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Investigation of Pre-School Teachers' Beliefs about Mathematics Education in Terms of Their Experience and Structure of Their Education[1]

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ABSTRACT
The aim of this study was to determine pre-school teachers' beliefs about teaching mathematics to young learners. In this context, we compared preschool teachers' beliefs with mathematical learning, talent-development-age appropriateness for mathematical learning, the nature of mathematics, the curriculum, teacher efficacy, and the teacher's role by taking into account the preschool teachers' graduation programs and their experiences. Data was collected from 139 pre-school teachers. The teachers were selected based on their teaching experiences and their graduation programs. A 32-item Likert-type "Belief Scale towards Mathematics Learning and Teaching" was used to determine their views about teaching, and the nature of the pre-school mathematics teachers learning mathematics. The results of an ANOVA test to determine whether there was a statistically significant difference between the score averages the of their beliefs and teaching practice time and graduated program, revealed a significant difference among pre-school teachers about mathematics and the role of teachers on teaching. Furthermore, the test revealed that the more experienced teachers have a better understating of the curriculum and the children and indicated a positive change in their opinions in the scale's related section.
Keywords: Preschool education, mathematics teaching, belief, curriculum

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State of the literature

- The belief system of teachers in regard to their nature of knowledge acquisition, and the belief system of children in regard to gaining experience before primary school are important determinants for implementing the curriculum, classroom decisions, and finally learning outcomes.
- Mathematics is an important tool for the children to develop higher level thinking skills, to be successful in other areas, and to solve problems they face in their daily life
- In early childhood education, children need to experience high-quality mathematics teaching for their future learning.

Contribution of this paper to the literature

- Preschool teachers' beliefs about mathematics education and teaching mathematics to young children lead to creating effective learning environments.
- The teachers' experiences and their educational backgrounds are also crucial as these factors shape teachers' professional development.

INTRODUCTION

There has been an increasing emphasis on early childhood education worldwide. Many countries share a strong goal to increase the enrollment rates in preschools. For example, according to the 2015 OECD report, enrollment rates in early childhood education at age 3 are above 90 % in Belgium, France, Norway, and United Kingdom (UK) (OECD, 2015). These countries are carrying out extensive work developing educational programs for their young children and training programs for pre-school teachers (OECD 2011, National Association for the Education of Young Children [NAEYC], 2001). Moreover, in 2000, the National Council of Teachers of Mathematics (NCTM) included the pre-school period as part of the standards for school mathematics (NCTM, 2000). This is one of the most important indicators of the importance given to pre-school mathematics education. There are two main reasons for this significant attention on preschool mathematics education. First, an informal foundation of mathematical information that children will encounter in their primary years are being introduced to them in this early period of preschool education. Therefore, the children are thought to be able to have stronger mathematical understanding as they continue in school if they are provided with early rich and meaningful mathematics learning experiences (Duncan et al., 2007). Considering that the pre-school period is the preparation to school, it is clear that the quality of children's preschool mathematics experience will be effective on math learning at this time or even later (Clements & Sarama, 2000; Duncan et al., 2007). Specifically, quality mathematic education given in the pre-school period may reduce the difficulties of learning mathematic in primary school (Fuson, Smith & Lo Cicero, 1997; Hiebert & Wearne, 1993). Second, studies have indicated that pre-school children have a natural interest in mathematics (especially for the number of terms) (Denton & West, 2002; Heinkle, 2000); therefore, it is possible to provide them with support on which this interest can be kept constant during this period and beyond.

Mathematics Education in Pre-school

Mathematics is an important tool for the children to develop higher level thinking skills, to be successful in other areas, and to solve problems they face in their daily life (Kilpatrick, Swafford, & Findell, 2001, Baroody 1987; Blevins-Knabe & Musun-Miller, 1996; Ginsburg & Baroody 1990). In early childhood education, children need to experience high-quality mathematics teaching for their future learning. This could be realized by providing them with effective learning programs and teaching methods (NCTM, 2000; NAEYC, 2001). Furthermore, math experiences for children at young ages can help them to create meaningful relationships through exploration and play in natural environments. Thus, the mathematics teaching programs should be implemented in these natural learning environments such as play areas and learning centers in preschools. Clements (2001) argued that including mathematics in early childhood education should be required because the children already have informal mathematical skills and they enjoy using them. From counting objects correctly to creating shapes, most of children's ability develops before they start school (Clements, 2001). In addition, many mathematical concepts develop intuitively in early childhood. Studies showing the differences between school-age children in terms of their mathematical skills are available (Anders, Grosse, Rossbach, Ebert, & Weinert, 2013; Magnuson, Meyers, Ruhm, & Waldfogel, 2004). Teaching mathematics in early childhood gains importance because children will not have any misconceptions about their later mathematics learning. Anders and Rossbach (2015) explained that the most important foundation of children' achievement and the process of adults' professional careers are the attainment of mathematical skills. Research emphasizes that early childhood programs play an important role in the development of children's first mathematical skills (Anders & Rossbach, 2015), and the importance of mathematics in the field of education is increasing day by day.

Both the content and context of mathematics education for pre-school children differ from other levels of mathematics education. In the content of preschool mathematics education, children's intuitive understanding about mathematics should be fostered, thus aiding them to gain this understanding within natural environments, and plans for intuitive understanding should be a part of the context presented (Linder, Powers-Costello & Stageline, 2011). During this period, the children's encounters with mathematics not only need to be embedded in the context rather than just a presentation of regular numbers and concepts of figures, but by including problem-solving activities for them. One of the main factors playing a crucial role here in the creation of such an environment is the teacher.

Pre-school Teachers' Beliefs about Mathematics

Unquestionably, it is the teacher who regulates the child's environment in preschool education and implements the appropriate program. Several studies have demonstrated that the teachers' attitudes and beliefs have a direct impact on the learners' learning process and their development of mathematical knowledge (Maasepp & Bobis, 2014; Shilling-Traina & Stylianides, 2013; Beswick, Callingham, & Watson, 2011; Chaping & Eastmen, 1996; Ernest,

1991). The NCTM (2000) emphasized that a teacher's attitudes and belief can impact the development of children' understanding about mathematical concepts. The beliefs that surface in a situation requiring teachers to make a decision, especially in the class, affect the types and qualifications of classroom applications (Klibanoff & Levine, 2006). Teachers intending to provide meaningful learning experiences in mathematics for children are first required to have positive attitudes and beliefs about mathematics.

In many studies, improving the quality of teaching mathematics has been associated with teacher qualifications. Even the qualifications of teachers depend on their beliefs, practices, and knowledge (Fennema & Franke, 1992; Thompson, 1992; Ma, 1999). However, studies have demonstrated that pre-service early childhood teachers often fail to present a positive attitude and belief about mathematics, and they have very limited knowledge of teaching mathematics (Kilpatrick, Swafford, & Findell, 2001; NAEYC, 2001). Ginsburg, Lee and Boyd (2008) stated that pre-school teachers are weak in mathematics and they are often afraid to teach mathematics to young children even though they think that mathematics is a very important subject (Ginsburg, Lee & Boyd, 2008).

Research in mathematics education demonstrates that children have a positive attitude towards mathematics at the beginning of their school life but this attitude changes later on, and children have developed negative opinions regarding mathematics by the end of their high school education (McLeod, 1994). This shift can be caused by different factors. One of the most important could be the teacher's attitude toward mathematics and mathematics education. Teachers affect children's interest and success in mathematic because the teachers' attitudes and beliefs about mathematics and mathematics education are reflected in their teaching practices and attitudes (Zacharos and et al., 2007). In their study, Zacharos et al. (2007) found that most of the pre-service early childhood teachers interviewed had negative attitudes towards mathematics throughout their own school life, and when they became teachers, they had to face teaching a subject which they disliked. As a result of this research, teachers' beliefs can be seen as an important factor in designing and planning the educational environment. Those who have negative attitudes towards mathematics and teaching mathematics tend to organize the teaching environments in a very simple way, one that lacks conceptual learning. Lara-Cinisoma et al. (2009) stated that the belief system of teachers in regard to their nature of knowledge acquisition, and the belief system of children in regard to gaining experience before primary school are important determinants for implementing the curriculum, classroom decisions, and finally learning outcomes. Moreover, in the research on how early childhood teachers define mathematics, teachers emphasized the benefits of mathematic in daily life (Thiel, 2010), and it has been found there is connection between the attitudes of early childhood teachers in terms of mathematics, mathematical belief, and mathematical knowledge. Therefore, teachers' attitudes need to be viewed in terms of different variables because their attitudes toward mathematics and teaching mathematics play an important role to create a rich, productive class environment.

The aim of the current study is to determine how the beliefs of early childhood education teachers are related to teaching and learning mathematics. In this context, the study also focuses on comparing preschool teachers' beliefs in regard to mathematical learning, talent-development-age appropriateness at mathematical learning, nature of mathematics, the curriculum, teacher efficacy, and the teacher's role by considering their graduate programs and experiences.

METHOD

This is a descriptive study to examine preschool teachers' views and beliefs about teaching and learning mathematics according to their experience as teachers and their educational background. Data was collected by using the belief scale developed for preschool teachers. The scale was applied to the teachers who graduated in different years and from different programs. The following four sections present the context of the study, the sample of the study, the data collection, and the data analysis.

The Context of the Study

All educational regulations in Turkey are made and run by the Ministry of National Education (MoNE). Teachers are employed by MoNE in either preschools or kindergartens in elementary schools. To become a pre-school teacher in Turkey, an applicant is required to have at least an undergraduate degree from a pre-school training program in a college of education. Along with their diplomas, all graduates from this training program receive certification to teach young children. After their graduation, all teacher candidates must pass a Public Personnel Selection Exam (in Turkish, Kamu Personeli Seçme Sınavı-KPPS) in order to work in public schools. If they want to work in private schools, no exam is required and only a diploma is necessary. However, the majority of preschool teachers in Turkey are working in public schools. In the past, those who graduated from vocational high schools or vocational colleges could be teachers in pre-schools. They did not need to have any further certification. Thus, most of the experienced teachers in public preschools have graduated from either high schools or vocational colleges. MoNE changed its requirement in order to increase the quality of early childhood education in Turkey and to meet the European Union standards as a candidate country. Following this regulation change by MoNE, many teachers were given the opportunity to upgrade their degree through distance (open) education. Eventually, this change led many teachers to earn bachelor degrees.

There is an obvious difference between the vocational high schools or college-level education and university level-education training programs. In the vocational high schools or vocational colleges, courses are geared more toward child development, child nutrition, and mother-infant health. The university-level programs, in addition to those courses above, offer courses on curriculum and instruction in early childhood education, teaching methods, instructional materials for young children, dramatic activity designing, etc. In preschool

teacher education programs, and also courses are given on mathematics education, science and nature education, and language education.

At the universities, pre-service teachers are introduced to mathematics education during the fourth semester of their eight-semester education. In this course, the following topics are discussed: Different Approaches Related to Development of Mathematical Thinking in Preschool, Math Concepts in Pre-School Education, Piaget and Cognitive Development, Math Concepts in Pre-School Education, and Mathematical Topics and Activities in Pre-School Education. The Council of Higher Education endorsed Mathematic Education to be taught as a one-semester course in teacher training programs as it was seen as key for children's cognitive development.

In Turkey, mathematics education for young children has become a crucial part of the national curriculum of early childhood education. In the context of the national curriculum, the following topics are highlighted:

> The role and importance of mathematical thinking, and the relationship of mathematics with variables such as social values, intelligence, gender, different approaches to development and the development of mathematical thinking in pre-school, basic teaching principles should be taken into account in teaching math concepts; the definition of intuitive mathematics and basic mathematical concepts can be gained in the pre-school (counting, abundance, operations with natural numbers, concepts related to measurement, basic geometric shapes, etc.) by creating activities using this information. (Council of Higher Education, 2006)

Participants

One hundred and thirty-nine pre-school teachers participated in this study. These teachers were working in public pre-schools and selected by considering their teaching experience and educational backgrounds (see **Table 1**). Among the participants, 65 of the 139 teachers had 1-5 years of experience, 41 had more than 10 years of experience, and 33 had 6-10 years of experience. The educational backgrounds of these teachers were as follows: 63 graduated from university programs, 42 graduated from open universities and 34 graduated from associated degree programs. Not using any criteria in the selection of teachers, all of pre-school teachers who served in a province in the north of Turkey and who volunteered to participate in the study constituted the sample.

Table 1. Distribution of Pre-School Teachers According To Teaching Experience Duration and Graduation Program

Duration of Teaching Experience	1-5 years	65
	6-10 years	41
	More than 10 years	33
	Total	**139**
Training, Educational Background	Undergraduate Program (4 year tertiary education)	63
	Open Education (4 year tertiary education)	42
	Associate Degree Program (2 year tertiary education)	34
	Total	**139**

The teachers agreeing to participate in the study were rated by the Likert-type scale and their development is presented in detail below to determine their beliefs about teaching and learning mathematics, as well as their opinions on the nature of mathematics.

Data Collection Tool

A "Belief Scale towards Mathematics Learning and Teaching" was used developed by the researchers to determine pre-school teachers' opinions about learning and teaching mathematics (Guven, Karatas, Ozturk, Arslan, & Gursoy, 2013). The scale is a Likert-type scale, and its validity and reliability had been checked. The scale consisted of 32 items and 6 dimensions. Mathematical learning, talent development and age-appropriateness of mathematical learning, the nature of mathematics, curriculum, teacher qualifications, and the role of teaching and teachers created the size of the scale as a result of a factor analysis. The dimensions of the scale used in this study and the sample material for each size are presented in **Table 2**.

Table 2. Scale Dimensions and Examples of Scale Items

Dimensions	Items	Examples of Scale Items
Learning mathematically	11, 12, 18, 21	Discoveries of the students are important in learning mathematic.
Talent development and age-appropriateness of mathematical learning	06, 13, 14, 19, 20, 22, 23, 24, 25	Mathematical activities are difficult for pre-school children
Nature of Mathematics	26, 27	Mathematics make daily life easier
Teaching program	03, 04, 07, 28, 29, 30	Mathematical activities are unnecessary for pre-school children
Teacher's qualification	01, 02, 05, 08, 15, 16, 17	I have sufficient knowledge to teach mathematic to pre-school students
Teaching and the role of teachers	09, 10, 31, 32	While teaching, expression of the children's thoughts is important.

Data Analysis

The data obtained from the scale consisting of six dimensions were analyzed quantitatively. An ANOVA test was used to determine whether there was a statistically significant difference between the average scores of teachers' beliefs in teaching and the duration of their teaching experience and graduated program. The level of significance was taken as 0.05 in the analysis. A single factor analysis of variance (ANOVA) was used to determine whether there was a statistically significant difference between the groups according to teaching experience duration and the type variables of graduated programs in each subscale. The homogeneity of variance in the ANOVA analysis was measured by the Levene test. In case there was a statistically significant difference in the teaching experience duration and graduated program variables between groups, the Scheffe test was also used to determine which group or groups this difference was in favor.

RESULTS

The pre-school teachers' beliefs about the nature of mathematics and teaching and learning mathematics was examined in terms of a subscale such as the ability to learn mathematics, development and age appropriateness, the nature of mathematics learning, the nature of mathematics, the teaching curriculum, the teacher and teaching role, and teacher competence. Data acquired from the scale with six dimensions was evaluated according to the graduated program and the teachers' working years. The ANOVA results are given in **Table 3**. According to the teaching experience duration of the participants, a significant difference emerged between the opinions of the teachers in the size of the nature of mathematics learning [F (2-138) = 3.64, p <.05] and role of teaching and teacher [F (2-138) = 4.47, p <.05].

Table 3. ANOVA Results in Terms of Scale Sizes Depending on Pre-school Teachers' Teaching Duration

Dimensions	Teaching Experience Duration	n	$\bar{x}$	SS	sd	F	p
Talent development and age-appropriateness of mathematical learning	1 – 5 year	65	23.29	4.03	2-138	2,93	.057
	6 – 10 year	41	24.70	5.49			
	More than 10 years	33	25.42	3.46			
Learning mathematically	1 – 5 year	65	11,23	2,85	2-138	3,64	,029
	6 – 10 year	41	12,12	3,29			
	More than 10 years	33	12,87	2,59			
The nature of Mathematics	1 – 5 year	65	6,33	1,67	2-138	1,25	,28
	6 – 10 year	41	6,82	1,04			
	More than 10 years	33	6,45	1,87			
Teaching program	1 – 5 year	65	17,86	4,47	2-138	2,52	,08
	6 – 10 year	41	18,48	4,59			
	More than 10 years	33	19,84	2,51			
Teaching and Teachers' roles	1 – 5 year	65	12,12	2,51	2-138	4,47	,01
	6 – 10 year	41	13,02	2,65			
	More than 10 years	33	13,57	1,65			
Teachers' qualification	1 – 5 year	65	23,46	3,94	2-138	2,73	.06
	6 – 10 year	41	24,87	3,72			
	More than 10 years	33	25,33	5,01			

In contrast, it was determined there was no significant difference between the opinions of pre-school teachers in the size of talent development and age appropriateness [F (2-138) = 2.93, p> .05], the nature of mathematics [F (2-138) = 1.25, p> .05], the curriculum [F (2-138) = 2.52, p> .05], and teacher qualifications [F (2-138) = 2.73, p> .05].

According to the teaching experience duration of pre-school teachers, the Scheffe test results were conducted to determine which group was significant in favor differences in the size of mathematical learning and if there was a difference in favor of the second group among teachers whose durations of teaching experience were more than10 years and the teachers whose duration of teaching experience ranged between 1-5 years. The test results indicated there was no significant difference between teachers in other groups and teachers whose duration of teaching experience was between 6-10 years. In addition, by increasing the duration of teaching experience, the teachers' positive answers to the agent for the nature of mathematics drew attention. This case seemed to clearly indicate the average score for this dimension of the groups was divided according to their teaching experience. Moreover, the study showed that a difference appeared between the views about teaching and the teacher's role in favor of the second group of teachers whose duration of teaching experience was more than 10 years, and of the teachers whose duration of teaching experience was between 1-5 years. There was no significant difference between the teachers whose teaching experience duration was between 1-5 years and teachers whose durations of teaching experience ranged from 6-10 years. When an average of the groups' score related to teaching and the teacher's role was examined, the statistic results corroborated that the highest average score belonged to the group of teachers whose teaching experience was more than 10 years.

Based on the teaching experience duration of pre-school teachers, there was no difference in the ideas for the curriculum related to the teaching experience duration. Beliefs about mathematical activities indicated that mathematics was seen as both an important part of the pre-school curriculum and mathematical activities were considered important to create social environment, but these beliefs did not reflect the meaningful differences according to the teaching experience duration of pre-school teachers. Furthermore, the teaching experience duration of pre-school teachers didn't reflect the differences of ideas related to teacher qualification. When the investigation using a survey on the teaching experience duration of the teachers was examined, the results showed that increased teaching experience duration had a linear relationship with a teacher's sufficiency. An ANOVA results was conducted to determine the relationship between the participants' views based on their graduation program are given in **Table 4**.

Table 4. ANOVA Survey Results Based on Pre-school Teachers' Graduation Program

Dimensions	Graduation	n	$\bar{x}$	SS	sd	F	p
Talent development and age-appropriateness of mathematical learning	Undergraduate program	63	25,30	3,98	2-138	3,53	,062
	Open education	42	23,28	4,82			
	Associate degree program	34	23,35	4,52			
Learning mathematically	Undergraduate program	63	12,06	2,95	2-138	,34	,71
	Open education	42	11,57	3,35			
	Associate degree program	34	11,94	2,61			
The nature of Mathematics	Undergraduate program	63	7,03	1,01	2-138	9,22	,00
	Open education	42	5,76	2,11			
	Associate degree program	34	6,47	1,26			
Teaching program	Undergraduate program	63	19,52	2,83	2-138	3,46	,03
	Open education	42	17,76	5,62			
	Associate degree program	34	17,58	3,90			
Teaching and teachers' role	Undergraduate program	63	13,30	2,22	2-138	4,28	,01
	Open education	42	12,61	2,50			
	Associate degree program	34	11,82	2,54			
Teachers' qualification	Undergraduate program	63	26,13	4,31	2-138	2,96	,04
	Open education	42	23,04	4,07			
	Associate degree program	34	24,58	3,92			

According to graduation programs of the pre-school teachers, a significant difference emerged between the opinions of teachers and the nature of mathematics [F (2-138) = 1.25, p> .05], curriculum [F (2-138) = 2.52, p> .05] and teacher qualifications [F (2-138) = 2.73, p> .05]. In contrast, it was determined that there was no significant difference between the opinions of pre-school teachers, talent development, and age appropriateness [F (2-138) = 2.93, p> .05], the nature of mathematic learning [F (2-138) = 1.25, p> .05], the curriculum [F (2-138) = 2.52, p> .05] and teacher qualifications [F (2-138) = 2.73, p> .05].

The Scheffe test conducted to determine which group was in favor between the opinions on the nature of mathematic of pre-school teachers who graduated from undergraduate programs, open education, and associate degree program, showed that the pre-school teachers who graduated from undergraduate programs and undergraduate education programs had more positive opinions about the nature of mathematics than teachers who had graduated from open education programs. In addition, the pre-school teachers who graduated from undergraduate programs and undergraduate education programs had more positive opinions

about the curriculum and teacher qualifications than the teachers who graduated from an open education program. There was a difference in favor of the undergraduate program group than teachers who graduated from the undergraduate educations in terms of the role of teachers and teaching.

DISCUSSION AND CONCLUSION

Teachers' beliefs regarding teaching and learning are among the most important factors shaping the teacher's classroom practices (Fang, 1996; Kagan, & Smith, K. E., 1988; Pajares, 1992). This study led us to examine pre-school teachers' beliefs about mathematics education.

Opinions have emerged about which pre-school teachers are suitable to teach mathematic to this age group, based on both their teaching experience duration and programs they graduated from on the point of talent development and age-appropriateness of mathematical learning. However, statistically there was no difference as there was an increase in the score average related to increase teaching experience, and the score average of the teachers who graduated from undergraduate programs and open education was higher than the others. The three main reasons for the positive change based on the increase in the teaching experience duration is that the teachers have (a) encountered different children over the years, (b) they have discovered their potential, and (c) they can see what the children are capable of. In contrast, the teacher's belief that pre-school children aren't ready to be taught mathematics has been reported as a false belief in previous studies (Lee, & Ginsburg, 2007a, 2007b). However, some researchers have argued that intentional mathematics education is unnecessary in the pre-school period and that it is not an appropriate approach and even suggest that may even be harmful to children (Balfanz, 1999). Other researchers have suggested that on the basis of this belief, teachers have a limited understanding of the Piaget's transaction period of Piaget (Ginsburg, Pappas, & Seo, 2001; Lee, & Ginsburg, 2007a; Walsh, 1991). He argued that attainment of mathematical skills occurs after a 7-year period that he called the transaction period (Piaget, 1952; Starkey, & Klein, 2008).

The average scores of preschool teachers, whose teaching experience duration was related to mathematical learning based on their teaching experience duration of more than 10 years, were statistically different than the scores of preschool teachers whose teaching experience duration was 1-5 years. It has been shown that the statistical difference between these scores was in favor of the teachers whose teaching experience duration was 1-5 years. Especially the number of teachers who chose "Strongly Agree" increased in relation to their teaching experience duration in such articles as "It is very important that the children are taking place in the mathematical problem-solving process" and "Contrast, confusion and bewilderment are the important parts of learning math." The main reason for the emergence of such a finding is that researchers claim that teachers encounter different situations, know children at different levels and see what they can achieve their cognitive development (Baroody, 1987; Clements, 2001). In contrast, studies show a statistically significant difference between the average scores of pre-school teacher on the mathematical learning. Some articles

(Maasepp & Bobis, 2014; Thiel, 2010) also indicate that, though there is no statistically significant difference in the result of the analyses of graduated programs, the teachers who have graduated from undergraduate programs seem to have more positive views than teachers who graduated from other programs.

While there is statistically no significant difference between the beliefs of pre-school teachers about the nature of mathematics in relation to their teaching experience duration, there is a statistically significant difference according to their graduation programs. According to the findings, teachers who graduated from undergraduate programs and associate degree programs have a more positive view than the teachers who graduated from open education programs. Thompson (1984) determined that teachers' beliefs and perspectives about the nature of mathematics are reflected consciously or unconsciously in the teaching phase. Furthermore, Ernest (1991) determined that teachers' beliefs determine the beliefs about teaching and learning mathematics.

While there is no statistically significant difference between the beliefs of pre-school teachers about the nature of mathematics according to teaching experience duration, there is statistically significant difference according to the programs they graduated. Although there is no statistically significant difference in result of the analyses conducted on graduated programs, teachers who have graduated from undergraduate program seems to indicate more positive views than teachers who have graduated from other programs in some article. Thus, such an increase reflects the importance of mathematics by experienced teachers. In other words, teachers who once thought that mathematics was not an important part in pre-school education programs in the early years of their experience teaching duration saw that mathematic is important for young children as their teaching duration increases. Lee and Ginsburg (2007a) explored teachers' beliefs about mathematics education in pre-schools in their study. They were divided the teachers into two categories, namely teachers of children who were at a moderate economic level and teachers of children who came from a low economic level. In this economic study, teachers of children from a low-income level determined that pre-school mathematics was necessary and important to teach. In contrast, the teachers of middle-income children thought mathematics education was an important socialization tool in the preschool years and expressed the need to pass in front of it. In retrospect, it has been proven that preschool math is important in the period in both groups, but middle-income children's socialization teachers have said that it is more important. The results obtained from this perspective are consistent with the results of this evaluation study.

Similarly Herron (2010) examined pre-school teachers' views on the mathematics curriculum. The opinions of the pre-school teachers were that it contains math resources for pre-school classes, provide the pre-school class with mathematical thinking, as well as shaping the program size to include instructional strategies. In this way, Herron (2010) revealed how all teachers perceived the pre-school mathematics curriculum. Findings indicated that it infers the need for curriculum and professional development of preschool teachers. When considering the findings of the research about the teaching experience of the pre-school

teachers as positive that mathematics is an important part of the pre-school curricula, Herron (2010) pointed out that these dimensions should be taken into consideration.

According to the preschool teachers who graduated with a graduation degree, significant differences emerged about the curriculum from the views of teachers who graduated from associate degree and open learning programs. This result reflected the mathematical education courses offered in undergraduate programs. The number of mathematics education courses given in the degree program contrasts the associate degree and open education in science and mathematics courses that are given during only one semester. The course included in science education is different than the associate degree and open education programs, because there is not enough time to introduce the curriculum in detail. Wang et al. (2008) examined pre-school teachers' beliefs about the preschool curriculum in China and America. Results of this study indicated that the pre-school teachers in China are varied, because there are two different ways to become a teacher in China, and this is linked to the differentiation of the beliefs of teachers trained in different ways. Turkey as well has three different ways to become a teacher, and these findings differed in their internal beliefs of different ways according to the teachers' curriculum from pre-school to become a teacher, Wang et al. (2008), the evidence in support of work that has been done. Similarly, Li, Wang & Wong (2011), investigated reform movements that have occurred in the pre-school curriculum, teachers' beliefs and the effect of their teaching practice. By observing the pre-school classes for a week, he interviewed 10 teachers about teaching practices in China. The results of the study pointed to the practice of beliefs as well as educational policy perspectives.

By analyzing the teaching and learning subscale of the instrument, it was found by the authors that there is a significant difference between the experience of preschool teachers and the time they graduate from the programs. The more experience they have, the more they have positive opinions. Those who graduated from undergraduate programs also tend to have positive opinions. These results may be attributed to the teachers' better understanding of children and their learning. Işıkoğlu, Basturk and Karaca (2009) examined the assessment of in-service teachers' beliefs about child-centered education. They found that there is a correlation between the duration of the teachers' education and the beliefs of the teachers about child-centered education. In particular, more experienced teachers had been more successful than less experienced ones in providing lessons that included the children' active participation. This difference was noted over the years, and it was argued that experienced teachers may be better teachers due to their ability to know the children better. Similarly, Markovits (2011) examined the beliefs of pre-school teachers towards mathematics and mathematics education. The study was conducted with 166 pre-service teachers during a semester course. The pre-service teachers answered open-ended questions before and after the course. The result revealed that the course had a positive impact on their beliefs about mathematics and that mathematics can be taught to young children. Likewise, our findings support that the more education teachers have, the stronger and more positive beliefs on mathematics education they tend to have.

Bandura (1997), argued that self-efficacy is related to self-judgment in terms of one's capacity to accomplish certain performances by organizing necessary activities. In other words, Bandura (1997) defined self-efficacy as an individual's belief about his or her performance. Bringing the definition of self-efficacy into teachers' classroom practice, the self-efficacy of teachers has gained importance. Teacher self-efficacy is a concept related to whether or not a teacher is able to make a change his or her students' behaviors and whether teachers can organize a quality learning environment for students (Gibson & Dembo, 1984).

In our study, when we analyzed what factors are affecting the perception of teachers' self-efficacy, we found that the average scores related to self-efficacy increases with the length of their experience in the classroom. However, this increase was not significant statistically. In other words, the duration of teachers' experiences is not enough to increase their perception levels. Yet teachers' graduation programs have a critical role in forming their perceptions. The teachers who graduated from undergraduate degree programs had higher average scores of self-efficacy perception than the teachers who graduated from open education degree programs. Similarly, the teachers who received mathematics education during their in-service training had higher average scores than the teachers who did not. Based on these findings, it can be concluded that teachers' in-service training education impacts their perceptions related to their profession. Although statistical differences were detected, it should be taken into account that there were not any huge differences among the teachers' average scores.

Brown (2003) studied the effects of preschool teachers' self-efficacy (related the important of mathematics and mathematics education) on their ability to teach mathematics. She concluded that preschool teachers who possess a high level self-efficacy performed better in classroom management, interaction with the young students, and used different teaching strategies, all of which supports the importance of pre-service teachers' education.

Educational Implications

The results derived from the data indicate that preschool teachers' beliefs about mathematics education and teaching mathematics to young children lead to creating effective learning environments. The teachers' experiences and their educational backgrounds are also crucial as these factors shape teachers' professional development. The results also showed that experienced preschool teachers tend to have positive views about teaching in general and their role in teaching and learning because the more teachers spend time with children, the better they get know them. Therefore, we argue that teachers must have more opportunities to get involved in working with children during their teacher training through teaching placements or practices.

In our study, we found that the teachers who have college degrees were likely to have more positive views than those who had other degrees such as from vocational colleges or open education degrees programs, because pre-service teachers trained in colleges take more courses on mathematics education and instruction. This indicated that training in mathematics education affects teachers' mathematics teaching and thus, the teachers need to participate in

in-service trainings about the related subjects in order to increase the quality of their teaching mathematics.

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