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PRE-SERVICE PRIMARY TEACHERS' MATHEMATICS TEACHING EFFICACY AND MATHEMATICS SELF-EFFICACY IN TERMS OF PARENTAL LEVEL OF EDUCATION

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Abstract

As is known, primary teachers' beliefs and preferences about mathematics and the teaching of mathematics play a great role in classroom teaching. Self-efficacy is an individual's belief or perception of their own skills. Pre-service primary teachers' mathematics teaching efficacy and self-efficacy beliefs should aim for the highest levels. Parents play a great role in upbringing individuals with high level of self-confidence. The more educated the parents are, the more self-confident the children are. In line with this, this research aims to explore pre-service teachers' mathematics self-efficacy beliefs and mathematic teaching efficacy in terms of parental level of education. The research was carried out with pre-service primary teachers enrolled in the faculties of education in İstanbul. The data was collected using the *"Mathematics Self-Efficacy Perception Scale", "Mathematics Teaching Efficacy Belief Scale-Pre-service Teacher Form" and demographical data. The SPSS16.0 statistical package was used for the statistical data analyses of the research, which was designed in survey model. According to the research findings, it was found that pre-service teachers' mathematics self-efficacy perceptions differed significantly in terms of statistics as parents' level of education increased. Pre-service teachers' mathematics teaching efficacy beliefs differed significantly in terms of maternal level of education; however, they did not differ in terms of paternal level of education. The results were discussed in the light of the literature and some suggestions were made for further research and researchers.*

Keywords: Preservice Primary Teacher, Mathematics Self-efficacy, Mathematics Teaching Efficacy, Maternal-Paternal.

INTRODUCTION

Mathematics education is an essential part of elementary education since mathematics is one of the key tools that promotes thinking (Umay, 2003). As is known, it is not possible to keep track of the advances in disciplines without having sufficient mathematics culture (Işık & Bekdemir, 1998). Today, almost every occupation requires some knowledge of mathematics, especially mathematical thinking (Olkun & Toluk, 2007). Mathematics, with its unique structure, content and system, contributes to every discipline and stands as an important part of education as well as life (Üldaş, 2005). In this context, it is even more important to teach and earn skills of mathematics, which is the most powerful tool that has to be learnt for the order and organisation of the advancing world (Betz, 1978).

Positive and negative attitudes towards mathematics, which is present into every aspect of life, are the most important components of mathematics education. Individuals' first impressions of mathematics substantially affect their future views of mathematics (Çakmak, 2005). As argued by Çelik and Bindak (2005), primary teachers play an important role in earning positive attitudes towards mathematics since primary teachers are those who transfer core subjects in the primary curriculum to children and help them develop positive

attitudes towards themselves and the outer world (Senemoğlu, 1994). However, teachers who do not have sufficient knowledge and experience of teaching cannot evoke feelings of trust in students and it is not possible for them to ideally carry out the functions of learning and teaching (Umay, 2001). Thus, self-efficacy belief, which is an individual's confidence in himself, affects the *effort teachers* invest in *teaching and the goals they set in teaching* (Hoy & Spero, 2005).

Self-efficacy belief, which was first introduced in Bandura's Social Learning Theory, is related to individuals' self-judgements regarding how well they are be able to do the necessary actions in order to cope with prospective situations (Hazır-Bıkmaz, 2004). Self-efficacy perception, which refers to an individual's judgement of his/her "capabilities to *organize* and execute the courses of action *required* to attain designated types of performances" (Bandura, 1986), influences individuals' level of success considerably (Pajares, 2002). Mathematics self-efficacy perception, on the other hand, was defined by Hackett & Betz (1989) as a "situational assessment of an individual's confidence in her or his ability to successfully perform or accomplish a particular mathematical task or problem." Mathematics self-efficacy perception is known as a strong predictive of math performance (Kiamanesh et al., 2004; Üredi & Üredi, 2005; Pajares & Miller, 1994; Pajares, 1996).

Teacher self-efficacy has been described as individuals' capability to influence students' performances and their senses of taking the necessary course of action to fulfill their roles (Aston, 1984; Atıcı, 2000). Among pre- and in-service teachers' efficacies are a wide range of topics, including specific information, skills, habits, attitudes and acts that are used to furnish students with, a suitable setting for that, guidance for students, management of learning and teaching activities and improvement of school and environment relations (Akengin et al., 2004). Teacher self-efficacy belief concerns the quality of teaching, methods and techniques adopted, students' participation into learning and their understanding and hence students' level of success. Therefore, well-trained teacher candidates are expected to have high self-efficacy belief (Üredi & Üredi, 2005) because mathematics self-efficacy and mathematics teaching efficacy are essential for the process of learning and teaching mathematics, which is present within all other disciplines.

On the other hand, parents' consistent behaviors are another factor that helps consolidate individuals' self-confidence and ensures intrinsic motivation in attaining success (Poyraz, 2012). Children's sense of confidence develops and level of success increases with respect to their parents' level of education. That means parents provide more academic counseling and support for their children as their level of education increases (Özan & Yüksel, 2003). From this point forth, this research was planned for the aim of questioning and studying whether field or teaching capabilities of pre- and in-service teachers involved in the process of learning and teaching of mathematics are influenced or not by their parents' educational background. Since there is a small number of studies in the literature about investigating mathematics self-efficacy and mathematics teaching efficacy beliefs in terms of parents' educational background, this research is expected to pave the way for further research and contribute to the studies of pre-service teacher training.

Aim

This research aims to explore pre-service primary teachers' mathematics self-efficacy beliefs and mathematics teaching efficacy beliefs in terms of parental level of education.

METHOD

This research was designed in survey model, which aims to describe the existing situation as it stands in the pas tor currently (Karasar, 2003).

Research Scope and Sampling

The scope of the research is limited to pre-service primary teachers studying in the city of İstanbul. The sampling of the research consists of 142 randomly chosen pre-service teachers enrolled at the primary education program of an education faculty in the city of İstanbul.

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Data Collection Tools

"Mathematics Self-Efficacy Perception Scale" developed by Umay (2001) and "Mathematics Teaching Efficacy Belief Scale-Pre-service Teacher Form" adapted by Şahinkaya (2008) using the "Mathematics Teaching Efficacy Beliefs Instrument" developed by Enochs, et al. (2000) were used as data collection tools in order to provide the necessary data in line with the aim of the research.

Mathematics Self-Efficacy Perception Scale, which is a five-point Likert type scale, is composed of 14 items. The reliability coefficient of the scale was calculated as ,88. The scale is composed of three factors as follows:
1. Mathematics self-perception 2. Mathematical self-awareness 3. Ability to transform mathematics efficacy into life skills. The scale consists of the options of "always", "usually", "sometimes", "rarely" and "never". The lowest possible score was calculated as 14 while the highest possible score was calculated as 70. Cronbach's Alpha (α) coefficient was calculated to determine the reliability of the scale and it was found to be 0.758.

"Mathematics Teaching Efficacy Belief Scale-Pre-service Teacher Form" adapted by Şahinkaya (2008) using the scale developed by Enochs, et al. (2000) consists of 21 items and has two forms: one for in-service teachers and one for pre-service teachers. The scale has two dimensions, which are "personal teaching efficacy or self-efficacy" and "teaching efficacy or outcome expectancy". These two dimensions consitute the dimension of mathematics teaching efficacy. The dimension of mathematics teaching self-efficacy is composed of 13 items while the dimension of outcome expectancy consists of 8 items. The Likert-type scale consists of five response options (Strongly Agree, Agree, Uncertain, Disagree, Strongly Disagree). Cronbach's Alpha α was calculated as 0,80 during the application of the scale in Turkey. However, it was calculated as 0,656 in this research.

Data Analysis

The SPSS19.0 statistical package program was used for the statistical analyses of the data. Kruskal Wallis-H Test was performed to determine whether pre-service teachers' scale scores significantly differ or not in terms of parental level of education. Later, Mann Whitney-U Analysis, which is one of the complementary statistical methods, was performed to find the source of significant difference between the groups. The significance level was taken as .05 in the statistical analyses.

FINDINGS

According to the research finding, it was seen that 8 (5,6%) of pre-service teachers' mothers did not go to school, 79 (55,6%) of them graduated from primary school, 15 (10,6%) of them graduated from secondary school, 30 (21,1%) of them graduated from high school, 10 (7,0%) of them graduated from university. When the pre-service teachers' fathers were taken into account, it was observed that 3 (2,1%) of them did not go to school, 41 (28,9%) of them graduated from primary school, 21 (14,8%) of them graduated from secondary school, 46 (32,4%) of them graduated from high school, 31 (21,8%) of them graduated from university.

Table 1: Results of the Kruskal Wallis-H Test Performed to Determine Whether Pre-service Primary Teachers' Mathematics Self-Efficacy Perception Scale Scores Differ or Not in Terms of Parental (Maternal) Level of Education

Score	Group	N	Average of Rows	Chi Square	Sd	P
Mathematics self-perception	Uneducated	8	72,88	11,726	4	,020
	Primary School	79	76,13			
	Secondary School	15	45,43			
	High School	30	63,83			
	Undergraduate	10	95,95			
	Total	142				

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Mathematical self-awareness	Uneducated	8	72,88			
	Primary School	79	76,13			
	Secondary School	15	45,43			
	High School	30	63,83			
	Undergraduate	10	95,95			
	Total	142		7,794	4	,099
Ability to transform mathematics efficacy into life skills	Uneducated	8	75,31			
	Primary School	79	74,06			
	Secondary School	15	46,70			
	High School	30	70,20			
	Undergraduate	10	89,30			
	Total	142		6,485	4	,166
Total Score	Uneducated	8	88,13			
	Primary School	79	66,06			
	Secondary School	15	62,90			
	High School	30	79,98			
	Undergraduate	10	88,60	9,630	4	,047
	Total	142				

As shown in Table 1, Kruskal Wallis-H Test was performed to determine whether pre-service teachers' Mathematics Self-Efficacy Perception Scale scores differ significantly or not in terms of parental (maternal) level of education. As a result of the analysis, it was observed that there was statistically significant difference between the mean ranks of groups in Mathematics Self-Perception (x^2= 11,726, p<.05) and total scale scores (x^2= 9,630, p<.05). There was no statistically significant difference between the mean ranks of groups in the subdimensions of Mathematical Self-Awareness (x^2= 7,794, p>.05) and Ability to Transform Mathematics Efficacy into Life Skills (x^2= 6,485, p >.05). Complementary statistical methods were performed to determine the source of significant difference between the groups. Since there is not a specific test technique for this purpose, binary comparisons were performed with the non-parametric Mann Whitney-U Analysis.

Table 2: Results of the Mann Whitney-U Analysis Perfomed to Determine the Source of the Difference Between the Mean Ranks of Pre-service Primary Teachers' Mathematics Self-Efficacy Perception Scale Scores in Terms of Parental (Maternal) Level of Education

Puan	Group	N	S.O.	S.T.	U	Z	P
Mathematics self-perception	Uneducated	8	42,13	337,00	301,000	-,222	,825
	Primary School	79	44,19	3491,00			
	Uneducated	8	15,19	121,50	34,500	-1,671	,095
	Secondary School	15	10,30	154,50			
	Uneducated	8	21,50	172,00	104,000	-,579	,563
	High School	30	18,97	569,00			
	Uneducated	8	7,56	60,50	24,500	-1,396	,163
	Undergraduate	10	11,05	110,50			
	Primary School	79	50,61	3998,50	346,500	-2,553	,011
	Secondary School	15	31,10	466,50			
	Primary School	79	57,73	4560,50	969,500	-1,470	,142
	High School	30	47,82	1434,50			
	Primary School	79	43,59	3444,00	284,000	-1,453	,146
	Undergraduate	10	56,10	561,00			
	Secondary School	15	18,27	274,00	154,000	-1,722	,085
	High School	30	25,37	761,00			

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	Secondary School	15	9,77	146,50	26,500	-2,715	,007
	Undergraduate	10	17,85	178,50			
	High School	30	18,18	545,50	80,500	-2,185	,029
	Üniversite	10	27,45	274,50			
Scale Total	Uneducated	8	45,25	362,00	306,000	-,147	,883
	Primary School	79	43,87	3466,00			
	Uneducated	8	15,88	127,00	29,000	-2,006	,045
	Secondary School	15	9,93	149,00			
	Uneducated	8	21,13	169,00	107,000	-,467	,641
	High School	30	19,07	572,00			
	Uneducated	8	8,06	64,50	28,500	-1,025	,305
	Undergraduate	10	10,65	106,50			
	Primary School	79	50,31	3974,50	370,500	-2,295	,022
	Secondary School	15	32,70	490,50			
	Primary School	79	55,28	4367,50	1162,500	-,153	,879
	High School	30	54,25	1627,50			
	Primary School	79	43,29	3420,00	260,000	-1,757	,079
	Undergraduate	10	58,50	585,00			
	Secondary School	15	17,43	261,50	141,500	-2,014	,044
	High School	30	25,78	773,50			
	Secondary School	15	9,83	147,50	27,500	-2,636	,008
	Undergraduate	10	17,75	177,50			
	High School	30	18,75	562,50	97,500	-1,643	,100
	Undergraduate	10	25,75	257,50			

As shown in Table 2, Mann Whitney-U analysis was performed to determine the source of significant difference between the mean ranks of Mathematics Self-Efficacy Perception Scale total scores and the subdimension of mathematical self-perception in terms of parental (maternal) level of education. As a result of the analysis, significant difference was observed in the subdimension of mathematical self-perception between the parents (mothers) who graduated from primary school and those who graduated from secondary school: in favor of the primary school graduates (z= -2,553 p<.05); between the parents (mothers) who graduated from secondary school and those who graduated from university: in favor of the university graduates (z= -2,715 p<.05); between the parents (mothers) who graduated from high school and those who graduated from university: in favor of the university graduates (z= -2,185 p<.05). When total scale scores are considered, significant difference was observed between the parents (mothers) who did not go to school and those who graduated from secondary school: in favor of those who did not go to school (z= -2,006 p<.05); between the parents (mothers) who graduated from primary school and those who graduated from secondary school: in favor of the primary school graduates (z= -2,295 p<.05); between the parents (mothers) who graduated from secondary school and those who graduated from high school: in favor of the high school graduates (z= -2,014 p<.05); between the parents (mothers) who graduated from secondary school and those who graduated from university: in favor of the university graduates (z= -2,636 p<.05).

Table 3: Results of the Kruskal Wallis-H Test Performed to Determine Whether Pre-service Primary Teachers' Mathematics Self-Efficacy Perception Scale Scores Differ or Not in Terms of Parental (Paternal) Level of Education

Puan	Group	N	Average of Rows	Chi Square	Sd	P
	Uneducated	3	60,00			
	Primary School	41	74,49	2,333	4	,675
	Secondary School	21	65,55			

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Mathematics self-perception	High School	46	67,41			
	Undergraduate	31	78,76			
	Total	142				
Mathematical self-awareness	Uneducated	3	73,67	1,533	4	,821
	Primary School	41	75,78			
	Secondary School	21	69,38			
	High School	46	66,13			
	Undergraduate	31	75,03			
	Total	142				
Ability to transform mathematics efficacy into life skills	Uneducated	3	107,00	10,203	4	,037
	Primary School	41	75,35			
	Secondary School	21	50,10			
	High School	46	69,28			
	Undergraduate	31	80,76			
	Total	142				
Scale Total	Uneducated	3	74,67	3,616	4	,461
	Primary School	41	75,23			
	Secondary School	21	62,76			
	High School	46	65,93			
	Undergraduate	31	80,44			
	Total	142				

As shown in Table 3, Kruskal Wallis-H Test was performed to determine whether pre-service teachers' Mathematics Self-Efficacy Perception Scale scores differ significantly or not in terms of parental (paternal) level of education. As a result of the analysis, statistically significant difference was detected between the mean ranks of groups in the subdimension of Ability to Transform Mathematics Efficacy into Life Skills (x^2= 10,203, p <.05). There was no statistically significant difference between the mean ranks of groups in total scale scores (x^2= 3,616, p>.05) and the subdimensions of Mathematical Self-Perception (x^2= 2,333, p>.05) and Mathematical Self-Awareness (x^2= 1,533, p>.05). Complementary statistical methods were performed to determine the source of significant difference between the groups. Since there is not a specific test technique for this purpose, binary comparisons were performed with the non-parametric Mann Whitney-U Analysis.

Table 4: Results of the Mann Whitney-U Analysis Perfomed to Determine the Source of the Difference Between the Mean Ranks of Pre-service Primary Teachers' Mathematics Self-Efficacy Perception Scale Scores in Terms of Parental (Paternal) Level of Education

Score	Group	N	S.O.	S.T.	U	Z	P
Ability to transform mathematics efficacy into life skills	Uneducated	3	32,00	96,00	33,000	-1,345	,179
	Primary School	41	21,80	894,00			
	Uneducated	3	20,83	62,50	6,500	-2,218	,027
	Secondary School	21	11,31	237,50			
	Uneducated	3	37,33	112,00	32,000	-1,560	,119
	High School	46	24,20	1113,00			
	Uneducated	3	22,83	68,50	30,500	-,984	,325
	Undergraduate	31	16,98	526,50			
	Primary School	41	35,35	1449,50	272,500	-2,377	,017
	Secondary School	21	23,98	503,50			
	Primary School	41	45,96	1884,50	862,500	-,693	,489
	High School	46	42,25	1943,50			

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	Primary School	41	35,23	1444,50	583,500	-,599	,549
	Undergraduate	31	38,18	1183,50			
	Secondary School	21	27,76	583,00	352,000	-1,790	,073
	High School	46	36,85	1695,00			
	Secondary School	21	20,05	421,00	190,000	-2,554	,011
	Üniversite	31	30,87	957,00			
	High School	46	36,49	1678,50	597,500	-1,213	,225
	Undergraduate	31	42,73	1324,50			

As presented in Table 4, Mann Whitney-U analysis was performed to determine the source of significant difference between the mean ranks of subdimension (Ability to Transform Mathematics Efficacy into Life Skills) scores of the Mathematics Self-Efficacy Perception Scale in terms of parental (paternal) level of education. According to the results of the analysis, it was observed that there was significant difference between the parents (fathers) who did not go to school and those who graduated from secondary school: in favor of those who did not go to school (z= -2,218 p<.05); between the parents (fathers) who graduated from primary school and those who graduated from secondary school: in favor of the primary school graduates (z= -2,337 p<.05); and between the parents (fathers) who graduated from secondary school and those who graduated from university: in favor of the university graduates (z= -2,554 p<.05).

Table 5: Results of the Kruskal Wallis-H Test Performed to Determine Whether Pre-service Primary Teachers' Mathematics Teaching Efficacy Scale Scores Differ or Not in Terms of Parental (Maternal) Level of Education

Score	Group	N	Average of Rows	Chi Square	Sd	P
Mathematics Teaching Efficacy	Uneducated	8	40,00	12,344	4	,015
	Primary School	79	77,51			
	Secondary School	15	48,77			
	High School	30	70,48			
	Undergraduate	10	86,40			
	Total	142				
Outcome Expectancy	Uneducated	8	54,50	2,560	4	,634
	Primary School	79	75,02			
	Secondary School	15	64,43			
	High School	30	71,73			
	Undergraduate	10	67,20			
	Total	142				
Scale Score	Uneducated	8	35,63	12,691	4	,013
	Primary School	79	77,61			
	Secondary School	15	49,93			
	High School	30	72,18			
	Undergraduate	10	82,25			
	Total	142				

As shown in Table 5, Kruskal Wallis-H Test was performed to determine whether pre-service primary teachers' Mathematics Teaching Efficacy Scale scores differ significantly or not in terms of parental (maternal) level of education. According to the results of the analysis, it was observed that there was statistically significant difference between the mean ranks of the groups in total scale scores (x^2= 12,691, p<.05) and the subdimension of Self-Efficacy (x^2= 12,344, p <.05). There was no statistically significant difference between

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the mean ranks of the groups in the subdimension of Outcome Expectancy (x^2= 2,560, p>.05). Mann Whitney-U Analysis which is one of the complementary statistical methods, was performed to determine the source of significant difference between the groups.

As a result of the Mann Whitney-U analysis, significant difference was observed between the parents (mothers) who did not go to school and those who graduated from primary school: in favor of the primary school graduates (z= -,222 p<.05); between the parents (mothers) who did not go to school and those who graduated from high school: in favor of the high school graduates (z= -1,996 p<.05); between the parents (mothers) who did not go to school and those who graduated from university: in favor of the university graduates (z= -2,366 p<.05); between the parents (mothers) who graduated from primary school and those who graduated from secondary school: in favor of the primary school graduates (z= -2,520 p<.05). When total scale scores are considered, there was significant difference between the parents' (mothers) who did not go to school and those who graduated from primary school: in favor of the primary school graduates (z= -2,716 p<.05); between the parents (mothers) who did not go to school and those who graduated from high school: in favor of the high school graduates (z= -2,335 p<.05); between the parents (mothers) who did not go to school and those who graduated from university: in favor of the university graduates (z= -2,589 p<.05); between the parents (mothers) who graduated from primary school and those who graduated from secondary school: in favor of the primary school graduates (z= -2,395 p<.05).

Table 6: Results of the Kruskal Wallis-H Test Performed to Determine Whether Pre-service Primary Teachers' Mathematics Teaching Efficacy Scale Scores Differ or Not in Terms of Parental (Paternal) Level of Education

Score	Group	N	Average of Rows	Chi Square	Sd	P
Mathematics Teaching Efficacy	Uneducated	8	12,83	7,873	4	,096
	Primary School	79	79,59			
	Secondary School	15	69,50			
	High School	30	69,87			
	Undergraduate	10	70,26			
	Total	142				
Outcome Expectancy	Uneducated	8	54,83	,584	4	,965
	Primary School	79	70,51			
	Secondary School	15	71,90			
	High School	30	72,49			
	Undergraduate	10	72,68			
	Total	142				
Scale Score	Uneducated	8	11,83	7,069	4	,132
	Primary School	79	76,76			
	Secondary School	15	72,10			
	High School	30	71,60			
	Undergraduate	10	69,77			
	Total	142				

As shown in Table 6, Kruskal Wallis Test was performed to determine whether pre-service primary teachers' Mathematics Teaching Efficacy Scale scores differ significantly or not in terms of parental (paternal) level of education. As a result of the analysis, it was observed that there was no significant difference between the mean ranks of groups in total scale scores (x^2= 7,069, p> .05) and the subdimensions of Self-Efficacy (x^2= 7,873, p >.05) and Outcome Expectancy (x^2= ,584, p> .05).

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CONCLUSION AND DISCUSSION

As a result of the findings, it was observed that pre-service teachers' total scores for the Mathematics Self-Efficacy Perception Scale and its subdimensions of mathematical self-perception and Mathematics Teaching Efficacy Scale scores differed with respect to parental level of education. It was concluded that pre-service teachers' Mathematics Self-Efficacy Perception Scale scores differed with respect to paternal level of education in the dimension of ability to transform mathematics efficacy into life skills. On the other hand, Mathematics Teaching Efficacy Scale scores did not differ significantly with respect to paternal level of education.

The studies prove the fact that individuals with high level of self-efficacy perception are insistent and patient, make great efforts to achieve anything and never give up easily when faced with difficulties (Aşkar & Umay, 2001). To explain and share mathematical thoughts in a logical way requires accurate use of mathematical terminology and language (MEB, 2005). Although it is teachers who help us acquire the skills of using mathematical language accurately, family is also known to contribute to the acquisition of skills. When the fact that it is especially mothers who provide support for children at home is considered, it is not surprising that children whose maternal level of education is high have a higher level of mathematic self-perception. Mathematics self-perception is concerned with a personal quality whereas mathematics teaching efficacy pertains to an imperative quality. An individual's self-efficacy requires having high level of self-confidence. Therefore, individuals with high level of mathematics self-perception have high level of mathematics teaching efficacy.

The research shows that individuals whose paternal level of education is high have a better ability to transform mathematics efficacy into life skills. Ability to transform mathematics efficacy into life skills requires some qualities such as methodological study and benefiting from others' experiences. This outcome might have been due to the fact that fathers with high level of education pass on their children such skills. When Bandura's social learning theory is taken into account, it is expected that positive models will have an influence on children's academic development. When the fact that Individuals with high levels of education demonstrate more advanced habits is considered, it can be stated that these parents would be a positive model for their children (Yıldız, 2010).

Besides, when the research sampling is considered, most pre-service teachers' parents are primary school graduates. With regard to this, it can be concluded that pre-service teachers are composed of the children of low and middle class families in socio-economic terms.

The following suggestions can be made in line with the research findings for further reserach:

1- It is observed that pre-service teachers' mathematics self-efficacy beliefs increase with respect to parental level of education. Therefore, more studies should be done to increase parents' educational level.

2- It is observed that pre-service teachers with high levels of mathematics self-efficacy have high levels of mathematics teaching efficacy. Therefore, teacher training institutions should conduct studies regarding pre-service teachers' self-efficacy.

3- Teacher training institutions should develop special teaching methods and techniques in order to increase mathematics teaching efficacy belief.

4- This research is limited to the city of İstanbul. Similar studies should be conducted in primary education and other teacher training programs of different universities.

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