	.65	.667	.222	.535	.659	---
	(2)2nd Year	46	2.79	.64	74.766	.415			
	(3)3rd Year	46	2.82	.67	75.434				
	(4)4th Year	46	2.90	.59					
	Total	46	2.82	.64					
MTCS	(1)1st Year	46	3.98	.58	.348	.116	.530	.662	---
	(2)2nd Year	46	4.03	.44	39.382	.219			
	(3)3rd Year	46	3.91	.46	39.730				
	(4)4th Year	46	3.96	.35					
	Total	46	3.97	.46					

The readiness levels of preservice primary school teachers, which vary within academic years, are 3.64 in the first year, 3.88 in the second year, 3.71 in the third year and 3.96 in the last year. Additionally, the average of the group was found to be 3.80. The teaching motivation of preservice primary school teachers, which varies within academic years, is 2.74 in the first year, 2.79 in the second year, 2.82 in the third grade and 2.90 in the senior year. Additionally, the average of the group was found to be 2.82. Regarding the participants' competencies in teaching mathematics, the average values are 3.98 in the first year, 4.03 in the second year, 3.91 in the third year and 3.96 in the senior year. Additionally, the average of the group was found to be 3.97 (Table 1). To determine the levels based on the scores obtained from the scales, the scale's range width was calculated using the formula "range width/number of groups to be created" ($4/5 = 0.80$) (Tekin, 1993). The arithmetic mean intervals of the scale were determined as follows: 1.00-1.79 'Very Low', 1.80-2.59 'Low', 2.60-3.39 'Moderate', 3.40-4.19 'High', 4.20-5.00 'Very High'. According to this, the preservice primary school teachers' proficiency in teaching mathematics at each year and their readiness for teaching are 'high'; it can be said that their teaching motivation is at a 'medium' level. Additionally, with regard to their changing situations within study years, teacher readiness and teaching motivation scores increased at every year level and are highest in the fourth year. Their proficiency in teaching mathematics was at its highest level in the second year, and although there was a decrease in the third year, it increased again in the fourth.

One-Way Analysis of Variance (ANOVA) was conducted to determine whether the scores of preservice primary school teachers on the examined variables changed according to the study year. Accordingly, the difference between the average scores of Preparedness to Teach Scale (PTS) [$F_{(3-180)} = 3.079, p < .05$] of the primary school teacher candidates according to study year is statistically significant (Table 1). LSD post hoc tests were performed to determine which groups were different: among the 4th-year teacher candidates, 1st-year and 3rd-year teacher candidates, 2nd-year teacher candidates were found to be more ready for teaching than the 1st-year teacher candidates. The differences between the scores on Motivation to Teach Scale (MTS) [$F_{(3-180)} = .535, p > .05$] and Mathematics Teaching Competencies Scale (MTCS) [$F_{(3-180)} = .530, p > .05$] were not statistically significant.

The findings regarding the third sub-problem are shown in Table 2.

Every year, preservice primary school teachers were asked to answer the question 'Do you think you will be a good teacher?' Independent Sample t-Test was conducted to see whether there was a significant difference in the change of this perception over time. Accordingly, the Preparedness to Teach Scale (PTS) was used in the 1st year ($t = 2.027, p < .05$), in the 2nd year ($t = 2.040, p < .05$), and in the 3rd ($t = 3.485, p < .01$) and 4th year ($t = 3.895, p < .01$). With regard to Motivation to Teach Scale (MTS), the scores were found to be statistically significant in 1st year ($t = 2.690, p < .01$), 2nd year ($t = 2.153, p < .05$) and 4th year ($t = 3.194, p < .05$). Finally, the scores on Mathematics Teaching Competencies Scales (MTCS) significantly increased in 3rd ($t = 3.693,$

Table 2
Changes in preservice primary school teachers' perceptions of 'being a good teacher' over time

Scales	Year		N	Mean	sd	t	p
PTS	1 st year	Yes	33	3.77	.67	2.027	.049
		No	13	3.31	.75		
	2 nd year	Yes	36	3.95	.44	2.040	.047
		No	10	3.61	.56		
	3 rd year	Yes	38	3.82	.50	3.485	.001
		No	8	3.16	.37		
4 th year	Yes	40	4.05	.42	3.895	.000	
	No	6	3.34	.39			
MTS	1 st year	Yes	33	2.89	.63	2.690	.010
		No	13	2.35	.57		
	2 nd year	Yes	36	2.90	.64	2.153	.037
		No	10	2.42	.53		
	3 rd year	Yes	38	2.91	.68	1.962	.056
		No	8	2.41	.49		
4 th year	Yes	40	3.00	.56	3.194	.003	
	No	6	2.25	.36			
MTCS	1 st year	Yes	33	4.07	.60	1.635	.109
		No	13	3.76	.47		
	2 nd year	Yes	36	4.09	.41	1.948	.058
		No	10	3.80	.47		
	3 rd year	Yes	38	4.01	.42	3.693	.001
		No	8	3.42	.33		
4 th year	Yes	40	4.03	.32	3.457	.001	
	No	6	3.55	.23			

$p < .01$) and 4th year ($t = 3.457$, $p < .01$). The obtained scores show that participants who thought they would be good teachers had higher scores than those who thought they would not (Table 2). It was concluded that the scores of the Motivation to Teach Scale (MTS) in the third year ($t = 1.962$, $p > .05$) and the scores of the Mathematics Teaching Competencies Scale (MTCS) in the first year ($t = 1.635$, $p > .05$) and second year ($t = 1.948$, $p > .05$) were not statistically significant.

The results of the fourth sub-problem are shown in Table 3.

Pearson correlation analysis was conducted to examine the relationships among the Preparedness to Teach Scale (PTS), Motivation to Teach Scale (MTS) and Mathematics Teaching Competencies Scale (MTCS) scores across academic years. The results revealed a positive, moderate relationship between PTS and MTS scores in the third year ($r = .460$, $p < .01$) and the fourth year ($r = .562$, $p < .01$). As presented in Table 5, although correlation coefficients were observed in the first ($r = .460$, $p > .05$) and second ($r = .460$, $p > .05$) year, these relationships were not statistically significant.

Table 3
Relationships between preservice primary school teachers' PTS, MTCS and MTS scores

Scales	Year	N	r	p
MTS	1 st year	46	.074	.623
	2 nd year	46	.267	.073
	3 rd year	46	.460	.001**
	4 th year	46	.562	.000**
MTCS	1 st year	46	.482	.001**
	2 nd year	46	.597	.000**
	3 rd year	46	.708	.000**
	4 th year	46	.516	.000**

With respect to the relationship between PTS and MTCS scores, a positive and moderately significant relationship was identified in the first ($r = .482, p < .01$), second ($r = .597, p < .01$) and fourth year ($r = .516, p < .01$). In contrast, a positive and highly significant relationship was found in the third year ($r = .708, p < .01$).

Discussion

The initial results of this longitudinal study, which scrutinized the preparedness for teaching, teaching motivation and mathematics teaching competencies of prospective classroom educators over a four-year span, from their enrollment in university until graduation, revealed that pre-service primary school teachers demonstrated a 'high' readiness for teaching across all academic years and exhibited competence in teaching mathematics. However, their teaching motivation was assessed at a 'medium' level. It is encouraging that teacher candidates perceive themselves as ready for the teaching profession, which is facilitated by their chosen pedagogical training, and they increasingly perceive themselves as competent in teaching mathematics, a core subject in primary education, as they progress through their academic journey. Conversely, in terms of teaching motivation, it was noted that their motivation may still be at a medium level, likely due to the lack of professional experience and practical application of the theoretical knowledge acquired during education, beyond their school-based practicum experiences. Notably, there was a discernible upward trajectory in both teaching motivation and readiness scores across each academic year, with the highest scores observed in the fourth year, which indicates a positive trend in the outcomes of their educational experiences. The peak proficiency in teaching mathematics was observed in the second year, with a subsequent decline in the third year, followed by a resurgence in the fourth year, which prompted further inquiry into this fluctuation. To contextualize these findings within the existing literature, a review of related studies was conducted. Research by Alsaleh and Anthony (2018) investigated the preparedness of teacher candidates in Saudi Arabia to teach mathematics in secondary schools. The study, involving 16 female mathematics teacher candidates, revealed that while these candidates felt prepared in teaching methods and strategies by the end of their four-year education,

they expressed less readiness in areas such as classroom management, lesson preparation and technology integration. In another study conducted in Saudi Arabia, Alsaleh (2019) monitored the readiness for teaching of 105 senior mathematics teacher candidates over a four-month period, revealing that they felt prepared to teach mathematics in schools. Moreover, a phenomenological study by Chaves (2018) delved into the experiences of beginning elementary school teachers in a large school district in southeastern Massachusetts, shedding light on their perceptions of preparedness to teach elementary mathematics and handle students' mathematical difficulties. Participants, including teachers with less than five years of experience teaching grades one through six, described feeling ill-equipped not only to teach mathematics but also to address the challenges arising in their classrooms. Collectively, these studies underscored the variability in teacher candidates' readiness for the profession, with some studies indicating high readiness, while others highlighted perceived inadequacies in preparedness (Aybek & Aslan, 2019; Güner, & Aslan, 2023). In this study, the teaching motivation of preservice primary school teachers gradually increased over the years, maintaining a medium level throughout. Similarly, Deringöl (2020) conducted a study revealing positive and high levels of teaching motivation among preservice primary school teachers. Furthermore, Baş (2022) investigated the teaching beliefs, self-efficacy and motivation of 447 teacher candidates, finding that teaching beliefs and attitudes toward teaching significantly predicted teaching motivation. In this study, preservice primary school teachers' mathematics teaching competencies significantly increased over time, as documented by Ünlü and Ertekin (2018) in a longitudinal study involving 39 teacher candidates. Conversely, the mathematics self-efficacy beliefs of these candidates were found to be at a moderate level. Despite minor fluctuations, the average scores of teacher candidates remained relatively consistent across the academic years. Specifically, self-efficacy beliefs towards mathematics teaching were assessed as moderate at the conclusion of the first, second and third year, reaching a high level by the conclusion of the fourth year. Similarly, Kim and Connelly's (2019) investigation with third and final year teacher candidates reported high levels of mathematics teaching self-efficacy beliefs, aligning with the findings of the present study. Hourigan and Leavy's (2022) research, conducted with 420 preservice primary school teachers in Ireland, corroborated the substantial influence of mathematics experiences in secondary education on the mathematics teaching competencies of teacher candidates during their university education. Similarly, , in their meta-analysis study examining teacher competencies in mathematics teaching, Akbayır and Akça (2021) highlighted teachers' perspectives indicating the influence of university education on their mathematics proficiency. Conversations with teachers revealed that university mathematics education played a pivotal role in shaping the mathematics competencies of primary school teachers. Numerous studies underscored the significance of university education on teachers' mathematics competence, with works by Hill et al. (2005) and Smith (2000) among them. When analyzing the variations in preservice primary

school teachers' readiness to teach, teaching motivation and mathematics teaching competencies across different grade levels, statistically significant differences were observed in the readiness for teaching among teacher candidates across different academic years. Fourth-year teacher candidates exhibited higher readiness levels compared to their first and third-year counterparts, with second-year candidates demonstrating greater readiness compared to first-year candidates. This progressive increase in readiness for teaching among preservice primary school teachers reflects positively on the efficacy of teacher training programs. While candidates may have initially felt less prepared during their first year at the faculty, their readiness for the teaching profession improved over time due to theoretical and practical training provided during their higher education. Furthermore, the study found no statistically significant differences in teaching motivation and mathematics teaching competencies across different study years. However, an examination of changing scores revealed that teaching motivation gradually increased at each academic year, peaking in the fourth. Similarly, proficiency in teaching mathematics was highest in the second year, albeit with a slight decrease in the third year, followed by a resurgence in the fourth. Teacher candidates' teaching motivation may also change over time (Davis & Wilson, 2000; Sinclair et al., 2006). The studies by Sinclair et al. (2006) and Sinclair (2008) align with the results of this research, which shows that the teaching motivation of preservice primary school teachers tends to increase as their academic level or age advances. This suggests a positive correlation between academic progression and teaching motivation, possibly reflecting a deeper commitment to the teaching profession as candidates gain more experience and maturity. In a two-year mixed-method case study conducted by Whitaker and Valtierra (2018), the impact of a teacher preparation programme on changing teacher candidates' motivation to teach culturally and linguistically diverse students was examined. The findings revealed statistically significant changes in self-confidence in teaching diverse students, self-efficacy for culturally sensitive pedagogy and perceptions and interests in the value of multicultural teaching among those with a master's degree in teaching. This underscored the potential for targeted interventions within teacher preparation programmes to influence and enhance teaching motivation, particularly in addressing the needs of diverse student populations. Similarly, Deringöl's (2020) study with preservice primary school teachers found that while teaching motivation tended to increase with academic level progression, it did not yield statistical significance. Despite this finding, the observed trend suggested a potential pattern wherein teaching motivation may indeed evolve over time, albeit without notable statistical variations. These findings collectively highlight the complex interplay of factors shaping teaching motivation and underscore the importance of continued research and support initiatives aimed at understanding and fostering educators' motivation throughout their careers. The findings of this study, which show no statistically significant difference in mathematics teaching competencies across different academic levels, but a consistent increase in scores over time, align with the

results of another longitudinal study conducted by Ünlü and Ertekin (2018) with 39 teacher candidates. In their study, self-efficacy beliefs of teacher candidates towards mathematics teaching throughout their undergraduate education were assessed, revealing a significant increase by the end of the fourth year. This suggested a positive trajectory in mathematics teaching competencies over the course of teacher education programmes, regardless of specific grade levels. It showed that individuals' perceptions of competence regarding a particular subject and its teaching are highly related to their knowledge of mathematics and mathematics teaching (Seo & Lee, 2017). In order to increase teachers' interest in teaching mathematics, paying more attention to pedagogical information about mathematics teaching-learning methods in teacher training courses will contribute positively to mathematics teaching competencies (Seo & Lee, 2017; Twohill et al., 2023). Courses on teaching methods in teacher training programmes have a great impact on increasing the mathematics teaching competencies of preservice teachers (Krejci et al., 2022). It's reasonable to consider that the courses related to teaching mathematics taken by preservice primary school teachers at education faculties in Türkiye may have influenced the findings of this research. Although it has been consistently increasing, it reached its peak at the second academic year. In Türkiye, preservice primary school teachers take Basic Mathematics I-II in their first year and Mathematics Teaching I-II courses in their third year. They might have felt more competent in mathematics teaching in the second year due to the two mathematics courses they took in the first year. The mathematics teaching courses in the third year, where they have the opportunity for in-class practices, may have positively influenced their perceptions of competency. Additionally, in their fourth year, preservice teachers conduct internships in primary schools through Teaching Practice I-II courses. With these courses, they have the chance to apply what they have learned in education faculties in real classroom settings. Therefore, they might have perceived themselves as more competent in mathematics teaching compared to other, previous academic years. In a study by Twohill et al. (2023) involving 450 preservice primary school teachers, it was concluded that readiness for the profession is related to mathematics teaching competencies, and additionally, mathematics achievement predicted both of these variables. Emphasis has been placed on the importance of the content and nature of teacher education programmes. Furthermore, the impact of experience on these two variables has been discussed. Within the framework of this research, preservice primary school teachers were surveyed annually with the question 'Do you think you will be a good teacher?' from the start of their university education until graduation. Their responses were analyzed each year, which revealed significant correlations with readiness for teaching across all four years, as well as with teaching motivation and mathematics teaching competencies in the third and fourth year. Upon examining the scores, it was noted that candidates who expressed confidence in their ability to become good teachers consistently scored higher than those who did not. Notably, teaching motivation was found to be insignificant in the third year, while

mathematics teaching competencies were insignificant in the first and second year. The varying perceptions among preservice teachers regarding their future effectiveness as educators may be influenced by the adequacy of teacher training programmes and their experiences in practical settings. To bolster the preparation of teacher candidates, particularly in the realm of teaching mathematics, increased engagement in school-based activities, notably through internships embedded within teaching practice courses, may prove beneficial. The findings of this study align with the research conducted by Hong and Han (2018) with 61 mathematics teacher candidates, which found the increase in mathematics teaching competencies subsequent to teaching practice engagement. Similarly, Davis et al. (2022) observed an enhancement in mathematics teaching competencies among teacher candidates facilitated by the establishment of virtual classroom environments and active involvement in teaching activities. In the Turkish context, where this investigation was conducted, primary school teacher courses are segmented into three principal categories: field and field education, teaching profession knowledge and general culture courses. Notably, field and field education courses constitute the majority of the curriculum, with the remaining portion evenly distributed between teaching profession knowledge and general culture courses. A notable aspect of these courses is the predominance of theoretical content, which accounts for 75 % of the curriculum, while practical components make up the remaining 25 % (YÖK, 2007). This instructional structure highlights a discernible disproportion between theoretical and practical training in Turkish teacher education programmes, with practical training receiving less emphasis compared to theoretical instruction (EACEA-Eurydice, 2015). Numerous scholarly investigations underscored the imperative of practical implementation in teacher education programmes, with many advocating for an elevation of practical training opportunities in Turkish contexts, where such experiences are not consistently provided at a satisfactory level. Hence, expanding opportunities for preservice teachers to engage in practical experiences, such as internships and field placements, holds considerable significance for augmenting their readiness and proficiency in teaching mathematics and other subjects (Zelyurt & Sucu, 2022). Finally, the research examined whether there was a relationship between preservice primary school teachers' readiness for teaching, which varied according to study years, and their teaching motivation and mathematics teaching competencies. A positive and moderate relationship was found between their readiness for teaching and their teaching motivation in the third and fourth year, but no significant correlation was found in the first and second study year. At the same time, a positive and moderate correlation was found between their readiness for teaching and mathematics teaching competencies in the first, second and fourth year, and a positive moderate relationship in the third academic year.

Overall, the results indicate a highly significant relationship among these variables. The fact that preservice teachers feel ready for the teaching profession as a result of the training they have received, their high motivation to teach and the fact they consider

themselves competent for teaching mathematics may be related to the instruction they received at universities. The findings suggest that opportunities for preservice primary school teachers to apply the acquired subject-specific and pedagogical knowledge in primary school settings during the fourth year of undergraduate education, which is the final year in Türkiye, may have contributed to the relationships observed in this study.

Conclusion

This study examined the levels of professional readiness of preservice primary school teachers studying at faculties of education in Türkiye their motivation to teach and the changes in their proficiency in teaching mathematics. In response to the research questions, the findings indicated that preservice teachers' professional readiness and their proficiency in teaching mathematics significantly changed over the course of their university education. However, limited or fluctuating changes were observed in certain dimensions of teaching motivation. These findings suggest that the professional development of preservice teachers does not follow a linear trajectory and that both the content of teacher education programmes and the degree to which they emphasize practice play a determining role in this developmental process.

Practical implications/recommendations

Drawing on the findings of the study, it is recommended to enrich courses related to mathematics teaching in primary teacher education programmes with practice-based activities and early classroom experiences. To support preservice teachers' motivation to teach in a sustainable manner, teacher education programmes should incorporate reflective practices, mentoring processes and structured feedback that strengthen candidates' perceptions of professional competence. Furthermore, programme evaluation and improvement efforts aimed at improving preservice teachers' levels of professional readiness should be informed by evidence derived from longitudinal research.

Limitations and directions for future research

This study is limited to preservice primary school teachers and focuses solely on the period from the first year of university education through graduation. In addition, the study was based exclusively on data obtained through the measurement instruments employed. Future research may benefit from incorporating qualitative data collection methods to examine preservice teachers' experiences in greater depth, and from conducting comparative longitudinal studies across different teacher education programs. Moreover, studies that extend beyond graduation to include the early years of professional practice may provide valuable insights into the long-term effects of teacher education programmes.

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Longitudinalno ispitivanje spremnosti za poučavanje, motivacije za poučavanje i kompetencija za poučavanje matematike među budućim učiteljima primarnoga obrazovanja

Sažetak

Cilj ovoga istraživanja bio je ispitati razvoj spremnosti za poučavanje, motivacije za poučavanje i kompetencija za poučavanje matematike budućih učitelja primarnoga obrazovanja tijekom njihova četverogodišnjega preddiplomskog obrazovanja te istražiti odnose među tim varijablama tijekom vremena. U studiji je primijenjen longitudinalni istraživački dizajn u kojem su podatci prikupljeni u četiri mjerne točke koje su odgovarale svakoj godini programa obrazovanja učitelja. U istraživanju je sudjelovalo 46 budućih učitelja primarnoga obrazovanja upisanih na učiteljski fakultet u Istanbulu, Turska. Podatci su prikupljeni korištenjem Skale spremnosti za poučavanje, Skale motivacije za poučavanje i Skale kompetencija za poučavanje matematike. Korelacijske analize provedene su radi ispitivanja odnosa među varijablama na različitim godinama studija. Rezultati su pokazali pozitivnu umjerenu korelaciju između spremnosti za poučavanje i kompetencija za poučavanje matematike u prvoj, drugoj i četvrtoj godini te snažnu pozitivnu korelaciju u trećoj godini. Općenito, tijekom četverogodišnjega razdoblja utvrđene su statistički značajne pozitivne povezanosti između spremnosti za poučavanje, motivacije za poučavanje i kompetencije za poučavanje matematike. Ovi nalazi ukazuju na to da su porasti profesionalne spremnosti povezani.

Ključne riječi: longitudinalni dizajn; motivacija u poučavanju; programi obrazovanja učitelja; učiteljske kompetencije

Uvod

Učitelji nose značajne odgovornosti u odgoju i obrazovanju pojedinaca koji su usklađeni s ciljevima postavljenima obrazovnim sustavima. Osim što omogućuju

akademski rast i uspjeh učenika, učitelji imaju ključnu ulogu u podržavanju njihova osobnoga, socijalnoga i emocionalnoga razvoja te u usmjeravanju prema tome da postanu produktivni članovi društva (Heinz, 2015). Kao rezultat toga, učiteljsko zanimanje postalo je jedno od najtraženijih zanimanja, a od pojedinaca koji žele ući u tu profesiju očekuje se da posjeduju visoku razinu motivacije prema učiteljskoj ulozi koju će preuzeti (Yenilmez, Balbağ i Turğut, 2018).

U Turskoj se obrazovanje učitelja provodi na učiteljskim fakultetima, gdje studenti učiteljskoga studija prolaze i teorijsku i praktičnu izobrazbu povezanu s profesijom (Özoğlu, Gür i Altunoğlu, 2013). Upis u ove programe zahtijeva da maturanti postignu propisane bodove na dvostupanjskim prijemnim ispitima za visoko obrazovanje, nakon čega slijedi završetak četverogodišnjega preddiplomskog studija (Önen i sur., 2023). Na globalnoj razini programi obrazovanja učitelja imaju ključnu ulogu u osposobljavanju budućih učitelja znanjima i vještinama potrebnima za učinkovito djelovanje u nastavničkoj profesiji (Aynas i Yar Sevmiş, 2024; Cho i Shim, 2013). Međutim, brojna istraživanja ukazuju na to da programi pripreme učitelja često nisu dostatni u rješavanju niskoga akademskog postignuća učenika i njihove nemogućnosti da ispune standarde predviđene za razinu razreda (Roberts, 2016; Van Ingen, Eskelson i Allsopp, 2016). Posljedično, mnoge su zemlje uvele standarde usmjerene na unaprjeđenje kvalifikacija učitelja i poboljšanje kvalitete obrazovanja (Eret-Orhan, Ok i Capa-Aydin, 2018). U tome se kontekstu razvoj kompetentnih učitelja tijekom inicijalnoga obrazovanja smatra ključnim za poticanje akademske uspješnosti učenika (Dotters i sur., 2016). Stoga se od inicijalnoga obrazovanja učitelja očekuje da podrži razvoj profesionalnih kompetencija koje omogućuju budućim učiteljima olakšavanje učinkovitih procesa učenja (Rajić, Hoşgörür i Drvodelić, 2015).

Očekuje se da se spremnost studenata koji se obrazuju za učiteljsku profesiju, njihova motivacija za poučavanje i njihove kompetencije za poučavanje matematike pozitivno mijenjaju tijekom programa obrazovanja učitelja. Iz toga razloga smatra se važnim ispitati mijenjaju li se ove afektivne i profesionalne karakteristike tijekom obrazovanja učitelja. S obzirom na središnju ulogu učitelja primarnoga obrazovanja u obrazovnim iskustvima djece i njihovim budućim akademskim putanjama, ispitivanje promjena u ovim konstruktima tijekom vremena od ključne je važnosti. Stoga je cilj ove studije bio ispitati promjene u spremnosti za poučavanje, motivaciji za poučavanje i kompetencijama za poučavanje matematike među budućim učiteljima primarnoga obrazovanja tijekom četverogodišnjega razdoblja od upisa na sveučilište do diplomiranja.

Teorijska osnova

Spremnost za učiteljsku profesiju

Osjećaj profesionalne spremnosti studenata učiteljskoga studija značajno utječe na njihovu sposobnost izvršavanja nastavničkih odgovornosti i suočavanja s profesionalnim izazovima tijekom njihove karijere (Brown, Lee i Collins, 2015). Spremnost za poučavanje povezana je s uspjehom u profesionalnoj praksi, što naglašava važnost

procjenjivanja razina spremnostistudenata učiteljskoga studija, kao i učinkovitosti programa inicijalnoga obrazovanja učitelja (Aynas i Yar Sevmiş, 2024). Prethodna istraživanja ispitivala su spremnost u različitim kontekstima, ukazujući na to da je riječ o dinamičnom konstrukt koji se razvija tijekom obrazovanja učitelja (Alsaleh i Anthony, 2018; Alsaleh, 2019; Ataş Akdemir, 2019; Aybek i Aslan, 2019; Chaves, 2018; Güner i Aslan, 2023; Yıldırım i Kalman, 2017; Twohill i sur., 2023).

Motivacija za poučavanje

Uz profesionalnu spremnost, motivacija za poučavanje smatra se ključnim čimbenikom u unaprjeđenju kvalitete i učinkovitosti obrazovnih sustava. Motivacija ima presudnu ulogu pri ulasku u programe obrazovanja učitelja te pri započinjanju učiteljske karijere (Dikmen, Şahin i Karakaya, 2023; Zincirli, 2021). Prema Ryanu i Deci (2000), motivacija učitelja značajno utječe na ostvarivanje obrazovnih ciljeva. Društva koja teže napretku stoga trebaju učitelje koji pokazuju želju za samousavršavanjem i koji posjeduju visoku razinu motivacije za poučavanje. Istraživanja su naglasila važnost ispitivanja i razina i izvora motivacije za poučavanje među studentima učiteljskoga studija upisanima na učiteljske fakultete, kao i identificiranja čimbenika koji utječu na tu motivaciju (Yenilmez, Balbağ i Turğut, 2018). Suprotno tome, pokazalo se da su niske razine motivacije za poučavanje snažno povezane s negativnim osobnim posljedicama za učitelja (Cece i sur., 2022). Motivacija za poučavanje smatra se ključnom sastavnicom obrazovnoga procesa te je pod utjecajem čimbenika kao što su interes za učiteljsku profesiju i sklonost prema njoj, zajedno s različitim povezanim varijablama (Zincirli, 2021). Empirijska istraživanja ispitivala su motivaciju među studentima učiteljskoga studija, naglašavajući važnost ovoga konstrukta i u kontekstu inicijalnoga obrazovanja i u kontekstu rada u službi (Deringöl, 2020; Kauffman, Yılmaz Soyulu i Duke, 2011; Sinclair, Dowson i McInerney, 2006; Rutten i Badiali, 2024; Whitaker i Valtierra, 2018).

Samoučinkovitost i učiteljska kompetencija

U razumijevanju motivacije studenata učiteljskoga studija važnu ulogu ima i konstrukt samoučinkovitosti. Ovaj je koncept uveo Bandura u okviru Teorije socijalnoga učenja, sugerirajući da percipirana kompetencija informira motivaciju prema određenim ciljevima (Bandura, 1977, 1989). Iz šire perspektive, motivacija učenika ovisi o motivaciji učitelja za poučavanje, kao i o posjedovanju profesionalnih kompetencija koje profesija zahtijeva (Uzunçam, Erdoğan i Özkan, 2024). Obrazovanje stečeno na sveučilištu predstavlja ključnu fazu u razvoju učiteljske kompetencije, a sami učitelji percipiraju ovaj proces kao čimbenik koji utječe na razine njihove kompetencije (Akbayır i Akça, 2021). Utemeljena u Teoriji socijalne kognicije, učiteljska učinkovitost definira se kao oblik samoučinkovitosti koji se odnosi na uvjerenja pojedinaca o vlastitoj sposobnosti postizanja određene razine kompetencije (Bandura, 1977, str. 480). Učiteljska kompetencija usmjerava nastavne prakse učitelja, njihova očekivanja i uvjerenja o vlastitim sposobnostima poučavanja, pri čemu učitelji koji

sebe percipiraju kompetentnima primjenjuju širi raspon nastavnih strategija tijekom inicijalnoga obrazovanja i rada u službi (Enochs, Smith i Huinker, 2000). Nastavna osposobljenost podupire razvoj učinkovitih nastavnih strategija te unaprjeđuje učiteljski rad, učinkovitost i produktivnost (Dibapile, 2012).

Kompetencija za poučavanje matematike

U kontekstu pružanja smislenoga i učinkovitoga obrazovanja iz matematike, učiteljska kompetencija uključuje razumijevanje matematičkih pojmova, kontinuirano praćenje napretka učenika, identificiranje individualnih potreba učenja te pažljivo planiranje nastave (Allshop, Lovin i Ingen, 2018, prema Karali, 2022). Uvjerenje u vlastitu sposobnost uspješnoga poučavanja matematike definira se kao kompetencija za poučavanje matematike (Giles i sur., 2016). Učitelji koji pokazuju visoke razine kompetencije za poučavanje matematike karakterizirani su sposobnošću stvaranja učeniku usmjerenih okružja za učenje, podržavanja razvoja učenika putem individualizirane pažnje, pomaganja učenicima u razvoju vještina te provedbe visokokvalitetne nastave matematike (Boyd, Foster, Smith i Boyd, 2014). Očekuje se da se kompetencije studenata učiteljskoga studija u poučavanju matematike razvijaju tijekom inicijalnoga obrazovanja (Akbayır i Akça, 2021; Davis i sur., 2022; Hong i Han, 2018; Hourigan i Leavy, 2022; Karali, 2022; Kim i Connelly, 2019; Krejci, Elana i Gabriele, 2022; Segarra i Julià, 2022; Ünlü i Ertekin, 2018).

Ovim istraživanjem nastoji pridonijeti popunjavanju praznina u postojećoj literaturi te pružiti spoznaje relevantne za unaprjeđenje programa obrazovanja učitelja, osobito u područjima u kojima su potrebna dodatna poboljšanja, kao i identificirati područja u kojima je novim učiteljima potrebna podrška. Iz toga razloga, cilj ove studije bio je ispitati promjene u pripremljenosti za poučavanje, motivaciji za poučavanje i kvalifikacijama za poučavanje matematike tijekom četverogodišnjega razdoblja od prve godine sveučilišta do godine diplomiranja. Specifična istraživačka pitanja navedena su u nastavku:

1. Kako se spremnost za poučavanje, motivacija za poučavanje i kompetencije za poučavanje matematike razlikuju među budućim učiteljima primarnoga obrazovanja s obzirom na godinu studija?
2. Kakve su se promjene tijekom vremena (tijekom godina studija) dogodile u spremnosti za poučavanje, motivaciji za poučavanje i kompetencijama za poučavanje matematike budućih učitelja primarnoga obrazovanja?
3. Kako su se spremnost za poučavanje, motivacija za poučavanje i kompetencije za poučavanje matematike studenata učiteljskoga studija mijenjale tijekom vremena s obzirom na njihovu procjenu o tome jesu li dobar učitelj ili ne?
4. Postoji li odnos između kompetencija za poučavanje matematike, motivacije za poučavanje i spremnosti za poučavanje među budućim učiteljima primarnoga obrazovanja te mijenja li se taj odnos tijekom vremena?

Metodologija

Model istraživanja

U istraživanju je korištena longitudinalna metoda za prikupljanje podataka od iste skupine uzorka u različitim situacijama i vremenima (Lynn, 2009). Longitudinalna istraživanja uključuju postupke anketiranja koji omogućuju prikupljanje podataka o promjenama u panel-skupini istih pojedinaca radi mjerenja trendova u istoj skupini (Creswell, 2017). U ovom su istraživanju budući učitelji primarnoga obrazovanja longitudinalno praćeni tijekom četiri godine. Promjene u spremnosti za učiteljsku profesiju, motivaciji za poučavanje i kompetenciji za poučavanje matematike među studentima učiteljskoga studija spitivane su primjenom ponovljenih mjerenja na svakoj godini studija, počevši od prve godine studija.

Uzorak sudionika

Istraživačku skupinu činili su budući učitelji primarnoga obrazovanja upisani na državno sveučilište u Istanbulu, Turska, odabrani metodom jednostavnoga slučajnog uzorkovanja. Budući da se pretpostavljalo da su fizički, socijalni i obrazovni uvjeti usporedivi, uzorkovanje je namjerno provedeno uz sudjelovanje budućih učitelja primarnoga obrazovanja s jednoga sveučilišta. Od svih sudionika dobivena je usmena informirana suglasnost, pisana suglasnost nije prikupljena. Ovo je istraživanje osmišljeno kao longitudinalno istraživanje, a instrumenti za prikupljanje podataka primijenjeni su na sve buduće učitelje na početku svake akademske godine. Međutim, tijekom istraživanja neki su se studenti prebacili na druga sveučilišta ili prekinuli svoje sveučilišno obrazovanje. Istraživanje je započelo s 59 budućih učitelja u prvoj godini, a zbog navedenih razloga broj sudionika postupno se smanjio na 46 u završnoj godini. Stoga podatci studenata koji su se povukli iz istraživanja ili prekinuli svoje sveučilišno obrazovanje nisu uključeni u analize; korišteni su samo podatci budućih učitelja koji su kontinuirano ostali upisani na učiteljskom fakultetu, programu obrazovanja učitelja primarnoga obrazovanja tijekom sve četiri godine studija. Sudjelovanje u istraživanju bilo je dobrovoljno. 89,1 % budućih učitelja primarnoga obrazovanja koji su sudjelovali u istraživanju su žene (N = 41), a 10,9 % (N = 5) su muškarci. Percepcija i zaključak da su većina učitelja koji pružaju odgojno-obrazovne usluge mlađim učenicima, poput predškolskoga i razrednoga obrazovanja, žene, bili su predmet mnogih istraživanja (Smedley, 2007). U Turskoj se učiteljska profesija percipira i bira kao žensko zanimanje. Kao što se vidi u ovome istraživanju, većina budućih učitelja primarnoga obrazovanja su žene.

Instrumenti za prikupljanje podataka

Kao instrumenti za prikupljanje podataka korišteni su Obrazac za informacije o kandidatu za učitelja, Skala spremnosti za poučavanje, Skala motivacije za poučavanje i Skala kompetencija za poučavanje matematike.

Obrazac za prikupljanje općih podataka o ispitanicima: Ovaj obrazac, koji je razvio istraživač, sastoji se od informacija o studentima učiteljskoga studija. U ovom obrascu

uključeni su podatci o godini studija, spolu i pitanje „Mislite li da ćete biti dobar učitelj?“. Uz pitanje o spolu ponuđeni su odgovori: „ženski” i „muški”, a na pitanje misle li da će biti dobar učitelj ponuđeni su odgovori „da” i „ne”.

Skala spremnosti za poučavanje - SSP: Skala koju su razvili Yıldırım i Kalman (2017) korištena je za mjerenje spremnosti za poučavanje budućih učitelja primarnoga obrazovanja. Ukupno se može ostvariti najmanje 20, a najviše 100 bodova. Koeficijent pouzdanosti skale iznosio je ,92, a u ovom istraživanju koeficijent pouzdanosti utvrđen je kao ,94.

Skala motivacije za poučavanje - SMP: Kako bi se utvrdila motivacija za poučavanje budućih učitelja primarnoga obrazovanja, korištena je skala koju su razvili Kauffman, Yılmaz-Soylu i Duke (2011), a na turski jezik prilagodili Ayık, Atas Akdemir i Seçer (2015). To je mjerni instrument Likertova tipa s pet stupnjeva koji se sastoji od 12 čestica u dvije dimenzije: unutarnjoj i vanjskoj. Sukladno tome, najviši rezultat na skali iznosi 60, a najniži 12. Koeficijent pouzdanosti Skale motivacije za poučavanje iznosio je ,86, a u ovome istraživanju utvrđen je kao ,78.

Skala kompetencija za poučavanje matematike - SKPM: Skala koju su razvili Esendemir, Çirak i Samancıoğlu (2015) korištena je za mjerenje kompetencija budućih učitelja primarnoga obrazovanja u poučavanju matematike. U tu svrhu čestice skale oblikovane su iz dimenzija razvoja vještina rješavanja problema, komunikacije, povezivanja i zaključivanja u području kompetencija za razvoj vještina iz nastavnoga predmeta Matematike unutar specifičnih područnih kompetencija učitelja. Skala se sastoji od 20 čestica, od kojih je 17 pozitivnih i 3 negativne, te je riječ o skali Likertova tipa s pet stupnjeva. Sukladno tome, najviši rezultat na skali iznosi 100, a najniži 20. Koeficijent pouzdanosti Skale kompetencija za poučavanje matematike iznosio je ,95, a u ovome istraživanju utvrđen je kao ,91.

Istraživački postupak

Budući da je ovo istraživanje longitudinalne prirode, obuhvaća razdoblje od četiri godine. Sudjelovanje u istraživanju temeljilo se na dobrovoljnom pristanku. U prvoj godini, nakon orijentacijskoga tjedna, budući učitelji bili su informirani o istraživanju. Obaviješteni su da prikupljeni podatci neće biti dijeljeni s trećim stranama te da će se koristiti isključivo u istraživačke svrhe, a njihov pristanak dobiven je u skladu s tim. Tijekom cijeloga istraživačkog procesa svi su postupci provedeni u skladu s etičkim i znanstvenim načelima.

U drugom tjednu svake akademske godine mjerni instrumenti primijenjeni su na buduće učitelje primarnoga obrazovanja tijekom sesije u trajanju od 60 minuta. Ovaj je postupak ponovljen na početku druge, treće i četvrte akademske godine. Svake godine neki su se studenti prebacili na druga sveučilišta ili prekinuli svoje sveučilišno obrazovanje; podatci o tim studenatima nisu uključeni u analize. Podatci su prikupljeni na početku svake akademske godine, osobito tijekom drugog tjedna semestra, kako bi se osigurala dosljednost između mjernih valova i zabilježile razvojne promjene neovisne

o kratkoročnim učincima poučavanja ili vrednovanja. Budući da je istraživanje pratilo istu skupinu budućih učitelja primarnog obrazovanja tijekom četiri godine, došlo je do gubitka sudionika zbog prebacivanja na druga sveučilišta ili prekida studija. Kako bi se održala longitudinalna valjanost i osigurala usporedivost između mjernih valova, u analize su uključeni samo podatci sudionika koji su ostali kontinuirano upisani u program obrazovanja učitelja primarnoga obrazovanja tijekom sve četiri akademske godine. Smatra se da ovaj pristup omogućuje točnije ispitivanje individualnih razvojnih trendova tijekom vremena. Nakon prikupljanja podatci su analizirani.

Analiza podataka

Prikupljanje podataka provedeno je u skladu s etičkim načelima te je osigurano dobrovoljno sudjelovanje. Za analizu podataka korišten je SPSS 25.0. Kako bi se provjerilo slijede li podatci normalnu distribuciju, korišten je Shapiro-Wilkov test zbog malih veličina uzorka (Razali i Wah, 2011). Prema analizi normalnosti Shapiro-Wilkovim testom utvrđeno je da Skala spremnosti za poučavanje ($p = ,00 < ,01$), Skala motivacije za poučavanje ($p = ,91 > ,05$) i Skala kompetencija za poučavanje matematike ($p = ,00 < ,01$) odstupaju od normalne distribucije. Budući da se motivacija za poučavanje pojavila s normalnim vrijednostima, za procjenu distribucije normalnosti za ostale skale korištena je druga metoda, odnosno asimetrija i spljoštenost. Sukladno tome, utvrđene su sljedeće vrijednosti: Skala spremnosti za poučavanje (asimetrija: $-,559$; spljoštenost: $,812$), Skala motivacije za poučavanje (asimetrija: $-,008$; spljoštenost: $-,255$) i Skala kompetencija za poučavanje matematike (asimetrija: $-,199$; spljoštenost: $1,984$). Budući da su vrijednosti asimetrije i spljoštenosti bile u rasponu od -2 do $+2$ (George i Mallery, 2010), zaključeno je da podatci imaju normalnu distribuciju te su za daljnju analizu primijenjeni parametrijski testovi, uključujući jednosmjernu analizu varijance (ANOVA), t-test za nezavisne uzorke i Pearsonovu korelacijsku analizu.

Rezultati

Rezultati istraživanja prikazani su u skladu sa specifičnim istraživačkim pitanjima. Sukladno tome, rezultati prvoga i drugoga istraživačkoga pitanja prikazani su u Tablici 1.

Tablica 1

Razina spremnosti za poučavanje budućih učitelja primarnoga obrazovanja, koja varira unutar godina studija, iznosi 3,64 u prvoj godini, 3,88 u drugoj godini, 3,71 u trećoj godini i 3,96 u završnoj godini. Dodatno, prosjek skupine utvrđen je kao 3,80. Motivacija za poučavanje budućih učitelja primarnoga obrazovanja, koja varira unutar godina studija, iznosi 2,74 u prvoj godini, 2,79 u drugoj godini, 2,82 u trećoj godini i 2,90 u završnoj godini. Dodatno, prosjek skupine utvrđen je kao 2,82. Kada se promatra njihova kompetencija u poučavanju matematike, ona iznosi 3,98 u prvoj godini, 4,03 u drugoj godini, 3,91 u trećoj godini i 3,96 u završnoj godini. Dodatno, prosjek skupine utvrđen je kao 3,97 (Tablica 1). Kako bi se odredile razine na temelju rezultata dobivenih iz skala, širina raspona skale izračunata je primjenom formule

širina raspona/broj skupina koje će se formirati ($4/5 = 0,80$) (Tekin, 1993). Intervali aritmetičkih sredina skale određeni su kako slijedi: 1,00 – 1,79 „vrlo nisko”; 1,80 – 2,59 „nisko”; 2,60 – 3,39 „srednje”; 3,40 – 4,19 „visoko”; 4,20 – 5,00 „vrlo visoko”. Prema tome, može se reći da su kompetencija za poučavanje matematike i spremnost za poučavanje budućih učitelja primarnoga obrazovanja na svakoj godini studija na „visokoj” razini; njihova motivacija za poučavanje je na „srednjoj” razini. Dodatno, kada se promatraju njihove promjene unutar godina studija, rezultati spremnosti za poučavanje i motivacije za poučavanje povećavali su se na svakoj godini studija i bili su najviši u četvrtoj godini. Njihova kompetencija za poučavanje matematike bila je na najvišoj razini u drugoj godini, i iako je došlo do smanjenja u trećoj godini, ponovno se povećala u četvrtoj godini.

Jednosmjerna analiza varijance (ANOVA) provedena je kako bi se utvrdilo razlikuju li se rezultati budućih učitelja primarnoga obrazovanja dobiveni mjernim instrumentima, koji se mijenjaju svake godine, ovisno o godini studija koju pohađaju. Sukladno tome, razlika između prosječnih rezultata Skale spremnosti za poučavanje (SSP) [$F(3 - 180) = 3,079, p < ,05$] studenata učiteljskoga studija prema godini studija statistički je značajna (Tablica 1). LSD post hoc testovi provedeni su kako bi se utvrdilo između kojih skupina postoji razlika. Prema tome, među studentima učiteljskoga studija na 4. godini, 1. godini i 3. godini, studenti učiteljskoga studija na 2. godini utvrđeni su kao spremniji za poučavanje od studenata na 1. godini. Kod Skale motivacije za poučavanje (SMP) [$F(3 - 180) = ,535, p > ,05$] i Skale kompetencija za poučavanje matematike (SKPM) [$F(3 - 180) = ,530, p > ,05$], razlika prema godini studija nije statistički značajna.

Rezultati trećega istraživačkog pitanja prikazani su u Tablici 2.

Tablica 2

Svake godine budućim učiteljima primarnoga obrazovanja postavljeno je pitanje „Mislite li da ćete biti dobar učitelj?” te je proveden t-test za nezavisne uzorke kako bi se utvrdilo postoji li značajna razlika u njegovoj promjeni tijekom vremena. Sukladno tome, za Skalu spremnosti za poučavanje (SSP) utvrđena je značajnost na 1. godini ($t = 2,027, p < ,05$), na 2. godini ($t = 2,040, p < ,05$), na 3. godini ($t = 3,485, p < ,01$) i na 4. godini ($t = 3,895, p < ,01$). Kada se promatraju rezultati Skale motivacije za poučavanje (SMP), utvrđeno je da su statistički značajni na 1. godini ($t = 2,690, p < ,01$), 2. godini ($t = 2,153, p < ,05$) i 4. godini ($t = 3,194, p < ,05$). Konačno, rezultati Skale kompetencija za poučavanje matematike (SKPM) utvrđeni su kao značajni na 3. godini ($t = 3,693, p < ,01$) i 4. godini ($t = 3,457, p < ,01$). Kada se vrednuje u smislu dobivenih rezultata, vidi se da u svakoj značajnoj skupini oni koji misle da će biti dobri učitelji imaju više rezultate od onih koji misle da to neće biti (Tablica 2). Rezultati Skale motivacije za poučavanje (SMP) bili su viši na 3. godini ($t = 1,962, p > ,05$), a rezultati Skale kompetencija za poučavanje matematike (SKPM) bili su viši na 1. godini ($t = 1,635, p > ,05$) i 2. godini. Zaključeno je da rezultati na Skali

motivacije za poučavanje (MTS) u trećoj godini ($t = 1,962, p > 0,05$) te rezultati na Skali kompetencija za poučavanje matematike (MTCS) u prvoj ($t = 1,635, p > 0,05$) i drugoj godini ($t = 1,948, p > 0,05$) nisu bili statistički značajni.

Rezultati četvrtoga istraživačkog pitanja prikazani su u Tablici 3.

Tablica 3

Provedena je Pearsonova korelacijska analiza kako bi se ispitali odnosi između rezultata Skale spremnosti za poučavanje (SSP), Skale motivacije za poučavanje (SMP) i Skale kompetencija za poučavanje matematike (SKPM) prema godinama studija. Rezultati su pokazali pozitivnu, umjerenu povezanost između rezultata SSP i SMP na trećoj godini ($r = ,460, p < ,01$) i četvrtoj godini ($r = ,562, p < ,01$). Kao što je prikazano u Tablici 5, iako su korelacijski koeficijenti uočeni u prvoj ($r = ,460, p > ,05$) i drugoj godini ($r = ,460, p > ,05$), ti odnosi nisu bili statistički značajni.

U pogledu odnosa između rezultata SSP i SKPM, pozitivna i umjereno značajna povezanost utvrđena je na prvoj godini ($r = ,482, p < ,01$), drugoj godini ($r = ,597, p < ,01$) i četvrtoj godini ($r = ,516, p < ,01$). Nasuprot tome, na trećoj godini utvrđena je pozitivna i visoko značajna povezanost ($r = ,708, p < ,01$).

Diskusija

Početni nalazi ove longitudinalne studije kojom se ispitala spremnost za poučavanje, motivaciju za poučavanje i kompetencije za poučavanje matematike budućih učitelja razredne nastave tijekom četverogodišnjega razdoblja, od upisa na sveučilište do diplomiranja i stjecanja učiteljskih kvalifikacija, pokazuju da budući učitelji primarnoga obrazovanja iskazuju „visoku” spremnost za poučavanje na svim godinama studija te pokazuju kompetentnost u poučavanju matematike. Međutim, njihova motivacija za poučavanje procijenjena je na „srednjoj” razini. Ohrabrujuće je da studenti učiteljskog studija sebe percipiraju spremnima za učiteljsku profesiju, što je potaknuto pedagoškim obrazovanjem kroz koje prolaze te da se sve više percipiraju kompetentnima u poučavanju matematike, koja je temeljni predmet u primarnom obrazovanju, kako napreduju tijekom svojega akademskog obrazovanja. Suprotno tome, u pogledu motivacije za poučavanje, uočava se da je njihova motivacija i dalje na srednjoj razini, vjerojatno zbog nedostatka profesionalnoga iskustva i praktične primjene teorijskoga znanja stečenoga tijekom obrazovanja na učiteljskom fakultetu, izvan školskih praktičnih iskustava. Uočava se jasan uzlazni trend i u rezultatima motivacije za poučavanje i u rezultatima spremnosti tijekom svake akademske godine, pri čemu su najviši rezultati zabilježeni u četvrtoj godini, što ukazuje na pozitivan trend u ishodima njihova obrazovnoga iskustva. Najviša razina kompetencije u poučavanju matematike uočena je na drugoj godini, nakon čega slijedi pad na trećoj godini i ponovno povećanje na četvrtoj godini, što potiče daljnje ispitivanje ove fluktuacije. Kako bi se ovi nalazi smjestili u kontekst postojeće literature, proveden je pregled relevantnih istraživanja. Istraživanje Alsaleh i Anthony (2018) ispitalo je spremnost

studentata učiteljskoga studija u Saudijskoj Arabiji za poučavanje matematike u srednjim školama. Studija koja je obuhvatila 16 studentica matematike, pokazala je da su se do kraja četverogodišnjega obrazovanja osjećale spremnima u pogledu metoda i strategija poučavanja, ali su izražavale manju spremnost u područjima kao što su upravljanje razredom, priprema nastave i integracija tehnologije. U drugoj studiji provedenoj u Saudijskoj Arabiji, Alsaleh (2019) pratio je spremnost za poučavanje 105 studentata za učitelje matematike završne godine tijekom razdoblja od četiri mjeseca, pri čemu je utvrđeno da su se osjećali spremnima poučavati matematiku u školama. Nadalje, fenomenološkim istraživanjem koje je proveo Chaves (2018) ispitala su se iskustva učitelja početnika u osnovnim školama u velikom školskom okrugu u jugoistočnom Massachusettsu, pri čemu su se rasvijetlile njihove percepcije spremnosti za poučavanje elementarne matematike te načine suočavanja s matematičkim poteškoćama učenika. Sudionici, uključujući učitelje s manje od pet godina iskustva u poučavanju od prvoga do šestoga razreda, opisali su da se osjećaju nedovoljno pripremljenima ne samo za poučavanje matematike, nego i za rješavanje izazova koji se pojavljuju u njihovim učionicama. Zajedno, ova istraživanja naglašavaju varijabilnost u spremnosti studentata učiteljskog studija za profesiju, pri čemu neka istraživanja ukazuju na visoku spremnost, dok druga ističu percipirane nedostatke u pripremljenosti (Aybek i Aslan, 2019; Güner i Aslan, 2023). U ovome istraživanju, iako je motivacija za poučavanje budućih učitelja primarnoga obrazovanja postupno rasla tijekom godina, zadržala se na srednjoj razini; slično tome, Deringöl (2020) proveo je istraživanje koje je pokazalo pozitivne i visoke razine motivacije za poučavanje budućih učitelja primarnoga obrazovanja. Nadalje, Baş (2022) ispitao je učiteljska uvjerenja, samoučinkovitost i motivaciju 447 studentata učiteljskoga studija te utvrdio da učiteljska uvjerenja i stavovi prema poučavanju značajno predviđaju motivaciju za poučavanje. U ovome istraživanju, razvoj kompetencija za poučavanje matematike među budućim učiteljima primarnoga obrazovanja tijekom vremena pokazao je pozitivan i značajan porast, što su dokumentirali Ünlü i Ertekin (2018) u longitudinalnoj studiji koja je uključivala 39 studentata učiteljskoga studija. Suprotno tome, uvjerenja o samoučinkovitosti u matematici tih studentata bila su na srednjoj razini. Unatoč manjim fluktuacijama, prosječni rezultati studentata učiteljskoga studija ostali su relativno dosljedni tijekom akademskih godina. Konkretno, uvjerenja o samoučinkovitosti u poučavanju matematike procijenjena su kao srednja na kraju prve, druge i treće godine, a porasla su na visoku razinu na kraju četvrte godine. Slično tome, istraživanje Kim i Connelly (2019), provedeno s studentima treće i završne godine, izvijestilo je o visokim razinama uvjerenja o samoučinkovitosti u poučavanju matematike, što je u skladu s nalazima ovoga istraživanja. Istraživanje Hourigan i Leavy (2022), provedeno s 420 budućih učitelja primarnoga obrazovanja u Irskoj, potvrđuje značajan utjecaj iskustava iz matematike prije visokoga obrazovanja na kompetencije za poučavanje matematike među studentima učiteljskoga studija tijekom njihova obrazovanja. Slično tome, Akbayır i Akça (2021) u svojoj metaanalitičkoj studiji koja je ispitala istraživanja o učiteljskim kompetencijama u poučavanju matematike

istaknuli su perspektive učitelja koje ukazuju na utjecaj sveučilišnoga obrazovanja na njihovu matematičku kompetentnost. Razgovori s učiteljima otkrili su da je sveučilišno obrazovanje iz matematike imalo ključnu ulogu u oblikovanju matematičkih kompetencija učitelja primarnoga obrazovanja. Brojna istraživanja naglašavaju važnost sveučilišnoga obrazovanja za matematičku kompetenciju učitelja, među kojima su radovi Hilla i sur. (2005) i Smitha (2000). Kada se analiziraju varijacije u spremnosti za poučavanje, motivaciji za poučavanje i kompetencijama za poučavanje matematike među budućim učiteljima primarnoga obrazovanja prema različitim godinama studija, utvrđene su statistički značajne razlike u statusu spremnosti za poučavanje među studentima učiteljskoga studija prema godini studija. Studenti četvrte godine pokazali su višu razinu spremnosti u usporedbi sa studentima prve i treće godine, dok su studenti druge godine pokazali veću spremnost u odnosu na studente prve godine. Ovo postupno povećanje spremnosti za poučavanje među budućim učiteljima primarnoga obrazovanja svake godine pozitivno odražava učinkovitost programa obrazovanja učitelja. Iako su se studenti možda na prvoj godini na fakultetu osjećali manje pripremljenima, njihova spremnost za učiteljsku profesiju s vremenom se povećavala zahvaljujući teorijskoj i praktičnoj izobrazbi koju su primali tijekom studija. Nadalje, istraživanje je pokazalo da ne postoje statistički značajne razlike u motivaciji za poučavanje i kompetencijama za poučavanje matematike prema različitim godinama studija. Međutim, analiza promjena u rezultatima pokazala je da se motivacija za poučavanje postupno povećavala na svakoj godini studija, dosežući vrhunac u četvrtoj godini. Slično tome, kompetencija za poučavanje matematike bila je najviša u drugoj godini, uz blago smanjenje u trećoj godini, nakon čega je ponovno porasla u četvrtoj godini.

Motivacija za poučavanje među studentima učiteljskoga studija također se može mijenjati tijekom vremena (Davis i Wilson, 2000; Sinclair, Dowson i McInerney, 2006). Istraživanja Sinclair, Dowson i McInerney (2006) te Sinclair (2008) u skladu su s rezultatima ovoga istraživanja, ukazujući na to da se motivacija za poučavanje među budućim učiteljima primarnoga obrazovanja povećava s napredovanjem u godini studija ili s dobi. To upućuje na pozitivnu povezanost između akademskoga napredovanja i motivacije za poučavanje, što može odražavati dublju posvećenost učiteljskoj profesiji kako studenti stječu više iskustva i zrelosti. U dvogodišnjoj mješovitoj studiji slučaja koju su proveli Whitaker i Valtierra (2018) ispitivan je utjecaj programa obrazovanja učitelja na promjene u motivaciji studenata za poučavanje učenika kulturno i jezično različitoga podrijetla. Rezultati su pokazali statistički značajne promjene sudionika s magisterijem iz poučavanja u samopouzdanju u poučavanju raznolikih učenika, u samoučinkovitosti za kulturološki osjetljivu pedagogiju te u percepcijama i interesu za vrijednost multikulturalnoga poučavanja. To naglašava potencijal ciljnih intervencija unutar programa obrazovanja učitelja da utječu na motivaciju za poučavanje i unaprijede je, osobito u kontekstu odgovaranja na potrebe različitih učeničkih populacija. Slično tome, istraživanje Deringöl (2020) provedeno s budućim učiteljima primarnoga obrazovanja pokazalo je da se motivacija za poučavanje povećava s napredovanjem

u godini studija, ali bez statističke značajnosti. Unatoč tome, uočeni trend sugerira potencijalni obrazac prema kojem se motivacija za poučavanje može razvijati tijekom vremena, iako bez značajnih statističkih varijacija. Ovi nalazi zajedno naglašavaju složenu međuigru čimbenika koji oblikuju motivaciju za poučavanje te ističu važnost daljnjih istraživanja i inicijativa podrške usmjerenih na razumijevanje i poticanje motivacije učitelja tijekom njihove karijere. Nalazi ovoga istraživanja, koji ukazuju na nepostojanje statistički značajnih razlika u kompetencijama za poučavanje matematike prema različitim godinama studija, ali na dosljedan porast rezultata tijekom vremena, u skladu su s rezultatima druge longitudinalne studije koju su proveli Ünlü i Ertekin (2018) s 39 studenata učiteljskoga studija. U njihovom istraživanju procijenjena su uvjerenja o samoučinkovitosti studenata učiteljskoga studija u poučavanju matematike tijekom njihova preddiplomskoga obrazovanja, pri čemu je utvrđeno značajno povećanje do kraja četvrte godine. To upućuje na pozitivan razvojni trend u kompetencijama za poučavanje matematike tijekom programa obrazovanja učitelja, neovisno o pojedinoj godini studija. Pokazuje se da su percepcije pojedinaca o vlastitoj kompetenciji u vezi s određenim predmetom i njegovim poučavanjem snažno povezane s njihovim znanjem iz matematike i poučavanja matematike (Seo i Lee, 2017). Kako bi se povećao interes učitelja za poučavanje matematike, posvećivanje veće pozornosti pedagoškim informacijama o metodama poučavanja i učenja matematike u okviru kolegija obrazovanja učitelja pozitivno će pridonijeti kompetencijama za poučavanje matematike (Seo i Lee, 2017; Twohill i sur., 2023). Metodički kolegiji u programima obrazovanja učitelja imaju velik utjecaj na povećanje kompetencija budućih učitelja za poučavanje matematike (Krejci, Elana i Gabriele, 2022). Razumno je smatrati da su kolegiji vezani uz matematiku i njezino poučavanje koje budući učitelji primarnoga obrazovanja u Turskoj pohađaju na učiteljskim fakultetima mogli utjecati na nalaze ovoga istraživanja. Iako je zabilježen kontinuirani porast, vrhunac je dosegnut na razini druge godine. Budući učitelji primarnoga obrazovanja u Turskoj na prvoj godini pohađaju kolegije Osnove matematike I–II, a na trećoj godini kolegije Poučavanje matematike I–II. Moguće je da su se u drugoj godini osjećali kompetentnijima za poučavanje matematike zbog dvaju matematičkih kolegija koje su pohađali u prvoj godini. Kolegiji poučavanja matematike na trećoj godini, u kojima imaju priliku za nastavu u razredu, mogli su pozitivno utjecati na njihove percepcije kompetentnosti. Osim toga, na četvrtoj godini budući učitelji obavljaju stručnu praksu u osnovnim školama kroz kolegije Nastavna praksa I–II. Ovim kolegijima imaju priliku primijeniti ono što su naučili na učiteljskim fakultetima u stvarnim razrednim okružjima. Stoga su se na četvrtoj godini mogli percipirati kompetentnijima za poučavanje matematike u odnosu na druge godine studija. U istraživanju Twohill i sur. (2023), koje je obuhvatilo 450 budućih učitelja primarnoga obrazovanja, zaključeno je da je spremnost za profesiju povezana s kompetencijama za poučavanje matematike te da matematičko postignuće predviđa obje varijable. Naglašena je važnost sadržaja i prirode programa obrazovanja učitelja. Nadalje, raspravljalo se o utjecaju iskustva na ove dvije varijable. U okviru

ovoga istraživanja budućim učiteljima primarnoga obrazovanja svake je godine, od početka njihova sveučilišnoga obrazovanja do diplomiranja, postavljano pitanje „Mislite li da ćete biti dobar učitelj?“. Njihovi odgovori analizirani su svake godine, pri čemu su utvrđene značajne povezanosti sa spremnošću za poučavanje tijekom sve četiri godine, kao i s motivacijom za poučavanje i kompetencijama za poučavanje matematike na trećoj i četvrtoj godini. Analizom rezultata uočeno je da su studenti koji su izražavali uvjerenje da će postati dobri učitelji dosljedno postizali više rezultate od onih koji to uvjerenje nisu izražavali. Značajno je da motivacija za poučavanje nije bila statistički značajna u trećoj godini, dok kompetencije za poučavanje matematike nisu bile značajne u prvoj i drugoj godini. Različite percepcije budućih učitelja o njihovoj budućoj učinkovitosti kao edukatora mogu biti pod utjecajem adekvatnosti programa obrazovanja učitelja i njihovih iskustava u praktičnim okruženjima. Kako bi se ojačala priprema studenata učiteljskoga studija, osobito u području poučavanja matematike, povećano sudjelovanje u školskim aktivnostima, posebno tijekom prakse integrirane u kolegije nastavne prakse, može se pokazati korisnim. Rezultati ovoga istraživanja podupiru se istraživanjem koje su proveli Hong i Han (2018) sa 61 studentom za učitelja matematike, koje ukazuje na povećanje kompetencija za poučavanje matematike nakon sudjelovanja u nastavnoj praksi. Slično tome, Davis i sur. (2022) uočili su poboljšanje kompetencija za poučavanje matematike među studentima učiteljskoga studija, potaknuto uspostavom virtualnih učioničkih okruženja i aktivnim sudjelovanjem u nastavnim aktivnostima. U turskom kontekstu, u kojem je ovo istraživanje provedeno, kolegiji za učitelje primarnoga obrazovanja podijeljeni su u tri glavne kategorije: struka i strukovna edukacija, znanja učiteljske profesije i opća kultura. Značajno je da kolegiji iz područja struke i strukovne edukacije čine većinu kurikula, dok kolegiji znanja učiteljske profesije i opće kulture ravnomjerno dijele preostali dio. Uočljiv aspekt ovih kolegija jest prevladavanje teorijskoga sadržaja, koji čini 75 % kurikula, dok praktične komponente čine preostalih 25 % (YÖK, 2007). Ova nastavna struktura naglašava uočljivu neravnotežu između teorijske i praktične izobrazbe u turskim programima obrazovanja učitelja, pri čemu je praktičnoj izobrazbi posvećeno manje pažnje u odnosu na teorijsku nastavu (EACEA-Eurydice, 2015). Brojna znanstvena istraživanja naglašavaju nužnost praktične primjene u programima obrazovanja učitelja, pri čemu mnogi zagovaraju povećanje mogućnosti praktične izobrazbe u turskom kontekstu, gdje takva iskustva nisu dosljedno osigurana na zadovoljavajućoj razini. Stoga proširenje mogućnosti za buduće učitelje da sudjeluju u praktičnim iskustvima, poput stručne prakse i terenskoga rada, značajno utječe na unaprjeđenje njihove spremnosti i kompetentnosti u poučavanju matematike i drugih predmeta (Zelyurt i Sucu, 2022).

Na kraju, istraživanje je ispitalo postoji li odnos između spremnosti za poučavanje budućih učitelja primarnoga obrazovanja, koja varira prema godini studija, i njihove motivacije za poučavanje te kompetencija za poučavanje matematike. Prema tome, postoji pozitivna i umjerena povezanost između njihove spremnosti za poučavanje

i njihove motivacije za poučavanje na trećoj i četvrtoj godini, dok u prvoj i drugoj godini ne postoji povezanost. Istodobno, postoji pozitivna i umjerena povezanost između njihove spremnosti za poučavanje i kompetencija za poučavanje matematike u prvoj, drugoj i četvrtoj godini te pozitivna umjerena povezanost na trećoj godini. Konačni rezultat istraživanja jest da postoji visoko značajna povezanost. Činjenica da se budući učitelji osjećaju spremnima za učiteljsku profesiju kao rezultat obrazovanja koje su primili, da je njihova motivacija za poučavanje visoka te da sebe smatraju kompetentnima za poučavanje matematike može biti povezana s obrazovanjem koje su stekli na sveučilištima. Nalazi upućuju na to da mogućnosti budućih učitelja primarnoga obrazovanja da primijene svoje predmetno i pedagoško znanje u okruženju osnovne škole tijekom četvrte godine preddiplomskoga studija, koja je završna godina u Turskoj, mogu doprinijeti odnosima uočenima u ovome istraživanju.

Zaključak

Ovim istraživanjem ispitala su se razine profesionalne spremnosti budućih učitelja primarnoga obrazovanja koji studiraju na učiteljskim fakultetima u Turskoj, njihovu motivaciju za poučavanje te promjene u njihovoj kompetentnosti za poučavanje matematike. Kao odgovor na istraživačka pitanja, nalazi su pokazali da su profesionalna spremnost budućih učitelja i njihova kompetentnost u poučavanju matematike pokazale značajne promjene tijekom njihova sveučilišnoga obrazovanja. Međutim, u određenim dimenzijama motivacije za poučavanje uočene su ograničene ili fluktuirajuće promjene. Ovi nalazi upućuju na to da profesionalni razvoj budućih učitelja ne slijedi linearnu putanju te da i sadržaj programa obrazovanja učitelja i stupanj u kojem naglašavaju praksu imaju odlučujuću ulogu u ovom razvojnem procesu.

Praktične implikacije i preporuke

Polazeći od nalaza istraživanja, preporučuje se da se kolegiji vezani uz poučavanje matematike u programima obrazovanja učitelja primarnoga obrazovanja obogate snažnijim naglaskom na aktivnosti temeljene na praksi i ranim iskustvima u učionici. Kako bi se motivacija za poučavanje budućih učitelja održivo poduprla, programi obrazovanja učitelja trebali bi uključivati refleksivne prakse, mentorske procese i strukturiranu povratnu informaciju koja jača percepciju profesionalne kompetentnosti studenata. Nadalje, naponi usmjereni na evaluaciju i unaprjeđenje programa, s ciljem povećanja razina profesionalne spremnosti budućih učitelja, trebali bi se temeljiti na dokazima proizašlima iz longitudinalnih istraživanja.

Ograničenja i smjernice za buduća istraživanja

Ovo istraživanje ograničeno je na buduće učitelje primarnoga obrazovanja i usmjereno je isključivo na razdoblje od prve godine sveučilišnoga obrazovanja do diplomiranja. Osim toga, istraživanje se temelji isključivo na podacima dobivenima putem korištenih mjernih instrumenata. Buduća istraživanja mogla bi imati koristi

od uključivanja kvalitativnih metoda prikupljanja podataka radi dubljega ispitivanja iskustava budućih učitelja te od provođenja komparativnih longitudinalnih studija u različitim programima obrazovanja učitelja. Nadalje, istraživanja koja obuhvaćaju razdoblje nakon diplomiranja i prve godine profesionalne prakse mogu pružiti vrijedne uvide u dugoročne učinke programa obrazovanja učitelja.