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Basic Education Teachers' Proficiency of Skills Required for Teaching Mathematical Concepts

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Summary
This study aimed to determine basic education teachers' proficiency of skills required for teaching mathematical concepts. The study sample consisted of (115) male teachers and (113) female teachers, the study results showed that the level of basic education teachers' proficiency of skills required for teaching mathematical concepts was average ranging from (2:27) to (4:13), while the overall average level of proficiency of these skills was (3:04).The results showed statistically significant differences in the level of basic education teachers' proficiency of skills required for teaching mathematical concepts based on some variables (educational stage, educational administration, gender, years of experience, grade, teaching load, and employment type), in favor of, female teachers, those who have longer years of experience, the elementary grades (fourth, fifth and sixth), the least teaching load, temporary teachers, where there are no significant differences with regard to teachers' proficiency skills required for teaching mathematical concepts that can be attributed to the variable of educational administration.

1. Introduction and Theoretical Framework

1.1 Introduce the Problem

Mathematics is a set of mathematical systems and their applications in all aspects of working life and scientific disciplines. The mathematical system is a deductive structure based on a set of axioms and hypotheses. The logical evolution of Mathematical systems starts with indefinite items including dots, line, group and number. These vary depending on the mathematical system on which they are based. These non-definitions are considered an essential component (first base) of mathematics structure components based on deductive system. The second basis for mathematical structure is the definitions that explain the meaning of a word or an expression and determines its concept, and the third one is axioms, while the fourth is the theories. (Alsadiq, 2001)

Mathematics is not just separate routine operations or skills, but it is a well-built structure closely related to each other leading to an integrated solid foundation. The basic blocks of this building are the mathematical concepts, as the rules, generalizations, theories and mathematical skills rely depend on concepts in composition and acquisition (Abu Zaina, 1990)

After the integration of mathematical knowledge with its traditional branches; Attempts occurred were made to classify knowledge according to its components in a way that shows the mathematical construction unit by linking these branches with each other so that the hierarchy structure of knowledge is evident. Most mathematicians managed to classify knowledge included in the curriculum of mathematics into: mathematical concepts, expressions, generalizations and Math principles, algorithms and mathematical skills and mathematical problems.

Mathematical concepts are essentially the building blocks of the structure of mathematics because it is difficult to learn any knowledge well without acquiring its own basic concepts. The basic feature of the construction of any curriculum in math is to provide concepts spirally at intervals of depth in successive stages. (Al Kubaisi 2008)

Concepts are built through direct interaction with the surrounding context of interpreting a certain event in the light of a specific and appropriate concept. (Cobb, 1994)

When a beginner learner can realize and recognize the concept of number, then he is able to perform many operations on numbers such as comparison, order and classification. He can also perform various calculations on numbers based on his understanding of the concept of number and absorbing it. (Robinson et al, 2002)

Hilda Tapa (1960) has considered mathematical concepts as the most important ways to determine educational goals and evaluating them, because it helps in building cognitive and procedural objectives and identifies the impact of these concepts on the learner's behavior.

Obaid et al (1992) confirms that mathematical concepts are the first and the basic building block of any mathematical structure, where mathematical knowledge, such principles, laws and theories consisting of relationships between two concepts or more and the math skills are an application of these concepts. Obaid (1998) also noted that the most important characteristic of the mathematics curriculum is its focus on math structure and concepts because mathematics becomes meaningful and more understanding and clearer if learners realize mathematical concepts.

Afaneh (2001) also called to use mathematical concepts as a way to develop the curriculum, by using appropriate strategies to teach concepts fit to the mental development stage of students.

Many educators believe that the general goal of teaching mathematics is to help the learner to obtain mathematical concepts and skills with deep meaning which makes him able to solve the problems related to the needs of everyday life; so the most important thing in modern mathematics curriculum is to focus on teaching and learning of mathematical concepts, and to develop the learner's understanding of these concepts, this allowing students to acquire the skill, and the ability to abstract and solve problems, due to this importance of teaching concepts, many of these educators have made many studies on mathematical concepts.

YU-Jiang (1995) found that physics' students did not develop a good understanding of the concepts of area and size, and their thinking is only related to mathematical rules and principles without a proper understanding of the concepts. Also, their understanding of concepts such as pressure and density was limited because of using the normal way of understanding the concept of area and size.

While Williams (1998) found the effectiveness for using concept schemata in teaching functions among university students.

Alsawaie (2001) conducted an experimental study in order to identify the role of language in the acquisition of the concept of place value. One of the most important results of this study was improving the level of children's understanding of the concept of place value.

It is clear from the results of Attorps (2003) study that teachers lack the required depth for the concept of the equation, due to that teachers have formed a mental image of the concept through their dealings with the application of this concept rather than through problems focusing on the same concept, this came out through their answers to the questionnaire, some of them linked the concept of the equation to its solution and others linked to the concept of equation with unknown words, while some of them linked the concept of the equation to the equal sign and others classified the inequality as equation, and many teachers of them have indicated that they do not remember a specific and clear definition of the equation, because it was presented to them rapidly and they moved directly to solve the equations. Others pointed out that they have spent most of their time in schools dealing with procedures and little emphasis on conceptual knowledge.

The results of Konyalioglu et al (2003) study about the impact of using visuals and optical items by students in learning the linear algebra' concepts showed that the experimental group outperformed the control group in the overall test and the special part of conceptual knowledge, and there were no differences between the average groups in terms of procedural knowledge.

Mastorides & Zachariades (2004) explored the understanding of mathematics teachers in secondary schools and their various justifications about the Limit and continuous concepts. The results showed that math teachers at this stage do not have a good and proper understanding of the concepts of the Limit and continuous, and there is a big gap between teachers' understanding of these concepts and its real meaning.

Ghandoura (1426H.) conducted a study to investigate the effect of using instructional media to improve understanding of mathematical concepts for kindergarten children in the Holy City (Al-Quds). The study found statistically significant differences between the average of the experimental group and the control group. The differences were in the experimental group in understanding mathematical concepts as well as the following mathematical concepts: geometrical concepts, classification, sequence, pattern, pairing, equal groups, number, and charts. The study concluded that there are no statistically significant differences between the average scores of students based on gender in achieving the whole mathematical concepts.

Zhou et al (2005) conducted an assessment study on strengthening learning concepts using the computer, where network effectiveness based on the constructivist theory created by Canadian universities and colleges to help students learn scientific concepts was evaluated. Quantitative and qualitative methods included tests, interviews and classroom observations. The results of the study showed that the network whose design based on the constructivist theory was useful in strengthening the learning concepts.

Khazindar (2007) worked to determine the level of mathematical concepts' achievements and its relationship with the level of abstract thinking of 10th grade female students in Gaza. This was limited to a sample of (86) female students from northern Gaza, the researcher used the descriptive approach. The results indicated a weakness in the capacity of abstract thinking of the sample students, and the presence of correlative and positive statistical significant relation at the level of (0.05) between the level of abstract thinking and achievement in mathematics.

It is clear from the above that there is a great interest on the part of researchers in the conceptual side and teaching strategies that help students to understand the concepts and absorbing them, such as active learning strategies and the use of educational and computer media and schemata. Studies also pointed to the role of language and the use of visual aids in understanding the concepts. It also refers to the significant role played by the teacher in learning the concepts if he is able to understand and acquire them.

1.2 The Problem of the Study

The principle of learning, which is one of the six principles contained in the document of principles issued by the National Council of Teachers of Mathematics in the United States (NCTM, 2000), stated that students should learn math and understand it because learning coupled with understanding makes subsequent learning easier, and mathematics becomes meaningful, and the ability to apply and use them in new situations is enhanced.

Proper mathematics teaching needs teachers with a deep understanding of the material which they teach and they have a variety of skills and distinctive methods of teaching. The success of concept-based learning depends on the success of the teacher to help students with mixed abilities to look at various aspects surrounding the concept and focus on the relationship between this concept and other concepts. In addition to that, the teacher needs to make all students feel that they can contribute to providing new information or add to the information provided by others. Several studies have indicated that teachers of secondary and preparatory stages lack a true conceptual understanding. (Attorps, 2003)

In addition, teachers seem less interested in the development of concepts in their students and spend most of their time in teaching skills and algorithms and procedures. (Porter, 1992)

Some teachers also consume their students' time in solving routine exercises that neither mean anything for them, nor introduce mathematics properly in a way that inspires their thinking (Abu Zina, 1994). In addition to that, active learning strategies are scarcely used in teaching mathematical concepts.

Based on the foregoing and the great importance of mathematical concepts closely linked to the rest of the mathematics components, the present study tries to determine the level of proficiency of skills required for teaching mathematical concepts by basic education teachers.

1.3 Study Questions

• What is the level of proficiency of skills required for teaching mathematical concepts by basic education teachers?

• Are there any statistically significant differences between the average scores of proficiency of skills required for teaching mathematical concepts by basic education teachers that can be attributed to the following variables: educational stage (elementary or preparatory), educational administration (Bagour, Menouf and Ashmun), gender (male or female), years of experience (less than 5 years, 5-10 years, more than 10 years), grade (fourth, fifth and sixth primary, first, second and third preparatory), teaching load (less than 15 hours, 15-20 hours and more than 20 hours per week, recruitment (permanent or temporary teachers)?

1.4 Importance of the Study

It coincides with modern trends in teaching mathematics, which stresses on the importance of teaching mathematical concepts and develops the necessary skills required for teaching. It helps who works of teachers' preparation programs in directing programs in line with the results of the study, and including many skills in teaching mathematics in future teacher preparation programs, especially those who lack these skills. An observation card is offered for teachers' performance about the necessary skills needed to teach mathematical concepts that can be available for researchers and those interested in the field of concepts.

1.5 Limitations of this Study

The study is limited to teachers of mathematics and specialists in the basic education stage in three educational administrations (Bagour, Menouf, Ashmun) Menofia governorate, Egypt.

1.6 Study Approach

To answer the questions of the study, the researcher used the descriptive approach because it seeks to identify the teaching skills necessary to teach mathematical concepts in basic education, while identifying the level of teachers' proficiency of these skills.

1.7 Study Terms

Mathematical concept: the researcher defines it as "a common trait or characteristic that is available in all the examples of that concept".

2. Method and Procedures

This study was conducted according to the following steps:

- Identifying necessary skills to teach mathematical concepts in basic education and preparing a list of these skills by studying and reviewing relevant literature as well as benefiting from the document of principles and standards for school mathematics issued by the National Council of Teachers of Mathematics in the United States (NCTM, 2000).
- Preparing an observation card which includes skills in the previous list.

- Presenting the observation card to a group of referees with expertise in the field of education to ensure the card validity and make some modifications (deletion, addition and modification).
- Ensuring the stability of the observation card after applying it to the experimental sample, and calculating the validity and reliability.
- Explaining every skill of observation card skills for supervisors in two sessions each lasts for two hours.
- Obtaining the approval of the concerned authorities to implement the study tool and then apply it.
- Collecting data and entering them into the computer and processing those using SPSS.
- Analyzing and interpreting the results and making recommendations.

2./ Population and the Study Sample
The study sample consisted of a number of male and female teachers of mathematics in basic education (elementary and preparatory stage), with 115 male teachers and 113 female teachers. The following table shows the study sample:

Table (1): The study sample

Educational stage		Administration			Gender		Years of experience		
Elementary	Preparatory	Bajour	Menouf	Ashmun	Male	Female	Less than 5	5-10	More than 10
106	122	66	76	86	115	113	52	124	52
46%	54%	29%	33%	38%	50%	50%	23%	54%	23%

Grade						Teaching load			Situation	
4El.	5El	6El	1Pr	2Pr	3Pr	Less than 15	20-15	More than 20	Permanent	Temporary
34	34	38	36	42	44	48	70	110	140	88
15%	15 %	17%	16%	18%	19%	21%	31%	48%	61%	39%

2.2 The Study Tools
After returning to the educational literature and related concepts in general and mathematical concepts in particular, the researcher designed an observation card to measure the level of proficiency of skills required for teaching mathematical concepts among basic education teachers. The tool consisted of two parts:

- Part I: It contains information about the teacher: educational stage (elementary or preparatory), educational administration (Bagour, Menouf and Ashmun), gender (male or female), years of experience (less than 5 years, 5-10 years, more than 10 years), grade (fourth, fifth and sixth primary, first, second and third preparatory), teaching load (less than 15 hours, 15-20 hours and more than 20 hours per week, recruitment (permanent or temporary employee)
- Part II: Card items that measure the level of skills. There are five levels for each skill to measure the degree of availability of this skill (always, often, sometimes, rarely, never). The scale contains (18) different skills deemed necessary to teach mathematical concepts in basic education from the perspective of the researcher (Appendix1).

The card validity has been confirmed through presenting it to a group of faculty members in the field of curriculum and teaching methods, and some changes were made. The card reliability was confirmed through the application by two supervisors on a sample of (16) teachers. The reliability is calculated by answering the coefficient of agreement by Cooper equation which amounted to 0.78 considered to be good and acceptable.

3. Discuss the Results and Its Interpretation
The first question:
"What is the level of proficiency of skills required for teaching mathematical concepts by basic education teachers?" To answer this question, the researcher placed a benchmark for evaluating the performance of teacher averages, where (3.66-5) is considered a high score and indicates a high proficiency, and (2.33-3.66) is a medium score that refers to medium proficiency, while (1 - 33.2) is a low score and indicates a low proficiency. Then the researcher calculated the mean and standard deviation and the level of proficiency for each skill as per the following table: -

Table (2): Averages, Standard deviations and the level of proficiency of the skills

N	Skill	Averages	SD	Level
1	The teacher makes sure that his students have pre-necessary requirements to learn the new concept.	3.40	1.06	Medium
2	He raises the attention of his students and prepares them to learn new concepts	2.94	1.35	Medium
3	He introduces the concept in a sequential and logical method.	2.34	1.54	Medium
4	He determines enough time to view concept.	2.73	1.24	Medium
5	He links between the concept and the students' environment.	2.27	1.67	Low
6	He offers a number of examples that linked to the concept.	3.50	0.85	Medium
7	He provides a number of examples that not linked to the concept.	2.73	1.35	Low
8	He shows the concept in simple language that fits the students' level.	3.94	0.95	High
9	He draws students' attention to the distinctive characteristics of the concept.	2.49	1.50	Medium
10	He directs students to ignore the non-distinctive characteristic features of the concept.	3.07	1.13	Medium
11	He shows the relationship between the new concept and other concepts associated with it.	2.81	1.26	Medium
12	He gives the opportunity for students to formulate the concepts in their own language.	3.71	1.96	Medium
13	He raises a variety of questions dealing with different aspects of the concept and deepens students' understanding of this concept	2.32	1.02	Medium
14	He uses different methods to teach concepts.	2.40	1.18	Medium
15	He focuses on the concept while applying.	3.05	1.15	Medium
16	He uses the suitable teaching tools which help students to explore the mathematical concepts (films, charts, pictures)	3.72	1.03	Medium
17	He tries to remove the mistaken concept.	3.17	1.01	Medium
18	He gives students homework and activities leading to deeper understanding of concepts.	4.13	1.11	High

It is clearly seen from the above table and through averages, standard deviations and the level of proficiency in each skill included in classroom observation card that averages ranged between (2.27) and (4.13), where only two skills got high scores and a percentage of (11.11%) from the total skills, these two skills are: He shows the concept in simple language that fits the students' level and he gives students homework and activities leading to deeper understanding of concepts, While (14) items got a medium score and a percentage of (77.77%) from the total skills, which is quiet good, (6) skills of these tend to go down by (33.33%), in addition, only two skills getting low scores and a percentage of (11.11%), these two skills are: He links between the concept and the students' environment, and he raises a variety of questions dealing with different aspects of the concept and deepens students' understanding of this concept. Looking back at the average of these two skills in the previous table, we find that they are much closed to the minimum level. In general, the average level of proficiency for all teachers is a medium level (3.04), this level of proficiency is not enough to teach mathematical concepts that are considered the basic component for teaching and learning mathematics. Probably, this is so, because the teachers focus on explaining the concepts as they are mentioned in the textbook and following the definition movement in teaching them. Moreover, teachers do not have the time and motivation for creativity in teaching to link concepts to the student's environment. They also do not give various questions and exercises that are linked with other aspects of concepts to enhance learning and students' understanding. This medium level of proficiency in teaching mathematical concepts can be attributed to the lack of workshops for teachers about these skills and the private lessons outside school, which means that the teachers did not give much time for teaching inside their actual classes.

The second question:

Are there any statistically significant differences between the average scores of proficiency of skills required for teaching mathematical concepts by basic education teachers that can be attributed to the following variables: educational stage (elementary or preparatory), educational administration (Bagour, Menouf and Ashmun), gender (male or female), years of experience (less than 5 years, 5-10 years, more than 10 years), grade (fourth, fifth and sixth primary, first, second and third preparatory), teaching load (less than 15 hours, 15-20 hours and more than 20 hours per week, recruitment (permanent or temporary teachers)?. To answer this question, T.test value and One Way ANOVA are followed as such: -

First: For the educational stage (elementary and preparatory):

T-test was used to determine the differences between the average proficiency of skills required for teaching mathematical concepts according to the educational stage as shown in the following table: -

Table 3: T-test for the educational stage (elementary and preparatory).

Stage	N	Average	SD	T- Score	Significant
Elementary	106	59.13	7.38	9.91	0.000*
Preparatory	122	50.23	5.99		

*Significant at level 0.05

Clearly shown from T- score and the statistical significance that there are differences between the average proficiency of skills required for teaching mathematical concepts according to the educational stage (elementary, preparatory) in favor for teachers at elementary stage, with an average score of elementary teachers (59.13), while the average scores of teachers at preparatory stage reached (50.23).This is probably due to the quality and nature of mathematical concepts of each stage and teaching concepts in elementary school are much easier than in the preparatory stage because of the nature of the stage and its students, and perhaps also due to the larger concern of elementary school teachers and their sense of the importance of conveying mathematical concepts to students, as the teachers at preparatory school teaching procedures and algorithms more than teaching concepts.

Second: Educational administration variable (Bagour, Menouf, and Ashmun):

The One Way ANOVA analysis has been used to determine the significance of differences between the average proficiency of skills required for teaching mathematical concepts according to the variable of educational administration as shown in the following table: -

Table (4): The One Way ANOVA analysis for educational administration (Bagour, Menouf, and Ashmun)

Source of variation	Sum of squares	Average of Squares	DF	F-Score	Significant
Between groups	143.354	71.677	2	1.12	0.328
Inside groups	14403.699	64.016	225		
Total	14547.053		227		

One-way ANOVA analysis shows no significant differences between teachers in three administrations, as F-Score equal (1.12) and the statistical significance (0.328) which is greater than (0.05), and this shows the similarities between teachers of the three educational administrations in the level proficiency of skills required for teaching mathematical concepts.

Third: Gender variable (Male and Female teachers):

The researcher uses the t-test to determine the significance of differences between the average scores of the proficiency of skills required for teaching mathematical concepts at basic education according to gender, as shown in the following table: -

Table (5): T-test for gender variable (Male and Female teachers).

Gender	N	Average	SD	T-Score	Significant
Male teacher	115	52.63	7.866	3.391	0.001*
Female teacher	113	56.14	7.784		

*Significant at level 0.05

Through T-Score and statistical significance, it is clear that there are statistically significant differences between the average scores of teachers on observation card. These differences were in favor of female teachers. The average of male teachers was (52.63), while the average of female teachers was (56.14). Probably this is due to the great care given by the female teachers to teaching the concepts more than male teachers, and their close commitment to instructions, courses and workshops in the field of teaching mathematics. As well as their lack of interest of having private lessons.

Fourth: Experience variable (Less than 5, 5 to 10 years, and more than 10 years):

The one-way ANOVA was used to determine the significance of differences between the average scores of the proficiency of skills required for teaching mathematical concepts at basic education according to years of experience as shown in the following table: -

Table (6): One Way ANOVA for Experience Variable (less than 5, 5 to 10 years, and more than 10 years).

Source of variation	Sum of squares	Average of Squares	DF	F-Score	Significant
Between groups	502.42	251.21	2	4.024	0.019*
Inside groups	14044.633	62.421	225		
Total	14547.053		227		

*Significant at level 0.05

The value of variance coefficient "F" and the statistical significance illustrate the existence of statistically significant differences between the average scores of teachers with the observation card skills in teaching mathematical concepts attributed to the number of years of experience (less than 5 years, from 5-10, more than 10). According to "Tukey" test for post application, it is clear that there are only significant differences between the average scores of teachers with experience of 5-10 years and more than 10 years in favor of more than 10 years. This confirms the presence of the impact factor of teaching experience at the level of proficiency of skills required for teaching mathematical concepts. The more years of experience, the more proficiency of teaching mathematical concepts.

Fifth: Grade variable (Fourth, fifth, and sixth elementary and first, second, and third preparatory)

The One Way ANOVA analysis was used to determine the significant differences between the average scores of the proficiency of skills required for teaching mathematical concepts according to the grade variable as shown in the following table: -

Table (7): The One Way ANOVA for Grade Variable (fourth, fifth, and sixth elementary and first, second, and third preparatory)

Source of variation	Sum of squares	Average of Squares	DF	F-Score	Significant
Between groups	4764.009	952.802	5	21.621	0.000*
Inside groups	9783.044	44.068	222		
Total	14547.053		227		

*Significant at level 0.05

The one-way analysis of variance illustrates that there are significant differences between teachers in the level of proficiency of skills required for teaching mathematical concepts attributed to the grade, and "Tukey" test shows that there are only significant differences between the average scores of teachers in the fourth, fifth, and sixth elementary, and first, second and third preparatory in favor of teachers in the fourth, fifth, and sixth grade. There are no differences between the average scores of teachers in other classes. This is consistent with what has been reached in the first part of this question which evident that there are significant differences in the level of proficiency of skills required to teach mathematical concepts between the mean of elementary school teachers and preparatory school teachers in favor of elementary teachers.

Sixth: Teaching load variable (less than 15 hours, 15-20 hours, more than 20):

The researcher uses One Way ANOVA to determine the significant differences between the average scores of proficiency of skills required for teaching mathematical concepts according to the variable of teaching load as shown in the following table: -

Table (8): The One Way ANOVA for teaching load variable (less than 15 hours, 15-20 hours, more than 20).

Source of variation	Sum of squares	Average of Squares	DF	F-Score	Significant
Between groups	2598.043	1299.022	2	24.461	0.000*
Inside groups	11949.010	53.107	225		
Total	14547.053		227		

*Significant at level 0.05

The value of one-way analysis shows significant differences between teachers in the level of proficiency of skills required for teaching mathematical concepts attributed to the teaching load (less than 15 hours, 15-20 hours, more than 20 hours per week), and "Tukey" test shows that there are significant differences only among less than 15 hours and 10-15 hours per week, in favor of the teachers with a teaching load of less than 15 hours per week. Whenever teaching load is less, the level of proficiency will be better. The same is with teachers whose their teaching load is more than 20 hours per week, and 15-20 hours per week in favor of teachers with teaching load more than 20 hours per week. This can be referred to the fact that most teachers with teaching load more than 20 hours per week are temporary who are eager to continue working and making the best of themselves, as it is seen through the "Tukey" coefficient values that there are no significant differences between the average scores of teachers with a teaching load of less than 15 hours, and more than 20 hours per week.

Seventh: The recruitment variable (permanent and temporary teachers)

The T-test used to determine the significance of differences between the average scores of the proficiency of skills required for teaching mathematical concepts according to the recruitment variable as shown in the following table:

Table (9): T-test for the recruitment variable (permanent and temporary teachers)

Recruitment	N	Average	SD	T-Score	Significant
Permanent	140	52.207	7.358	5.458	0.000*
Temporary	88	57.806	7.824		

*Significant at level 0.05

Illustrated by the value of T-test shows that there are statistical significant differences between the averages of teachers on the special observation card in teaching mathematical concepts attributed to the recruitment of the teacher (permanent, temporary), in favor of the temporary with average (52.207), for permanent teachers, while an average of temporary teachers was (57.806). Probably this is due to the fact that the commitment of the temporary is greater than the permanent teachers because the temporary don't feel job security which makes them work hard so as not to lose their jobs. The culture and curricula in universities have been changed and this has a great impact on the teachers' ability in teaching these concepts.

4. Conclusion and Recommendations

The results show that a medium proficiency for mathematics teachers in basic education to teach the skills required for teaching mathematical concepts. It appears that those who raise this level of proficiency are the elementary teachers because of their over-commitment, the nature of the stage and curricula and the nature of the students in this stage. It is evident that there are statistical significant differences in the level of basic education teachers' proficiency of skills required for teaching mathematical concepts based on these variables: educational stage, educational administration, gender, years of experience, grade, teaching load, and recruitment type, in favor of, female teachers, those who have longer years of experience, the elementary grades (fourth, fifth and sixth), the least teaching load, the temporary teachers, respectively, while no statistical significant differences due to the department of education variable. These differences indicate the height enables of each of the primary school teachers, female teachers, teachers with high years of experience, teachers at the elementary grades (fourth, fifth and sixth), teachers with lower teaching load, and the temporary teachers compared to their mates.

In light of the previous findings, the researcher recommends the following: -

- Conducting training and workshops designed to train mathematics teachers in basic education (elementary and preparatory) to teach mathematical concepts.
- Training supervisors to teach mathematical concepts to transfer their expertise to their teachers.
- Developing academic programs of teaching methods in the field of mathematics at colleges to include necessary skills for teaching mathematical concepts.
- Conducting further studies on similar mathematical cognitive categories such generalizations, skills and problem resolving.

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6. Appendix1

Observation Card

Educational stage:……………………… Educational administration:……………………………

Gender:…………………………. Years of experience:……………………………..

Grade:…………… Teaching load:……………………….. Recruitment:………………………..

N	Skill	Always	Often	Sometimes	Rarely	Never
1	The teacher makes sure that his students have pre-necessary requirements to learn the new concept.					
2	He raises the attention of his students and prepares them to learn new concepts					
3	He introduces the concept in a sequential and logical method.					
4	He determines enough time to view concept.					
5	He links between the concept and the students' environment.					
6	He offers a number of examples that linked to the concept.					
7	He provides a number of examples that not linked to the concept.					
8	He shows the concept in simple language that fits the students' level.					
9	He draws students' attention to the distinctive characteristics of the concept.					
10	He directs students to ignore the non-distinctive characteristic features of the concept.					
11	He shows the relationship between the new concept and other concepts associated with it.					
12	He gives the opportunity for students to formulate the concepts in their own language.					
13	He raises a variety of questions dealing with different aspects of the concept and deepens students' understanding of this concept					
14	He uses different methods to teach concepts.					
15	He focuses on the concept while applying.					
16	He uses the suitable teaching tools which help students to explore the mathematical concepts (films, charts, pictures)					
17	He tries to remove the mistaken concept.					
18	He gives students homework and activities leading to deeper understanding of concepts.					