GENDER AND STUDENTS’ VIEWS OF PARENTAL AND PEER MATHEMATICS ANXIETY: EFFECTS ON MATHEMATICS ACHIEVEMENTS

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This project is submitted in partial fulfilment of the requirements for a Bachelor of Education with Honours (Mathematics)

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ABSTRACT

GENDER AND STUDENTS’ VIEWS OF PARENTAL AND PEER MATHEMATICS ANXIETY: EFFECTS ON MATHEMATICS ACHIEVEMENTS

Wong Jing Ling

This study aimed to determine the relationships between secondary school students’ mathematics anxiety, their views of parents’ and peers’ mathematics anxiety and mathematics achievement. This research also investigated differences in the variables in terms of gender. A total of 300 Form Four students from two schools in Sibu and four schools in Kuching participated in this correlational and comparative survey research. This study used a questionnaire adapted from the Mathematics Anxiety Rating Scale-Revised to collect the required data collection. In addition, students’ mathematics marks in their first semester examination represented the measurement of their mathematics achievement. In this study, Pearson-product moment correlations were used to determine the relationships between students’ mathematics anxiety, their views of parents’ and peers’ mathematics anxiety and mathematics achievements. Furthermore, independent t-test analyses were used to determine the differences in students’ mathematics anxiety, their views of parents’ and peers’ mathematics anxiety, and their mathematics achievement between male and female students. This research findings indicated that students’ mathematics achievement was significant and negatively correlated with their views of parents’ mathematics anxiety, their views of peers’ mathematics anxiety and their own mathematics anxiety. On the other hand, the students’ mathematics anxiety was significant and positively correlated with their views of parents’ and peers’ mathematics anxiety. Only students’ views of their peers’ mathematics anxiety were significant different for males and females. Female students viewed that their peers had lower mathematics anxiety compared to male students. There was no significant difference between male and female students in their mathematics achievement, their views of parents’ mathematics anxiety and their own mathematics anxiety.
ABSTRAK

JANTINA DAN PANDANGAN PELAJAR TERHADAP KERESAHAHAN MATEMATIK IBUBAPA DAN RAKAN SEBAYA: KESAN TERHADAP PENCAPAIAN MATEMATIK

Wong Jing Ling

Kajian ini bertujuan untuk menentukan hubungan antara keresahan matematik pelajar sekolah menengah, pandangan mereka terhadap keresahan matematik ibubapa dan rakan sebaya mereka terhadap pencapaian matematik. Kajian ini juga berminat untuk menentukan perbezaan bagi pembolehubah-pembolehubah tersebut dari segi jantina. Seramai 300 pelajar tingkatan empat dari dua buah sekolah di Sibu dan empat buah sekolah di Kuching terlibat dalam kajian ini. Borang soal-selidik yang diubahsuai daripada "Mathematics Anxiety Rating Scale-Revised" digunakan sebagai alat ukur bagi tujuan pengumpulan data. Tambahan pula, markah ujian matematik semester pertama pelajar digunakan sebagai ukuran pencapaian matematik pelajar. Dalam kajian ini, kolerasi pearson digunakan untuk mengukur hubungan antara keresahan matematik pelajar sekolah menengah, pandangan mereka terhadap keresahan matematik ibubapa dan rakan sebaya mereka terhadap pencapaian matematik mereka. Di samping itu, ujian bebas t digunakan untuk menentukan kewujudan perbezaan antara pelajar lelaki dan perempuan bagi keresahan matematik pelajar sekolah menengah, pandangan mereka terhadap keresahan matematik ibubapa dan rakan sebaya mereka dan pencapaian matematik pelajar. Hasil kajian menunjukkan hubungan negatif yang signifikan antara pencapaian matematik pelajar dengan pandangan pelajar terhadap keresahan matematik ibubapa, pandangan pelajar terhadap keresahan matematik yang dialami oleh rakan sebaya, dan keresahan matematik pelajar sendiri. Sebaliknya, terdapat hubungan positif yang signifikan antara keresahan matematik pelajar dengan keresahan matematik yang dialami oleh ibubapa dan rakan sebaya pelajar. Hanya pandangan pelajar terhadap keresahan matematik rakan sebaya mempunyai perbezaan yang signifikan antara pelajar lelaki dan perempuan. Pelajar perempuan berpandangan bahawa rakan sebaya mereka mengalami keresahan matematik yang lebih rendah berbanding pelajar lelaki. Tiada perbezaan signifikan yang wujud antara pelajar lelaki dan perempuan dalam pencapaian matematik mereka, pandangan mereka terhadap keresahan matematik ibubapa dan keresahan matematik sendiri.
CHAPTER ONE
INTRODUCTION

1.0 Introduction

This present study investigated the relationships between secondary school students’ mathematics anxiety, their views of parents’ and peers’ mathematics anxiety and their mathematics achievement. This study also discussed them in terms of gender issue. This chapter discusses the background of the study, statement of the problem, research objectives, research hypotheses and research framework of the study. This chapter also presents the significance of the study, limitation of the study and definition of important terms used in the study.
1.1 Background of the Study

Mathematics is essential in daily life, especially in this globalization era. Almost all affair or business required mathematical knowledge or skills. It could not be denied that adolescence is an important stage for an individual in making decision, especially, regarding his or her future such as career choice before the transition to society. However, Betz (1987, cited in Scarpello, 2005) claimed that mathematics anxiety may influence the students’ choices in their academic or job selection, and the probability in achieving their academic or career goals. This was supported by Truttschel (2002) who also stated that individuals’ academic choices are influenced by their mathematics anxiety. Therefore, it was important to identify the existence of mathematics anxiety which may exist with or without students’ realization in order to get rid of the mathematics anxiety as a constraint in determining the selection of courses and career choices.

Mathematics anxiety is defined as “feelings of tension and anxiety that interfere with the manipulation of mathematical problems in a wide variety of ordinary life and academic situations” (Richardson & Suinn, 1972, p. 551 cited in Sherman & Wither, 2003). According to Scarpello (2005), mathematics anxiety was first discovered in the late 1950s and has been studied since then. The common issue of mathematics anxiety such as factors and effects of mathematics anxiety had been the target of researchers.

The phenomenon of students experiencing mathematics anxiety could be due to the students viewing mathematics as complex and a subject which is not useful, consisting of a series of numbers and memorized formulae (Perez, 2005). The symptoms of mathematics anxiety can be in physical or mental. There are three categories of symptoms of high mathematics anxiety (Johnson, 2003). The categories refer to mental block, mental distraction and physical symptoms. Each category has
different descriptions. For instances, freeze up, knowing the material but drawing a blank and bad timing on test are included in mental block category. The examples of mental distraction include procrastination, unable to concentrate and sensitivity to noise, room temperature and lighting. On the other hand, physical symptoms are fidgeting, butterflies, rapid heart rate, difficulty breathing, nausea, headache, and muscular tension.

There are various instruments available for measuring the level of mathematics anxiety. Mathematics Anxiety Rating Scales (MARS) by Richardson and Suinn’s (1972, cited in Wigfield & Meece, 1988) is one of the most frequent used instruments. MARS consists of 98 items which relate to the feeling of anxious in dealing with mathematics problems or situation in daily life or academics (Wigfield & Meece, 1988). The revised Mathematics Anxiety Rating Scale-Revised (MARS-R) is another measurement scale of mathematics anxiety (Plake & Parker, 1982, cited in He, 2007). The constructs of MARS-R are highly related to “situation-specific anxiety, general anxiety and test anxiety” (He, 2007, p. 37).

The possible effect of mathematics anxiety on mathematics achievement has gained many researchers’ attention. A study by He (2007) found that there was a negative relationship between students’ mathematics anxiety and their mathematics achievement for both European-American and Mainland-Chinese. This finding was supported by Dede (2008) who also reported that there was a significant strong negative relationship between mathematics achievement and mathematics anxiety.

Parents was one of the factors of mathematics anxiety since they could pass their phobias in mathematics to their children (Fiore, 1999; Hembree, 1990; Williams, 1988, cited in Perez, 2005). This was supported by a research done by He (2007) involving a comparative study of European-American and Mainland-Chinese
students. He (2007) found that adolescents’ views of their parents’ and peers’ mathematics anxiety predicted their own mathematics anxiety for both groups.

The issue of gender in mathematics anxiety and mathematics achievement is also important. According to He (2007), gender effect on students’ mathematics anxiety was not significant. This finding was similar to that reported by a research carried out by Perez (2005). Results of a study done on fifth, eighth and eleventh grade students in Pennyslvania schools by Kohr, Coldiron, Skiffington, Masters and Blust (1987) indicated that there was no significant difference in mathematics achievement based on gender at any of the three grade levels. Nonetheless, a study by Cox (2000) found that males’ achievement were significantly higher in four mathematics subjects in the Common Assessment Task 3 (CAT 3) and three mathematics subject in CAT 4 than females. Generally, it could be concluded that the performance of female students relative to male students gets poorer as one progressed from CAT 1 to CAT 4. In other words, the findings for CAT 3 and CAT 4 provided evidences that the 17 years old male students in Australia performed better in mathematics than female students (Cox, 2000).

1.2 Problem Statement

Mathematics anxiety is neither a new phenomenon nor a new issue. It has been a popular issue for both mathematics educators and educational psychologist. However, some people may not realize they have mathematics anxiety even though they are experiencing it. Truttschel (2002) claimed that mathematics anxiety was a problem and it did influenced on daily life activities, academics, careers, and causing stress which would lead to other many other troubles.

Generally, the performance of Malaysian students in mathematics was not satisfactory and this poor mathematics achievement among the secondary students
has resulted in a decrease of number of students getting to the university (Noraini Idris, 2006). According to Noraini Idris (2006), mathematics anxiety leads to existence of difficulties in learning mathematics among students. She reported that many students felt anxious and tense when dealing and solving numerical or mathematical problems. Mathematics anxiety is “a psychological state engendered when a student experiences or expects to lose self-esteem in confronting a mathematical situation” (Noraini Idris, 2006, p. 70). Therefore, students faced difficulties in learning mathematics due to the mathematics anxiety. They might even fail to solve simple mathematical problems or tasks.

Based on the research findings by various Malaysian researches, Malaysian students had moderate level of mathematics anxiety (Rahmah, 1999; Ahmad Sukri Yahaya, Hafsa Abdul Majid & Muriati Mukhtar, 1996; Jasmani Bidin, Noorzila Sharif & Zurina Kasim, 2005, cited in Effandi Zakaria & Norazah Mohd Nordin, 2008). According to Effandi Zakaria and Norazah Mohd Nordin (2008), students’ needs, abilities and their different levels of mathematics anxiety should be taken into consideration when teachers design their lesson.

Generally, mathematics anxiety was also found to be related to mathematics achievement. Ashcraft and Kirk (2001) conducted a study which involved three experiments to examine the relationships between working memory, mathematics anxiety and performance. From their study, they found that working memory capacity and mathematics anxiety was negatively associated. In other words, individuals with high mathematics anxiety had lower working memory capacity and vice versa. The reduced working-memory capacity disrupted information processing in mathematical tasks (Ashcraft & Kirk, 2001). The researchers also argued that mathematics performance will be greatly affected by mathematics anxiety since mathematics anxiety influences working memory. The researchers further concluded that mathematics anxiety was not a cognitive appraisal about oneself that is unrelated to
the nature of mental processing. Mathematics anxiety interferes with the continuing activities or tasks performed by working memory and thus slowed down the performance and affected its accuracy (Ashcraft & Kirk, 2001).

Most of the studies investigating this issue were conducted in Western countries. In Malaysia, research by Effandi Zakaria and Norazah Mohd Nordin (2008) found that students with low mathematics anxiety had higher motivation in learning mathematics and thus obtained higher score in their mathematics test as compared to students with moderate or high level of mathematics anxiety.

Furthermore, studies investigating the influences of students’ views of parents’ and peers’ mathematics anxiety on mathematics achievement were limited either in Western or Malaysian context. Most of the researches studied on the direct influences of parents and peers on students’ selection of courses, careers and performances in schools (Scarpello, 2005; Howard, 2004; Hanushek, Kain, Markman & Rivkin, 2002).

Thus, this present study aimed to gain a better understanding on the relationships between students’ views of parents’ mathematics anxiety, students’ view of peers’ mathematics anxiety and students’ mathematics anxiety with mathematics performance. In addition, this study also investigated gender issue regarding these relationships.
1.3 Research Objectives

Specifically, the study intended to achieve the following research objectives:

1. Determined the relationship between students’ views of parents’ mathematics anxiety and mathematics achievement.

2. Determined the relationship between students’ views of peers’ mathematics anxiety and mathematics achievement.

3. Determined the relationship between students’ mathematics anxiety and mathematics achievement.

4. Determined the relationship between students’ views of parents’ mathematics anxiety and students’ mathematics anxiety.

5. Determined the relationship between students’ views of peers’ mathematics anxiety and students’ mathematics anxiety.

6. Determined the differences in mathematics achievement based on gender.

7. Determined the differences in students’ views of parents’ mathematics anxiety based on gender.

8. Determined the differences in students’ views of peers’ mathematics anxiety based on gender.

9. Determined the differences in students’ mathematics anxiety based on gender.
1.4 Research Questions

The study sought to answer the following research questions:

1. Was there a significant relationship between students’ views of parents’ mathematics anxiety and mathematics achievement?

2. Was there a significant relationship between students’ views of peers’ mathematics anxiety and mathematics achievement?

3. Was there a significant relationship between students’ mathematics anxiety and mathematics achievement?

4. Was there a significant relationship between students’ views of parents’ mathematics anxiety and students’ mathematics anxiety?

5. Was there a significant relationship between students’ views of peers’ mathematics anxiety and students’ mathematics anxiety?

6. Was there a significant difference between male and female students in mathematics achievement?

7. Was there a significant difference between male and female students in their views of parents’ mathematics anxiety?

8. Was there a significant difference between male and female students in their views of peers’ mathematics anxiety?

9. Was there a significant difference between male and female students in mathematics anxiety?
1.5 Research Hypotheses

Specifically, the research hypotheses tested in this study were as follows:

**Research Hypothesis 1**
H₀₁: No significant relationship existed between students’ views of parents’ mathematics anxiety and mathematics achievement.

**Research Hypothesis 2**
H₀₂: No significant relationship existed between students’ views of peers’ mathematics anxiety and mathematics achievement.

**Research Hypothesis 3**
H₀₃: No significant relationship existed between students’ mathematics anxiety and mathematics achievement.

**Research Hypothesis 4**
H₀₄: No significant relationship existed between students’ views of parents’ mathematics anxiety and students’ mathematics anxiety.

**Research Hypothesis 5**
H₀₅: No significant relationship existed between students’ views of peers’ mathematics anxiety and students’ mathematics anxiety.

**Research Hypothesis 6**
H₀₆: No significant difference existed between male and female students in mathematics achievement.
Research Hypothesis 7
H₀⁷: No significant difference existed between male and female students in their views of parents’ mathematics anxiety.

Research Hypothesis 8
H₀⁸: No significant difference existed between male and female students in their views of peers’ mathematics anxiety.

Research Hypothesis 9
H₀⁹: No significant difference existed between male and female students in mathematics anxiety.
1.6 Research Framework

Figure 1.1 below shows the variables in the present study, namely; demographic variable, independent variables and dependent variable. In line with the objectives of the study, the figure shows how the variables in this study were hypothesized to be related to each other. Demographic variable referred to gender which were male and female while the three independent variables were students’ views of parents’ mathematics anxiety, students’ views of peers’ mathematics anxiety and students’ mathematics anxiety. Finally, mathematics achievement was the dependent variable.

**Demographic variable:**
Gender: male, female

**Independent variables:**
1. Students’ views of parents’ mathematics anxiety
2. Students’ views of peers’ mathematics anxiety
3. Students’ mathematics anxiety

**Dependent variable:**
Mathematics achievement

Figure 1.1 Research Framework
1.7 Definition of Terms

Mathematics Anxiety: In this study, mathematics anxiety referred to negative feeling, tension and anxiety in solving mathematical problems which involved numerical values either in academic or daily life. For academic purposes, it referred to the level of anxiety when taking mathematics examination or test and pop quiz. Activities related to mathematics in daily life included were interpreting graph or chart and thinking of mathematics while walking on school.

Mathematics Achievement: Mathematics achievement in this study referred to students’ mathematics performance in their first semester examination which was held in June, 2008 expressed as percentage. The students’ marks were used as a measurement of their mathematics achievement.

Gender: In this study, gender referred to male and female only.

Students: Students in this study were Form Four students from two secondary schools in Sibu and four secondary schools in Kuching. All of them took mathematics subject and had sat for their first semester examination.