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Reducing Mathematics Anxiety: The Ways Implemented by Teachers at Primary Schools

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Abstract

This research is an investigation of 'reducing mathematics anxiety: the ways implemented by teachers at primary schools in Turkey'. This study is needed to understand the ways which teachers implement to reduce the level of anxiety that pupils face in mathematics. In order to get sufficient data a qualitative research methodology was preferred in this study. The sample which purposively selected was comprised of fifty teachers teaching 4th and 5th graders at primary schools in Turkey. The results revealed that to reduce pupils' anxiety in mathematics, teachers chose such ways as motivating pupils, making math relevant, reviewing the given topic by examples and exercises, using games and also getting support from parents. It was also found that while using these given strategies, teachers did not evaluate whether pupils' anxiety was reduced. It should be noted that the results of this study is limited with teachers' views and there is a need to look at pupils' views to get fruitful information about the topic and to structure the ways of reducing anxiety in mathematics based on views of both sides.

Keywords: *mathematics anxiety, teachers' views, reducing anxiety, teaching strategies*

1. Introduction

The development in science and technology accentuates the significance of mathematics. On the one side mathematics, therefore, is acknowledged as essential for individuals' lives and career choices. On the other side mathematics, ever since it became part of the school curriculum serving to develop cognitive skills, has always been viewed as a problem area for pupils' school lives. The fact that pupils' having trouble in mathematics cannot be only related to its being subject of numbers but also can be related to pupils' mathematical ability, understanding and attitudes, along with teachers' mathematical ability, knowledge and teaching styles. There are a high number of pupils avoiding mathematics, and having difficulties in learning and understanding mathematics (McLeod and Adams, 1989; Ruffins, 2007; Tobias, 1993; Zettle and Houghton, 1998).

Pupils, who struggle to understand mathematical concepts, subsequently find themselves frustrated by their lack of success in mathematics. This situation, then may develop a phobia due to fear or even antipathy towards mathematics (Hembree, 1990; Izard, 1972; Zettle and Houghton, 1998). Dislike and fear of mathematics, in turn, can cause pupils to develop '*mathematics anxiety'*. Mathematics anxiety is a fear of mathematics and an intense negative reaction to it (Sherard, 1981). Due to this anxiety, pupils avoid the use and study of mathematics.

Alsup (2005) stated, *"Math anxiety […] can have […[a crippling effect upon students learning mathematics"* (p. 4). As pointed out by Bessant (1992) and Skiba (1990), pupils have trouble remembering or understanding the necessary steps in solving problems and perform poorly in mathematics when they face with anxiety. Within this frame, Uusimaki and Kidman (2004) emphasized

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that mathematics anxiety was the fear of performing mathematical tasks. This means a pupil who is anxious has a fear of not gaining the knowledge or skilfull to be successful in doing a mathematical problem even it is simple or complex.

This state of mind occurs among many pupils at all levels of the education. For example, research has shown that pupils suffer from mathematics anxiety across all levels from kindergarten through college (Betz, 1978; Furner and Duffy 2002; Hembree, 1990; Ma, 1999; Ryan and Ryan, 2005; Woodard, 2004). Therefore, many studies examined mathematics anxiety in such approaches as identification and measurement of the level of mathematics anxiety (Aiken and Dreger, 1961; Basar et al., 2002; Bekdemir et al, 2004; Betz, 1978; Demir, 2004; Dreger and Aiken, 1957; Engelhard, 2001; Fennema and Sherman, 1976; Gierl and Bisanz, 1995; Harper and Daane, 1998; Hembree, 1990; Hummer, 1998; Izard, 1972; Johnson, 2003; Koeling, 1995; Ma, 2003; Ma and Xu, 2004; Plake and Parker, 1982; Richardson and Suinn, 1972; Suinn and Edwards, 1982; Şahin, 2004; Taylor and Fraser, 2003) and the relationship between mathematics anxiety and performance and overcoming mathematics anxiety (Baloğlu, 2004; Engelhard, 2001; Farquharson, 2004; Hembree, 1990; Johnson, 2003; Tobias, 1978; Wittman et al, 1998).

There is a negative relationship between mathematics anxiety and mathematics achievement (Betz, 1978; Furner and Duffy 2002; Hembree, 1990; Ma, 1999; Tobias, 1993; Woodard, 2004). This means that as the level of mathematics anxiety increases, the level of mathematics achievement decreases and, vice versa. As a result of this fact, studies (Armstrong and Price, 1982; Berebitsky, 1985; Bessant, 1995; Boer and Weatenberg, 1994; Byrd, 1982; Cemen, 1987; Fergusson and Horwood, 1993**;** Fiore, 1999; Harris and Harris, 1987; Lazarus, 1974; Mathiesen and Tambs, 1999; Mulenga, 1990; Norwood, 1994; Tobias, 1978; Tobias, 1993; Williams, 1988) tried to find out the reason of mathematics anxiety and suggested that mathematics anxiety is multifaceted and attributed to many factors related to personality, peers, parents and teachers.

Considering the effects of teachers and their teaching strategies, Midgely et al. (1989) stated that the relationship between teachers and pupils may have an impact on pupils' progresses in the lesson which in turn affect their attitudes towards mathematics. For example, when the exchanges between teacher and pupil are positive, consisting of possible talk, encouragement, and a belief in every pupil's ability to learn, pupils feel valued and are able to trust the learning environment (Young, 1998). Additionally, teaching methods used in mathematics are expressed as one of the main reasons of creating mathematics anxiety (Burton, 1984; Greenwood, 1984; Williams, 1988). Such methods as memorizing (Buhlman and Young, 1982), having not connection with real life (Harris and Harris, 1987), aiming quick responds in solving mathematical problems (Harris and Harris, 1987), emphasizing only one way of solving (Byrd, 1982; Furner and Duffy, 2002; Oberlin, 1982) and explain-practice-memorize may cause anxiety (Buhlman and Young, 1982; Greenwood, 1984; Steele and Arth, 1998) are found as being attributable to mathematics anxiety.

The causes of mathematics anxiety especially the effects of teachers along with their strategies and styles need to be known in order for teachers to help prevent and/or reduce its effects (Furner and Duffy, 2002). Since, as I explained earlier, mathematics anxiety has negative influences on pupils' performance and achievement in mathematics. Yet, if this anxiety is not reduced, its negative outcomes may be sustainable. Hence, it is necessary to reduce pupils' mathematics anxiety when they have been realized rather than waiting for it to resolve itself. Many studies investigated mathematics anxiety and the ways of diminishing or eliminating its effects (Baloğlu, 2004; Brady and Bowd, 2005; Chappell and Thompson, 2009; Engelhard, 2001; Farquharson, 2004; Hembree, 1990; Johnson, 2003; Morris, 1981; Norwood, 1994; Reyes, 1984; Schwartz, 2000; Skiba, 1990; Steele and Arth, 1998; Tobias, 1991; Varsho and Harrison, 2008; Wagner, 1980; Warfield, 2008; Wigfield and Meece, 1988; Williams, 1988; Wittman et al., 1998; Zaslavsky, 1999; Zemelman et al., 1998) Apart from indicating overcoming ways, some of these studies also focus on differentiating the importance of preventing and reducing the anxiety in mathematics.

Pan and Tang (2005) contended that there is a need to discover the teaching strategies that can help pupils to learn mathematics and to reduce their level of mathematics anxiety. For instance, Burton (1984) conducted a study and expressed some teaching strategies and styles which were useful in creating positive attitudes as follows:

> making assignments which the student can accomplish within a reasonable time, providing specific and task-related feedback, praising the use of appropriate procedures as well as the attainment of correct answers, allowing choice in assignments and methods wherever possible, encouraging students to ask questions in and outside class, monitoring their nonverbal responses to students errors and inquiries, helping students analyze their work to discover they did correctly and what type of errors (careless or conceptual) they made, discussing the differences between debilitating ad facilitating anxiety (p. 205-206).

Based on pupils' perceptions regarding teachers' behaviours, Stuart (2000) suggested in his study that some teachers' teaching strategies and styles which help them to reduce their pupils' anxiety about mathematics were:

a) incorporating cooperative groups in problem-solving situations, where pupils, given a variety of problems; worked together and share their solutions;
b) using pupils' other academic strengths in mathematics class, such as letter and journal writing in order to help solving problems on current topics;
c) applying mathematics to areas of science and social studies boosted pupil confidence and provided a meaningful context for their work in mathematics.

In addition to this, in the book *'Best practice: New Standard for teaching and learning in America's school'* based on a culmination of research, Zemelman et al. (1998), put together a list of what were considered to be the '*best practices'* for teaching mathematics which include: a) the use of manipulative, b) the use of cooperative work, c) the use of discussion when teaching mathematics, d) the use of questioning and making conjectures as a part of mathematics, e) the use of justification of thinking, f) the use of writing in math for thinking, feelings and problem solving, g) the use of the problem-solving approach to instruction, making content integration a part of instruction, h) the use of calculators and computers, i) the role of the teacher of being a facilitator of learning and j) the assessment of learning as a part instruction.

As I mentioned earlier, the wide body of research in this area focussed on the level of mathematics anxiety, the causes and effects of it, and the relation between mathematics anxiety and performance. However, in Turkish context, there is a need to conduct study about overcoming mathematics anxiety and reducing the level of mathematics anxiety. In order to reduce anxiety in mathematics according to Brush (1979), teachers can play a vital role. It can be said that teachers have the greatest impact on pupils' attitudes toward mathematics (Murr, 2001). Furthermore, Stodolsky (1985) explained the importance of teaching which shapes pupils' attitudes and also emphasized that mathematics instruction is teacher dominated. Since, by employing teaching strategies, teachers can assist pupils in their quest for success in mathematics (Preis and Biggs, 2001).

It is also necessary for effective teachers to inquire into new teaching strategies to improve pupils' attitudes, and performances in mathematics to enhance their success. In this regard, it is important to get their views on how they design their lessons and what they do in order to reduce mathematics anxiety in the pupils in their classes. This study was conducted to explore the views of teachers on their strategies to reduce pupils' anxiety in mathematics at primary schools in Turkey. Although some studies (Baloğlu, 2004; Engelhard, 2001; Farquharson, 2004; Hembree, 1990; Johnson, 2003; Tobias, 1978; Wittman et al, 1998) investigated overcoming ways of mathematics anxiety, this study entailed an attempt to make an additional contribution to existing studies. Another contribution of this study can be adding primary school teachers' lenses to given body of studies.

2. Methodology

An appropriate method for addressing the aim of this study is a qualitative research strategy. *Qualitative research* demands that the world be approached with the assumption that nothing is trivial, that everything has the potential of being a clue that might unlock a more comprehensive understanding of what is being studied (Bogdan and Biklen, 1992, p.30)

Qualitative research strategy enabled me to explore teachers' detail views about their ways of teaching in order to reduce anxiety in mathematics. This strategy also helped to answer what is going on in particular teaching ways that teachers use to reduce anxiety.

Data Collection

Based on my research question and the method I used open-ended questionnaires to collect the data. The purpose of utilising an open-ended questionnaire was to allow for detailed explanations of teachers' views as it allowed the respondents to express their own views. The questions in the questionnaire were constructed as a direct result of information gathered from my literature review on mathematics anxiety. After designing the questionnaire, I piloted it and subsequently re-constructed some of the questions based on the opinions of 10 teachers with whom I piloted.

The open-ended questionnaire was comprising of three main questions and sub-questions for each to get the views about specifically how teachers differentiate between pupils on the basis of their mathematics anxieties, how they cope with pupils' anxiety and what they would suggest to reduce mathematics anxiety. Teachers were requested to answer each questions with examples in detail. They were given sufficient time to answer the questionnaire and had the chance to reply it on their own; therefore, they had the opportunity to answer within the context of their own experience and interpretation. Thus, administering an open-ended questionnaire enabled to get detail responses relevant to research questions.

Sampling

Denzin and Lincoln (2000) stated that "Many qualitative researchers employ purposive sampling and they seek groups, settings and individuals where the processes or phenomenon being studied are most likely to occur" (p. 370). In order to select the sample, I used *purposive sampling* method. The needs of the study were to get the views of primary school teachers. According to Scarpello (2007) and Tankersley (1993), pupils' mathematics anxieties begin at the beginning of fourth grade. Therefore, I purposively included teachers who were dealing with anxious pupils at 4^{th} and 5^{th} grade in a city of Turkey. I also involved convenient sampling by selecting teachers who showed willingness to participate in my study. With a purposive sampling, the number of participants in a study is less important than the criteria used to select them.

Based on this selection procedure, fifty teachers who were teaching 4^{th} grade and 5^{th} grade pupils and had mathematically anxious pupils at different primary schools were chosen. These participants demonstrated the typicality of features required for the study such as 'being in fourth and fifth year' and 'dealing with mathematically anxious pupils' (Cohen and Manion, 2000). It should be noted that the gender of primary teachers was not considered whereas their being expert in teaching was considered. Since, the teachers experienced between five and ten years were more effective than new teachers and one year experienced teachers, and had essential teaching knowledge and skills than novices (Borko and Livingston, 1989; Darling-Hammond, 2000).

Before the data collection, I had an informal conversation with teachers to give information about the aim of my research, the possible benefits of my research and who might see the results of my research. I requested participants not to mention their names but to mention their genders on the questionnaire form and informed them that I would use pseudo-names in terms of their genders when needed to use their words in forms.

Validity and reliability
Internal validity refers to the accuracy of the results gathered from the study, and whether it represents the reality (Verma and Malick, 1999). In my study, it refers to the teachers' views on the ways of teaching to reduce anxiety in mathematics. External validity refers to the degree of generalisability of the findings (Creswell, 2003). In my study it refers to the degree to which the results concerning teachers' views on reducing mathematics anxiety can be generalised to all teachers.

The reliability of the data was supported by piloting since any ambiguities that were noticed during the pilot were clarified. This also helped me to be sure that teachers' understanding of what was asked was as close as possible to my own understanding as well as to other teachers. Moreover, the piloting of the questionnaire a careful design of an open-ended questionnaire was done to make sure that the data collected was valid and feasible (Morrison, 1993).

Data Analysis
By following the ways of inductive analysis, I found the concepts that helped me make *'sense of what was going on'* (Hammersley and Atkinson, 1995, p. 209) in my data. These concepts and themes were derived from teachers' views given in the questionnaires. The results were presented in terms of main themes.

3. Results and Discussion

Almost all teachers said that mathematically anxious pupils could be clearly differentiated from non-anxious pupils. Since, these pupils had different and scared reactions towards mathematics compare to other lessons. According to teachers, these anxious pupils did not want to be called to work at the blackboard, they became red in their faces whenever asked any questions even not related to mathematics, they made up excuses for not studying or not doing homework, they tried to hide themselves when teachers asked to solve a problem to the group, and also they trembled when they were singled out to solve a problem. Teachers stated that these pupils expected not to be involved any activities in mathematics. Robertson and Claesgens (1983) suggested that teachers needed to be carefull when they wanted anxious pupils to engage in activities. They also suggested some do's and dont's for teachers not to make pupils more anxious when asking questions in mathematics.

Teachers in the sample also mentioned that pupils were anxious as they had problems in learning. Thus, according to them, when pupils understood what was given in the lesson and when they learnt the topic, their anxiety would be reduced. The results showed that teachers believed that pupils' anxiety was mostly related to their lack of understanding, so to their lack of learning. This suggests that there is a connection between learning and anxiety in mathematics (Hembree, 1990; Izard, 1972; Young, 1998; Zettle and Houghton, 1998).

Motivating Pupils
Forty four out of 50 teachers mentioned that anxious pupils interact with their peers in other lessons but refused to do in mathematics. Teachers also wrote that anxious pupils seemed uncomfortable whenever asked for cooperative work with peers and whenever teachers asked whether the topic was understood or not. For example in one of a response a teacher wrote *"[...] I know she is anxious. That's why I am asking her 'do you understand what I explained?' But I can see on her eyes that she doesn't want me to ask.[...] I want her feel confident [...]"*. These words show that the teacher wants to help the pupil, however it seems that teacher does not know how to do.

One of the teacher wrote that *" [...] I am very friendful to my anxious pupils, I always touch them to show I am with them"*. Another teacher wrote that *"During the lesson, I asked for example, Ayşe to solve a problem but also say her 'if you don't want to do dont worry you can do later' [...]"*. The results showed that some of the teachers believed that building a warm interaction between anxious pupils and

themselves or treating anxious pupils as if they wanted positive differentiation. However it seems that these teachers slightly fails in motivating anxious pupils or the ways they used are not adequate to motivate pupils. Teachers need to treat anxious pupisl in a non-threatining manner as anxious pupils do not want to be realized by others.

In terms of the results, it can be said that teachers recognize anxious pupils, know their problems in mathematics but some of them lack in helping anxious pupils. It seems that these teachers assume that using friendly way, asking pupils whether they comprehend the concepts in mathematics could be helpful for them to be motivated. Multon, Brown and Lent (1991) suggested that pupils tended to do better in mathematics when motivated. Furthernore, Fotoples emphasized that *"negativity can only break down what must be built up in the fragile psyche that exists in some math-anxious students"* (p. 149).

On the other hand the results also indicated that some of the teachers tried their best to help anxious pupils. For example, teacher Ali wrote that *"I believe that their motivation to the lesson can be difficult. [...] I pay attention their personal differences to motivate them. For example, Elif is very sensitive compare to others. So I use various techniques to motivate them"*. Teacher Hatice wrote *that "[...] sometimes, for example, I write down a very easy problem which is also known by my anxious pupils, and try to give them chance to answer it. [...] so they feel confident".* Another teacher wrote that *"anxious pupils want to see that you value them, to be encouraged when made any mistakes. I try to do like this."* These showed that some of the teachers know how to motivate pupils. Steele and Arth (1998) emphasized that listening and valuing pupils enable them to engage in activities in mathematics. Significantly, the results showed that these teachers were aware of pupils' personal differences and how to react each of them.

In addition to these, almost all teachers complained about the limitations on time. They mentioned that they were aware that pupils got more involved in lessons when they encouraged them to do so and when they helped them during problem solution process. However, twenty out of fifty teachers emphasized that they could not support each pupil individually as a result of limitations on time.This suggests that even though teachers know anxious pupils need extra support from them, they sometimes ignore considering pupils individual cognitive and emotional difficulties due to the time limitation.

Making Mathematics Relevant

The data showed that almost all teachers tended to relate exercises in mathematics to pupils' life by giving examples and by dramatization from the pupils' daily lives. Almost all teachers also wrote that the national curriculum suggested them to use real world applications. For example, two teachers wrote nearly same that *"In the curriculum it is clear that we need to provide real world connections in our lessons [...]*(Teacher Ayhan) *[...] The books are also giving examples from real-world* (Teacher Hasan)*"*. This means teachers apply real world applications since it was obligated by curriculum. Therefore, it could be argued that teachers were not explicitly aware of the effects of using real life experiences. Real world applications enhance pupils to connect mathematical concepts to real world situations (Panasuk, et al., 2002); this then help them to understand mathematics well, and in turn help them to reduce anxiety.

Some of the teachers mentioned that they believed real life integration was important for pupils to understand some concepts in the lesson and to relate concepts in mathematics and in their lives. These teachers stated that connection with real world enabled pupils to comprehend; so to give meanings to mathematical problems and to develop positive reactions to mathematics. Moreover, these teachers gave examples how they related real life to mathematics. According to those examples, some of the teachers sometimes –if they got permission from the head of school- took pupils to the nearest supermarket and did shopping with them. These teachers wrote that during shopping, pupils did addition and subtraction by themselves; even though anxious pupils did not do in classroom activities. Thus, according to them, anxious pupils enjoyed these kinds of activities as these helped them to reduce their anxieties.

Twenty nine out of teachers mentioned that books given by government also paid attention to give examples related to pupils' real world. In teachers' examples, it was seen that the names of famous people who could be known by pupils, the events that could be remembered by pupils and the cases that could be understood by pupils used in books. These teachers wrote that these kinds of examples took anxious pupils' interests. Therefore, in terms of teachers' views these pupils felt comfortable during activities. Furthermore, teachers also mentioned when anxious pupils involved in activities, they started to deal with their anxieties.

It seems that teachers sometimes fail in relating 'real life' as a result of the difference between teachers' real life, the real life in textbooks and the pupils' real life. I can argue that the integration of 'real life' with mathematics is complex as it is constructed by teachers, and it is not actually the real life of each pupil. The use of pupils' backgrounds and the link between classroom activities and real life activities cannot be overemphasized as it has been supported by many authors and educationists. However, it can be a useful support for pupils in comprehending the use for numbers.

For example, teacher Altan emphasized that after he supported his pupils to construct a connection between numbers and why and what for they might use these numbers, pupils started to do better and to get high scores in mathematics than the previous years. Some of the teachers mentioned that they linked knowledge together so anxious pupils could undertand mathematical operations. It could be argued that there is a possibility that one action caused the other, however there could be other variables to be taken into account. My argument is that it is more likely that pupils need to understand *'what to do'*, *'how to do'* and *'why to do'* in mathematics. This view also supported by many studies conducted in this area (Greenwood, 1984; Stodolsky, 1985; Wallace and Kaufmann, 1986; Tobias, 1990).

4. Repetition and Review

While promoting pupils' understanding and effective learning in mathematics, forty teachers said that they tended to use as many structurally similar examples and exercises as they could in a lesson which took forty minutes. Teachers in the sample believed that pupils could easily learn when they repeated what they were taught by using examples and exercises. For example teacher İlker wrote that *"[...] examples are useful because pupils can explicitly understand and strenghten [...] so they can believe themselves that they can do similar problems."* Another teacher wrote that *"I try to use examples because they help pupils to understand so to feel confident [...] they can forget their anxieties when they do one of these exercises"*.

It is more likely that there is a sense in teachers that repetition in mathematics is helpful for the pupils' learning. Also it seems that teachers tended to believe that when pupils learn effectively they could reduce the level of anxiety. In this sense, I can say that results of current study confirm studies done by Sherard (1981) and Tobias (1990). According to them, examples and exercises should be included in every lesson as repetition and review lessen mathematics anxiety. Thus, examples and exercises, on the one hand, enable teachers to repeat and review what they taught and on the other hand, enable pupils to understand what was taught. It can be said that if pupils can effectively learn, there will be less negative feelings about mathematics. However, it should be noted that repetition has disadvantages as well as advantages. Based on the data gathered from teachers' answers, I can say that the majority of teachers argue that the more exercises the teachers give, the more chances there are that pupils will follow the mathematical concepts better and possibly master the skills more effectively. However, once the pupils grasp the idea, there may be no point in giving more exercises just for sake of it.

Using Games

Almost all teachers believed that playing games with pupils were attractive to appeal pupils' interests in mathematics. Nearly all teachers mentioned that they preferred using games to support pupils' learning, so they could understand the topic and in turn would reduce the anxiety. They emphasized that that while

pupils were playing, they would learn better than just learning by conveying information to pupils; therefore, they tended to use the games given in textbooks. Teacher Akın wrote that *"[...] by the help of games I believe I can foster a social learning environment for pupils, so 'a want' can be created. [...] maybe just a simple game but help to memorize multiplication table [...]*. As seen, teachers use games not only for giving some information but also for attracting pupils and involving them in the lesson. 21 out of teachers also emphasized that by making lessons attractive, a game could help pupils not forgetting what they learnt as they thought that was a game and what they learnt was the process of the game. Therefore, it seems that if pupils remember the knowledge gathered during the game, they will use this knowledge in the future. Thus, they will not feel fear when face with a problem related to given information.

The results also showed that some of the teachers used games in mathematics just to attract pupils. For example teacher Seher wrote that *"I can see that anxious pupils are happy when they play games. That's why I prefer games in my lessons"*. Additionally teacher Gül wrote that *"Sometimes they get bored in mathematics. When I notice this, I immediately want to attract them so such games which are related to their interest can help me to do"*. Furthermore, the results indicated that almost all teachers believed that games could motivate pupils in a fun way so boost the pupils' interests. Some of them also mentioned that they used games to have a short break during the lesson; so no disinterest could be in the lesson. It seems that some of the teachers prefer games not as a teaching technique, but as a game to create a warm athmosphere not including fears and worries in. Therefore, it could be said that games can be a technique to support pupils' learning and also can be a way of fun to attract pupils and enhance their involvement in the lesson. However it is also emphasized by Shanahan et al. (2006) that effective in-class games should be related to learning outcomes; therefore, it would be more effective to enhance learning and in turn to reduce the anxiety.

Involving Parents

In terms of dealing with anxious pupils and helping them to reduce the level of anxiety in mathematics, most of the teachers emphasized that they needed parents' cooperation to help pupils. Teacher Ümmü said that *'If parents don't give support at home, as teachers we can fail to help pupils'.* And teacher Ali stated that *'what I do here should be followed at home or else that pupil's anxiety can be returned back'.* It can be said that as in teaching-learning process, teachers also need parents' involvements in dealing with pupils' anxiety in mathematics. Thus, it seems that teachers do not want to take the responsibility only to themselves and want parents to take place in solution.

5. Conclusion

Teachers without a doubt have an immense control on pupils' academic success and on their feelings as also suggested by Fiore (1999). Martinez and Martinez (2003) also emphasized that the way mathematics was taught affected mathematics learning and played a significant role in the development of anxiety in mathematics. Therefore, teachers' ways of teaching was significant area both for inducing and reducing mathematics anxiety.

This study aimed to find out how teachers reduce pupils' anxiety in mathematics. The data from teachers revealed that teachers could identify anxious pupils in mathematics. The data also showed that in order to reduce mathematics anxiety teachers emphasized the connection between understanding along with learning and anxiety in mathematics. Additionally, they suggested that when pupils understood and learnt mathematics, the anxiety would be reduced. Therefore, the results suggested that teachers focused more on effective teaching and pupils' effective learning in mathematics rather than finding out and implementing special teaching strategies and styles for anxious pupils.

On the other hand, the results indicated that even though teachers were aware that they had to resolve the anxiety problem in mathematics, they used same teaching strategies and styles for all pupils. In other words they did not use different teaching strategies and styles for anxious pupils. However, it was seen

that during the teaching process teachers, they monitor anxious pupils' involvement in the lesson and want them to understand mathematical procedure.

The results suggested that in order to reduce pupils' anxiety in mathematics, teachers stated that they chose such ways as motivating pupils, making math relevant, reviewing the given topic by examples and exercises, using games and also getting support from parents. As stated earlier, it can be said that teachers consider anxious pupils' learning and their level of anxiety. However, it was also found that while using these given strategies, teachers did not evaluate whether pupils' anxiety was reduced. Moreover, teachers did not mention how they measure whether pupils' learning improved by the way they used which in turn affected their anxiety level in mathematics.

The findings of this study contribute to the knowledge in overcoming and reducing mathematics anxiety. This study was designed in terms of qualitative research strategy by using open-ended questionnaire. Another study can be done using different data collection tools; for example, interviews or focus group can be more effective to get more detailed data. Additionally, a study investigating same topic by collecting data from different participants as teachers and pupils can also provide fruitful information, and help to structure the ways of reducing anxiety in mathematics based on views of both sides.

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