

The Issue Of Gender In Mathematics Teaching Anxiety

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ABSTRACT

The purpose of this study was to investigate the gender-related differences in mathematics teaching anxiety. In March 2008, a Likert-type questionnaire was administered to 368 pre-service American mathematics teachers, residents of the state of North Dakota (USA). In the sample 58.3% of the pre-service elementary mathematics teachers were females and 41.7 % were males. Likewise, 54.4% of the pre-service high school mathematics teachers were females and 45.6 % of them were males. An independent samples t-test with alpha level of .05 was used in the analysis of data. The results revealed no statistically significance in the gender-related difference in mathematics teaching anxiety between male and female pre-service mathematics teachers. There was also no gender difference in teaching anxiety between males and females in the groups of middle schools and high school teachers.

INTRODUCTION

According to Iossi (2007) teaching anxiety is defined as a feel of fear while new teachers, whether pre-service or in-service try to provide instruction to their students. Trujillo and Hadfield (1999) explain that this anxiety is more prominent in mathematics teaching. This comes from the specifics and nature of the field and subject matter taught. According to Halat (2006) gender is an important factor in mathematics teaching anxiety. Forgasiz (2005) argues that it is significantly important to include gender as a variable in research analysis of studies. It is clear that gender plays prominent role especially among pre-service teachers, as they prepare to come out on the job.

RESEARCH ABOUT MATHEMATICS ANXIETY AND MATHEMATICS TEACHING ANXIETY

Today mathematics anxiety is a vital common phenomenon from elementary through university students. According to Forgasiz (2005) mathematics anxiety comes first among the most crucial problems in teaching mathematics. In order to understand math anxiety one should initially find the complexity of this

concept. Newstead (1998) state that it a felling of intense frustration or helplessness about one’s ability to mathematics and can be described as an emotional response to participating in a math class, listening to a lecture, working through problems and discussing mathematics.

The research has shown that there were many studies done on the anxiety about mathematics with pre-service teachers. For example, according to Levine (1996) and Malinsky et al. (2006), the origin of pre-service teachers’ negative believes and anxiety about mathematics could be attributed to prior school experiences, such as their experiences as mathematics students, the effect of prior teachers and of teacher preparation programs.

Anxiety for teaching mathematics is a frequent fear of pre-service teachers. It is associated with teaching mathematics. It may reflect real or perceived knowledge deficits in mathematics content as well as in mathematics teaching skills, and memories of past occurrences of mathematics failure or mathematics anxiety (Levine, 1993). Gardner and Leak (1994) conceptualized teaching anxiety as anxiety experienced in relation to teaching activities that involve the preparation and execution of classroom activities. Mathematics teaching anxiety can be defined as teachers’ feelings of tension and anxiety which occurs during teaching mathematical concepts, theories and formulas or during problem solving.

Gender Related Differences and Mathematics Achievement and Mathematics Teaching Anxiety

Research has shown that findings regarding gender issue are varied. Over the past two decades, research has documented that there is a difference between the achievement of males and females in mathematics (Ayalon, 2003). Some researchers found that there were no gender differences in terms of mathematics anxiety between pre-service male and female teachers. For example, Dane (2005), who studied 363 university students stated that gender was not a factor in mathematics anxiety. Similarly, according to Haynes et al. (2004), no significant difference about mathematics anxiety was found between male and female college students. Furthermore, there was no gender difference found in terms of teaching anxiety between male and female educators and between pre-service male and female teachers.

THE PURPOSE OF THE STUDY

The purpose of this study was to examine the gender differences in mathematics teaching anxiety. The following questions guided this study:

1) Is there a significant difference regarding mathematics teaching anxiety between pre-service female and male mathematics teachers within the groups of middle school and high school prospective teachers?

2) Is there a significant difference in reference with mathematics teaching anxiety between pre-service female and male mathematics teachers?

METHOD

Participants

The study included 368 pre-service mathematics teachers. One hundred ninety nine of them were middle school mathematics teachers from the department of Elementary Mathematics Teacher Education and 169 were high school mathematics teachers from the department of Secondary Mathematics Teacher Education. Moreover, 58.3% of the pre-service elementary math teachers were females and 41.7 % were males. Likewise, 54.4% of the pre-service high school math teachers were females and 45.6 % were males. The participants involved in this study were from three different regional universities in the Northern Planes of the US. All of them volunteered in the study.

Instrument and Data Analysis

The researchers used a Likert-type questionnaire consisting of 23 items. This was designed by researchers to measure mathematics teaching anxiety. Factor analysis revealed these four factors: content knowledge – 10 items (factor loading from 0.58 to 0.86), self-confidence – 6 items (factor loading ranging from 0.57 to 0.76), attitude toward mathematics teaching – 4 items (factor loading from 0.61 to 0.70), and teaching knowledge – 3 items (factor loading ranging from 0.68 to 0.78). After data collection the researchers used independent samples t-test with $\alpha = 0.05$ to analyze the quantitative data. The results of the statistical analysis are reported below.

RESULTS

Question 1: Is there a significant difference regarding mathematics teaching anxiety between pre-service female and male middle and high school mathematics teachers?

Table 1 presents the descriptive statistics for pre-service female and male middle and high school math teachers' anxiety. It shows that female middle school teachers,

mean score (43.71) is higher than that of males (43.15). Similarly, the pre-service female high school math teachers’ mean score (42.98) is higher than that of males (43.23). However, the table shows that these differences are not statistically significant at .05 level.

Table 1 The Level of Pre-service Middle & High School Mathematics Teachers’ Teaching Anxiety in Mathematics

Pre-service Middle School Mathematics Teachers				Pre-service High School Mathematics Teachers				
	<i>N</i>	\bar{X}	<i>SD</i>	<i>t</i>		\bar{X}	<i>SD</i>	<i>t</i>
Female	116	43.71	11.22	.324	92	42.98	10.54	-.132
Male	83	43.15	13.19		77	43.23	14.64	
Total	199				169			

Question 2: Is there a significant difference in reference with mathematics teaching anxiety between pre-service female and male mathematics teachers?

Table 2 presents the descriptive statistics for pre-service male and female math teachers’ anxiety. It indicates that the pre-service male teachers’ mean score (43.19) is lower than that of females (43.39). The independent samples t-test presented in table demonstrates that the difference is not statistically significant.

Table 2 The Level of the Pre-service Mathematics Teachers’ Teaching Anxiety in Mathematics

	<i>N</i>	\bar{X}	<i>SD</i>	<i>t</i>	<i>p</i>
Female	208	43.39	10.90		
Male	160	43.19	13.86	.153	.879
Total	368				

CONCLUSION AND DISCUSSION

This current study showed that the mean score of mathematics teaching anxiety level of the pre-service middle school female mathematics teachers is slightly higher than that of pre-service male mathematics teachers. However, the mean score of mathematics teaching anxiety level of the pre-service high school male mathematics teachers is numerically higher than that of pre-service female mathematics teachers. But, these differences were not statistically significant. In other words, there were no gender related differences found in mathematics teaching anxiety between pre-service male and female middle, and high school mathematics teachers.

Furthermore, in general the mean score of mathematics teaching anxiety level of the pre-service female mathematics teachers is almost equal to the pre-service male mathematics teachers' mean score of mathematics teaching anxiety. That is, this study found that gender was not a factor in mathematics teaching anxiety for the pre-service middle and high school mathematics teachers. These results support the findings of researchers Dane (2005) and Haynes et al. (2004), who expressed that there was no gender related difference in teaching anxiety between the pre-service male and female teacher candidates, and between male and female educators.

There might be several variables, such as lack of content knowledge, self-confidence, lack of pedagogical content knowledge, use of manipulative materials, lack of school experience and teaching practicum, test anxiety, fear of success, instruction, negative attitudes of teacher, and perceiving mathematics as a male domain seeming to cause one's mathematics anxiety and teaching anxiety.

In the study gender was not a factor in mathematics teaching anxiety explained above. What might be the reasons behind the finding of this study? In Elementary and Secondary School Mathematics Teacher Education Programs in the state of North Dakota, the pre-service teachers are required to take courses related the content knowledge, pedagogical course, school experience, and teaching practicum. Therefore, the participants must have had strong mathematical content knowledge and pedagogical content knowledge because they successfully completed all required mathematics courses and pedagogy courses in which they were taught how to teach mathematics in different ways and how to use manipulative materials in teaching of specific mathematical contents. Moreover, they could have gained self-confidence because they completed their teaching practicum course. They had three semesters of school experiences. In short, these variables were under controlled and it may not cause to gender differences.

As a conclusion, the study indicated that there were no genders differences found in mathematics teaching anxiety between pre-service male and female middle, and high school mathematics teachers, and that there was also no gender difference detected in terms of mathematics teaching anxiety between pre-service male and female mathematics teachers. In other words, gender was not a factor in mathematics teaching anxiety.

Recommendations, Limitations, and Future Research

As Levine (1996) stated, using manipulative materials play important roles in the acquisition of mathematical concepts, which causes to reduce teaching anxiety. Besides, implementing alternative teaching techniques and problem solving strategies may help the pre-service mathematics teachers to gain self-confidence and teaching practicum may reduce teaching anxiety in mathematics.

Gender related differences in mathematics teaching anxiety may be equaled if teacher educators pay attention to the importance of these points. The findings should not be generalized to other pre-service mathematics teachers because mathematics teacher preparation programs might be different and also cultural differences might limit the results in other countries. Similar studies with pre-service mathematics teachers can be conducted in order to see the effect of different teacher preparation programs and cultural differences regarding gender issue in teaching anxiety.

REFERENCES

- [1] Iossi, L. (2007). Strategies for reducing math anxiety in post-secondary students. In S. M. Nielsen & M. S. Plakhotnik (Eds.), *Proceedings of the Sixth Annual College of Education Research Conference: Urban and International Education Section* (pp. 30-35). Miami, USA: Florida International University.
- [2] Trujillo, K. M. & Hadfield, O. D. (1999). Tracing the roots of mathematics anxiety through in-depth interviews with preservice elementary teachers. *College Student Journal*, 33(2), 219-232.
- [3] Halat, E. (2006). In-Service Middle & High School Mathematics Teachers: Geometric Reasoning Stages and Gender. *The Mathematics Educator*, 18 (1), 8-14.
- [4] Forgasız, H. (2005). Gender and mathematics: re-igniting the debate. *Mathematics Education Research Journal*, 17(1), 1-2.
- [5] Newstead, K. (1998). Aspect of children's mathematics anxiety. *Educational Studies in Mathematics*, 36, 53-71.
- [6] Levine, G. (1993). *Prior mathematics history, anticipated mathematics teaching style, and anxiety for teaching mathematics among pre-service elementary school teachers*. Paper presented at the Annual Meeting of the International Group for Psychology of Mathematics Education, North American Chapter (ERIC Document Reproduction Service No. ED373972).
- [7] Malinsky, M., Ross, A., Pannells, T., & McJunkin, M. (2006). Math Anxiety in pre- service elementary school teachers. *Education*, 127(2), 274-279.

- [8] Levine, G. (1996). *Variability in anxiety for teaching mathematics among pre-service elementary school teachers enrolled in a mathematics course*. Paper presented at the Annual Meeting of the American Educational Research Association in New York (ERIC Document Reproduction Service No. ED398067).
- [9] Gardner, L., & Leak, G. (1994). Characteristics and correlates of teaching anxiety among college psychology teachers. *Teaching of Psychology*, 21(1), 28-32.
- [10] Ayalon, H. (2003). Women and Men Go to University: Mathematical Background and Gender Differences in Choice of Field in Higher Education. *Sex Roles*, 48(5/6), 277-290.
- [11] Dane, A. (2005). Differences in mathematics anxiety by sex, program, and education of university mathematics students in the U.S. *Psychological Reports*, 96(2), 422-424.
- [12] Haynes, A. F., Mullins, A. G., & Stein, B. S. (2004). Differential models for math anxiety in male and female college students. *Sociological Spectrum*, 24(3), 295–318.