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In-Service Training Needs of Teachers Working in Primary Schools About Mathematics: An Example in İstanbul

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ABSTRACT

Background: One of the fields with changes and developments is education, for sure. Changes and developments occur in many subjects such as instruction programs, teaching techniques and methods, educational technologies etc. It is also important for teachers, playing an important role in increasing the quality and efficiency in education, to have today's current knowledge and skills. In this sense, in-service training plays the key role. **Objective:** The purpose of the study is to determine the in-service training perception of the teachers working in primary schools of MEB (Ministry of Education) about mathematics, and to ascertain the level of participation. Target population of the study is Istanbul, and the sample is composed of randomly selected 238 primary schools in different regions of the city. The study is a field application. Survey method was used in obtaining data. A questionnaire was applied to the participants in order to determine their demographic characteristics and their perceptions about in-service training. Cronbach's alpha analysis was conducted for the reliability of the questions prepared, and the 0.972 coefficient was found. Descriptive statistics, independent sample t-test, variance analysis, chi-square analysis were used in the analysis of data. **Results:** Following the research, differences occurred regarding some items between the opinions about in-service training by the variables of sex, education and age. Moreover, following the analysis of the items by the type of school, it has been observed to result in differences on the items like increasing activities to establish the relation between mathematics and other disciplines, developing prediction strategies of students etc. **Conclusion:** As a result, efforts should be exerted to determine in-service training perceptions of teachers for math class, and to organize the required activities and arrangements in this direction, and to provide participation of teachers to regular and comprehensive in-service training activities. It can be stated that in-service training received for the branch shall make positive contributions for the lesson.

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INTRODUCTION

A rapid change is observed in nearly all fields today and education becomes an important factor in catching and keeping up with those changes. The continuity in this change necessitates in-service training for the individuals during their working life in line with the changes and developments (EARGED, 2008, 1). Developments in social, economic and technological fields oblige people with change. The most effective and basic way to adapt to change is education. It must be paid attention to systematic training activities in order to follow those developments and to be up to date about innovations. In-service training is an important practice for institutions to convey modern innovations, knowledge and skills to the personnel (Gül, 2000).

Almost all institutions and employees in the world need in-service training according to the renewed criteria. One of the most important educational institutions is Directorate of National Education and the teachers within its body. "In order to increase the quality of education applied in this country, vigorous efforts should be spent on training of teachers and teacher candidates in pre-service and in-service periods" (Kaya, Çepni and Küçük, 2004, 112).

In today's world, innovations always take place in the field of education as in every field. Traditional teaching approaches in education have given place to modern teaching approaches. Some changes were made in

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contents of course schedules, teaching subjects, assessment and evaluation criteria (EARGED, 2008). Restructuring of schools, a new curriculum and rearrangement of objectives expected from students do not improve the quality of teaching or learning alone (Elmore, 1992 as cited by Metin and Özmen, 2010, 820).

This can only be possible by improving knowledge and skills of teachers in line with the new expectations (Özyürek, 1981). In the information technology society of the 21st century, teachers who should have the sufficient competence to prepare the students for the future (EARGED, 1999), are expected to know their subject focus and to have necessary knowledge, skills and attitudes about education and training (Sönmez, 1999 as cited by Çatmalı, 2006, 1). With this aspect, in-service training of teachers is seen as an important way of acquiring new knowledge and skills and fulfilling the incompetence of pre-service training (Gültekin and Çubukçu, 2008, 189). It is a fact that the training that teachers receive in pre-service period about applying the innovations in education in an efficient way and acquiring necessary knowledge and skills will be insufficient (EARGED, 2008).

The way to train teachers in professional sense is professional development activities composed of in-service trainings (Altun, and Cengiz, 2012; Odabaşı and Kabakçı, 2007 as cited by Arslan and Şahin, 2013, 57). For teachers to work as individuals who are always stronger and more hardworking in their own field is only possible via in-service training and professional development (Saban, 2000). In-service training is the process in which any person having a profession trains herself/himself or be trained from the first day of practicing her/his profession until s/he stops performing it (Pehlivan, 1997 as cited by Öztürk & Sancak, 2007, 763).

No matter how well teachers have been trained in pre-service period, they must get in-service training all the time in order to be practice their profession successfully. Therefore, in-service training of teachers is seen as a complementary for pre-service training and as an important way to acquire new knowledge and skills about the profession (Gültekin *et al*., 2010, 133). In-service training is an important phase for teachers to raise their qualifications and to use their potential in full capacity (Seferoğlu, 2004, 85). However, this process should be well-planned and applied to reach its goal. Teachers can only update themselves in this way and carry out the today's educational activities (Cerit, 2004, 59). The past's view that basic teacher training is sufficient during the whole teaching career of teachers has given place to the view that teacher training should continue during the whole career of teachers (Garuba, 2004).

In-service training programs for teachers can be conducted for various purposes like bringing them in knowledge and skills required by the innovations and developments in the field, meeting their educational needs, refreshing teachers' knowledge and helping them to catch up with the professional and technological developments (Baskan, 2001 as cited by Gültekin *et al*., 1, 2010, 133). Moreover, pre-service training of teachers, differences in the region they teach and in experiences, their attitudes towards teaching, their level of knowledge, changes in technical knowledge and personal developments result in change in their in-service training needs (Joerger, 2002).

Teachers need in-service training in order to fulfill their incompetence both in pre-service and in-service period. Many factors such as pre-service knowledge being insufficient for work, the obligation to catch up with the changes and developments, and acquiring some knowledge and skills only in-service process require in-service training (Selimoğlu and Yılmaz, 2009, 3).

Although some relevant in-service training seminars are held and given to teachers, those in-service trainings can't meet the needs of teachers completely. In the study carried out by Önen *et al.*, l (2009), it is stated that professional incompetence of teachers still goes on despite in-service training seminars held (Önen, Mertoğlu, Saka, Gürdal, 2009).

Seminars and workshops held for teachers aim at certain subjects, branches and skills in different content and scope. One of those fields is the seminars that are held for teachers in mathematics. In-service training plays a significant role in bringing teachers in changes and innovations that occur in many technological and professional subjects like innovations in the field of mathematics, course content, appearance of different methods and techniques about the field, new course materials, teaching programs etc.

Due to the fact that main purposes of teaching mathematics is to develop thinking capacity, the most important improvement and innovation progresses in the field of mathematics education aim at changing traditional class environments into the places which will improve thinking skills of students. For mathematics courses aiming at developing the thinking skills of students, it is important to define the new roles and tasks of math teachers in those classes and to equip them with relevant training (As cited by Erktin *et al*., 2014, 41). It is a fact that the only way to do this is via in-service training. In this regard, in-service trainings to be given will help teachers to develop themselves professionally and contribute course efficiency to increase.

On that note, it can be uttered that it will also contribute to present the current status of this study that is carried out with the purpose of determining the in-service training perception of the teachers working in primary schools of MEB about mathematics, and to ascertain the level of participation.

Purpose, Scope and Method:

The purpose of the study is to determine the in-service training perception of the teachers working in primary schools of MEB, and to ascertain the level of participation. Target population of the study is Istanbul, and sample is composed of randomly selected 238 primary schools in different regions of the city. 70 of those schools are private and foundation schools. A total of 728 primary school teachers participated in the study. The survey questions are those measuring the demographic characteristics and in-service training perceptions of teachers. As a result of Cronbach's alpha analysis that was applied to the items of the scale for the reliability of the questions, 0.972 value was obtained.

Analysis of Data:

Data obtained following the questionnaire were analyzed in PASW 20.0 package program. Descriptive statistics, reliability analysis, independent sample t-test, variance analysis, chi-square analysis were conducted within the scope of analysis.

Demographic statistics:

Table 1: demographic statistics of the participants.

		Frequency	Column %
Sex	Female	325	45%
	Male	403	55%
Marital Status	Married	425	58%
	Single	303	42%
Age	18-25	21	3%
	26-33	91	13%
	34-41	369	51%
	42-50	211	29%
	51 and over	36	5%
Educational status	Vocational school	101	14%
	University	216	30%
	Master's degree	271	37%
	PhD	28	4%
	Other	112	15%
The school worked	Public	322	44%
	Private-foundation	406	56%
School sufficiency	Yes	403	55%
	No	325	45%

Table 2: Reliability analysis for the scale.

Cronbach's Alpha	Number of Items
.972	31

As Alpha = 0.972 following the reliability analysis, we can say that 31 items are at very high reliability level.

Table 3: T-test analysis on the opinions of the participants for in-service training and sex variable.

	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
Applying new teaching program of mathematics	-2.570	726	.010
Problem solving strategies	2.260	726	.024
Organizing activities directed to establishing connections between development process of mathematics science and current practices	-2.020	726	.044
The ability to take into account the different meanings of operations in teaching arithmetic operations	-3.575	726	.000
The ability to develop prediction strategies of students about numerical cases	-2.225	726	.026
The ability to organize activities about geometric shapes, features of shapes and their relations with each other	-2.329	726	.020
Organizing activities that will ensure students to use standard and non-standard units of measure	-4.109	726	.000
Organizing activities that will help students relate measurement, geometry and algebra	-3.483	726	.001

Regarding the distribution of the participants by sex, it is seen that 45% is female, 55% is male. 58% of the participants are married, 42% is single. 3% is aged between 18-25, 13% is aged between 26-33, 51% is aged between 34-41, 23% is aged between 42-50 and 5% is aged 51 and over. 14% is vocational school graduate, 30% is university graduate, 37% has master's degree, 4% has PhD degree and 15% is others. The rate of the teachers working in public schools is 44%, the rate of those working in private and foundation schools is 56%. 8% has a discomfort period less than 1 year, 15% has 1-5 years, 44% has 6-10 years, 31% has 11-15 years and

2% has 16-20 years. The rate of those finding the school sufficient is 55%, the rate of those not finding the school sufficient is 45%.

Independent sample t-test of the items about in-service training by sex:

H0: Sex doesn't cause difference on the item analyzed.

Regarding the items of in-service training by sex, the items in which Sig value is smaller than 0.05 and H0 hypothesis should be rejected are stated below. Accordingly, sex causes a statistical difference on those items.

- Implementing new teaching program of mathematics
- Problem solving strategies
- Organizing activities directed to establishing connections between development process of mathematics science and current practices
- The ability to take into account the different meanings of operations in teaching arithmetic operations
- The ability to develop prediction strategies of students about numerical cases
- The ability to organize activities about geometric shapes, features of shapes and their relations with each other
- Organizing activities that will ensure students to use standard and non-standard units of measure
- Organizing activities that will help students relate measurement, geometry and algebra

Table 4: ANOVA test on the opinions of the participants for in-service training and age variable.

	Sum of Squares	df	Mean Square	F	Sig.
Skills in new teaching program of mathematics	34.922	4	8.731	9.110	.000
Problem solving strategies	12.755	4	3.189	2.867	.022
Methods and techniques of learning-teaching strategies in teaching mathematics	14.135	4	3.534	4.169	.002
Organizing activities directed to establishing connections between development process of mathematics science and current practices	27.225	4	6.806	10.915	.000
Assessment and evaluation methods and techniques that are suitable for mathematics program	18.007	4	4.502	4.372	.002
The ability to take into account the different meanings of operations in teaching arithmetic operations	31.481	4	7.870	7.082	.000
The ability to develop problem solving and posing skills of students including arithmetic operation	29.798	4	7.450	7.069	.000
The ability to develop prediction strategies of students about numerical cases	36.971	4	9.243	9.085	.000
Development stages of students about geometrical concepts in teaching geometry	15.951	4	3.988	4.078	.003
The ability to organize activities about geometric shapes, features of shapes and their relations with each other	53.972	4	1.493	12.608	.000
The ability to organize activities emphasizing the relations between pattern, decoration and transformation geometry	37.841	4	9.460	8.111	.000
Organizing activities that will help students relate measurement, geometry and algebra	22.604	4	5.651	5.873	.000
The ability to develop problem solving skills of students about measurement	16.580	4	4.145	4.011	.003
The ability to develop data collection and interpretation skill in students	20.300	4	5.075	4.934	.001
Organizing activities that will help them apply and develop different strategies in probability and statistical problems	22.772	4	5.693	6.458	.000
Stages about algebraic development of students about algebra	29.798	4	7.450	7.069	.000

Independent sample t-test of the items about in-service training by age:

H0: Age doesn't cause difference on the item analyzed.

Regarding the items of in-service training by age, the items in which Sig value is smaller than 0.05 and H0 hypothesis should be rejected are stated below. Accordingly, age causes a statistical difference on those items.

- Skills in new teaching program of mathematics
- Problem solving strategies
- Methods and techniques of learning-teaching strategies in teaching mathematics
- Organizing activities directed to establishing connections between development process of mathematics science and current practices
- Assessment and evaluation methods and techniques that are suitable for mathematics program
- The ability to take into account the different meanings of operations in teaching arithmetic operations
- The ability to develop problem solving and posing skills of students including arithmetic operation
- The ability to develop prediction strategies of students about numerical cases
- Development stages of students about geometrical concepts in teaching geometry
- The ability to organize activities about geometric shapes, features of shapes and their relations with each other

- The ability to organize activities emphasizing the relations between pattern, decoration and transformation geometry
- Organizing activities that will help students relate measurement, geometry and algebra
- The ability to develop problem solving skills of students about measurement
- The ability to develop data collection and interpretation skill in students
- Organizing activities that will help them apply and develop different strategies in probability and statistical problems
- Stages about algebraic development of students about algebra

Table 5: ANOVA test on the opinions of the participants for in-service training and education variable

	Sum of Squares	df	Mean Square	F	Sig.
Applying new teaching program of mathematics	15.059	4	3.765	3.631	.006
Skills in new teaching program of mathematics	27.412	4	6.853	7.074	.000
Problem solving strategies	19.126	4	4.782	4.334	.002
Practices considering the students who require special education in mathematics	12.732	4	3.183	4.037	.003
Organizing the activities that can establish the relation between mathematics and other courses, interim disciplines and daily life	12.996	4	3.249	3.764	.005
Development stages of students about the concept of number in teaching numbers	8.960	4	2.240	2.695	.030
The ability to take into account the different meanings of operations in teaching arithmetic operations	35.676	4	8.919	8.068	.000
Teaching how to apply the relations between fraction, decimal fraction, ratio and proportion, and percentage in operations	21.242	4	5.310	5.055	.001
The ability to organize activities about geometric shapes, features of shapes and their relations with each other	11.482	4	2.871	2.543	.039
Organizing activities that will help students relate measurement, geometry and algebra	29.143	4	7.286	7.645	.000
The ability to develop problem solving skills of students about measurement	34.736	4	8.684	8.613	.000
The ability to develop data collection and interpretation skill in students	36.485	4	9.121	9.065	.000
Organizing activities that will help them apply and develop different strategies in probability and statistical problems	11.288	4	2.822	3.145	.014
Organizing the activities that help students grasp the different meanings of algebraic expressions	21.242	4	5.310	5.055	.001

Independent sample t-test of the items about in-service training by education:

H0: Education doesn't cause difference on the item analyzed.

Regarding the items of in-service training by education, the items in which Sig value is smaller than 0.05 and H0 hypothesis should be rejected are stated below. Accordingly, education causes a statistical difference on those items.

Table 6: T-test on the opinions of the participants for in-service training and school culture.

	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
Applying new teaching program of mathematics	-2.421	726	.016
Organizing the activities that can establish the relation between mathematics and other courses, interim disciplines and daily life	-2.606	726	.009
Teaching how to apply the relations between fraction, decimal fraction, ratio and proportion, and percentage in operations	-2.663	726	.008
The ability to develop prediction strategies of students about numerical cases	-2.113	726	.035
Development stages of students about the concept of measurement regarding measurement	-4.155	726	.000
Organizing activities that will ensure students to use standard and non-standard units of measure	-3.586	726	.000
The ability to develop problem solving skills of students about measurement	-2.493	726	.013
Organizing the activities that help students grasp the different meanings of algebraic expressions	-2.663	726	.008

- Applying new teaching program of mathematics
- Skills in new teaching program of mathematics
- Problem solving strategies
- Practices considering the students who require special education in mathematics
- Organizing the activities that can establish the relation between mathematics and other courses, interim disciplines and daily life
- Development stages of students about the concept of number in teaching numbers
- The ability to take into account the different meanings of operations in teaching arithmetic operations

- Teaching how to apply the relations between fraction, decimal fraction, ratio and proportion, and percentage in operations
- The ability to organize activities about geometric shapes, features of shapes and their relations with each other
- Organizing activities that will help students relate measurement, geometry and algebra
- The ability to develop problem solving skills of students about measurement
- The ability to develop data collection and interpretation skill in students
- Organizing activities that will help them apply and develop different strategies in probability and statistical problems
- Organizing the activities that help students grasp the different meanings of algebraic expressions

Independent sample t-test of the items about in-service training by the type of school:

H0: Type of school doesn't cause difference on the item analyzed.

Regarding the items of in-service training by the type of school, the items in which Sig value is smaller than 0.05 and H0 hypothesis should be rejected are stated below. Accordingly, type of school causes a statistical difference on those items

- Applying new teaching program of mathematics
- Organizing the activities that can establish the relation between mathematics and other courses, interim disciplines and daily life
- Teaching how to apply the relations between fraction, decimal fraction, ratio and proportion, and percentage in operations
- The ability to develop prediction strategies of students about numerical cases
- Development stages of students about the concept of measurement regarding measurement
- Organizing activities that will ensure students to use standard and non-standard units of measure
- The ability to develop problem solving skills of students about measurement
- Organizing the activities that help students grasp the different meanings of algebraic expressions

Table 7: Chi-square test for the variables of sufficiency of school and the school worked.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.035[a]	1	.851		
Continuity Correction[b]	.013	1	.910		
Likelihood Ratio	.035	1	.851		
Fisher's Exact Test				.881	.455
Linear-by-Linear Association	.035	1	.851		
N of Valid Cases	728				

Dependency relation between type of school and sufficiency of school – Chi-Square Test:

Regarding the relation between type of school and the physical capacity sufficiency of school, it has been determined that type of school has an effect on physical capacity and they are not independent.

Table 8: Chi-square test for the variables of educational status and the school worked

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.535[a]	4	.021
Likelihood Ratio	12.357	4	.015
Linear-by-Linear Association	1.299	1	.254
N of Valid Cases	728		

Dependency relation between type of school and educational status – Chi-Square Test:

Regarding the relation between type of school and educational status, it has been determined that type of school has an effect on education and they are not independent.

Table 9: Chi-square test for the variables of age and the school worked.

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.498[a]	4	.075
Likelihood Ratio	8.536	4	.074
Linear-by-Linear Association	3.358	1	.067
N of Valid Cases	728		

Dependency relation between type of school and age – Chi-Square Test:

Regarding the relation between type of school and age, it has been determined that type of school doesn't have an effect on age and they are independent.

Table 10: Chi-square test for the variables of sex and the school worked.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.619[a]	1	.000		
Continuity Correction[b]	19.943	1	.000		
Likelihood Ratio	20.668	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.591	1	.000		
N of Valid Cases	728				

Dependency relation between type of school and sex – Chi-Square Test

Regarding the relation between type of school and sex, it has been determined that type of school has an effect on sex and they are not independent.

Conclusion and evaluation:

Regarding the distribution of the participants by age and sex, it has been found out that the majority is male and aged between 34-41, and most of them are married. The rate of teachers who have a master's degree is higher than other groups. The rate of teachers working in private-foundation schools is 56%. 55% of them don't find the school sufficient.

The items, in which sex causes difference, have been found as development of teaching mathematics with current practices, organizing the activities that will ensure the relations between numbers and shapes.

The items, in which age causes difference, have been determined as those developing practices that will help students understand the relation between concepts better and developing problem solving and strategic thinking skills cause difference.

The items, in which education causes difference, have been found as developing interpretation capacities of students, increasing their skills and perceptions and developing interpretation skills for the relations with other fields of mathematics and daily life.

The items, in which type of school causes difference, have been found as increasing the activities in order to establish relation between mathematics and other disciplines and developing prediction strategies of students.

It has also been found out that the type of school and the physical capacity of school are not independent from educational status and sex.

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