Faculty of Cognitive Sciences and Human Development

FACTORS THAT CAUSE MATHEMATICS ANXIETY AMONG UNDERGRADUATE STUDENTS

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Statement of Originality

The work described in this Final Year Project, entitled “Factors that cause mathematics anxiety among undergraduate students” is to the best of the author’s knowledge that of the author except where due reference is made.

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(Date submitted)  Nur A’ain Binti Sabri

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FACTORS THAT CAUSE MATHEMATICS ANXIETY AMONG UNDERGRADUATE STUDENTS

Nur A’ain binti Sabri

This research investigated the factors that cause mathematics anxiety among undergraduate students by determined the greatest influence in the development of mathematics anxiety such as parents, teachers, society and peers. Grade level at which anxiety started and students’ perception about society beliefs and myths were also considered as contributory factors of mathematics anxiety. Besides, teaching strategies that could contribute and reduce mathematics anxiety were investigated. The research investigated relationships between all of these factors with mathematics anxiety. Seventy-three undergraduate students from the Cognitive Sciences Program in the Faculty of Cognitive Sciences and Human Development at University of Malaysia Sarawak were the sample for this study. The questionnaire from the previous researcher, Shields (2006) and Mathematics Anxiety Rating Scale – Short Version (MARS-S) was used as the research instrument in this study. The total score from the scale determined the level of mathematics anxiety. Besides, students’ perceived level of mathematics anxiety based on a one-question rating was also examined. Then, relationships between both mathematics anxiety levels were investigated using Pearson-product moment correlations. The results showed positive relationships between students’ perception about society mathematics myths and mathematics anxiety. In addition, the results also indicated relationships between the teaching strategies of individual, partner and team work activities in contributing to mathematics anxiety. In contrast, no relationships existed between teaching strategies posed to be able to reduce mathematics anxiety with mathematics anxiety level. Grade level at which anxiety started and students’ perception about the importance of mathematics from the society showed insignificant relationship with mathematics anxiety. However, students’ perceived level of mathematics anxiety correlated positively with mathematics anxiety score, as measured on MARS-S.
ABSTRAK

FAKTOR YANG MENYEBABKAN KEBIMBANGAN TERHADAP MATEMATIK DALAM KALANGAN PELAJAR UNIVERSITI

Nur A’ain Binti Sabri

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FACTORS THAT CAUSE MATHEMATICS ANXIETY AMONG UNDERGRADUATE STUDENTS

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

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This project entitled “Factors that cause mathematics anxiety among undergraduate students” was prepared by Nur A’ain binti Sabri and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfilment of the requirements for a Bachelor of Education (Honours) Mathematics.

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CHAPTER 1
INTRODUCTION

1.0 Introduction

This study aimed to investigate the factors causing mathematics anxiety among undergraduate students. This chapter discusses the background of the study, problem statement, research objectives, research hypotheses and research framework of the study. The 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 may be viewed logically as a set of assumed convention for manipulating symbols (Noddings, 1990). In today’s modern world, it is important that young people feel confident in their ability to do mathematics in an ever-increasingly high-tech globally competitive society. Mathematics is one of the important subjects students need to learn in order to further their studies and in choosing a career. Shields (2006) reported that in today’s society, mathematics is a necessary skill for survival. It is not simply an entry level prerequisite for engineering or other success banged career, but it is necessary in most occupations.

It is Malaysia’s vision to be a fully developed country by the year 2020. By then, the intention is that the Malaysian society will have evolved into one that is democratic, liberal, tolerant, caring, progressive and possessing a competitive and dynamic economy. It is argued that establishing a scientific and technological culture will lay the foundation towards the attainment of such a society. Hence science, mathematics and technology have always been emphasized in the national development plans. Mathematics certainly means many things to many people (Marzita binti Puteh, 2002). Many aspects of daily life require some knowledge of mathematics. Knowledge of mathematics and the ability to use this knowledge is critical to the pursuit of many existing and newly emerging occupational fields. Moreover, all undergraduate students are required to take some level of mathematics. If students suffer from mathematics anxiety, their willingness to enroll and succeed in mathematics courses diminished (Stubblefield, 2006).

Mathematics anxiety is a problem for many people. It can have detrimental effects for college students including feelings of nervous tension, fear of rejection, and stress (Truttschel, 2002). According to Perry (2004), much like a novice golfer on the first tee, the mathematics student can seriously hamper her or his performance by
being nervous and insecure toward mathematics. At the college level, this anxiety is most often seen in mathematics courses required for nontechnical majors. Most teachers of mathematics would agree that mathematics anxiety stems primarily from students' fears of failure and feeling of inadequacy. In most cases, mathematics anxiety is not extreme or overwhelming, yet it continues to haunt most students throughout their encounter with mathematics.

Millions of adults are blocked from professional and technical job opportunities because they fear or perform poorly in mathematics. Most of these adults are brain-capable of learning more mathematics. Theirs is not a failure of intellect, but of nerve. All people have some mathematics anxiety, but it disables women and minorities more than others. There is a cure, but it involves changing learners and teachers attitudes at the same time (Tobia, 1991).

Mathematics anxiety is often developed as a result of a student’s prior negative experiences when learning mathematics in the classroom or at home (Rossnan, 2006). Mathematics is perceived by most pupils as difficult, boring, not very practical, abstract, and its learning as requiring a “special ability” that is not always within everyone's reach. Many pupils generate negative attitudes toward mathematics in the course of their academic life, and on occasions present an authentic aversion to the discipline. For most pupils the subject is not a source of satisfaction, but rather one of frustration, discouragement, and anxiety. Many of them, even some of the most able, find mathematics to be just a tiresome chore (Ignacio, Nieto, & Barona, 2006).

The mathematics anxiety process pictured by Arem (2003) was related with student’s previous experiences. According to Arem (2003), students who were made to feel bad about mathematics become wary and prejudiced against it, mistrusting their own abilities. New experiences in mathematics, seen in light of the old, are
tarnished by the troubled past, which only accentuates and reinforces long-entrenched negativity. Bad feelings persist, impairing prospects for learning new material and generating anxiety and self-doubt. Mathematics anxiety people often say things to themselves such as “I’m stupid,” “I’ll never be able to do mathematics,” “I’ll fail,” and “Why do I need to know mathematics anyway?” Soon a continuous flood of negative talk about mathematics ensues; before long, anxiety, overwhelming fears of failing or looking stupid, and panic set in. Physically, these people may experience nausea, perspire profusely, develop a headache or tight muscles, or exhibit a number of other physical symptoms. Mentally, they become confused or disorganized, make lots of careless errors, forget formulas they knew, can’t think clearly, or blank out entirely. The end result: poor progress, avoidance of mathematics, feelings of failure. Arem (2003) had diagrammed this process in Figure 1.1.

![Diagram of the Mathematics Anxiety Process](image)

*Figure 1.1 The Mathematics Anxiety Process (Arem, 2003)*
Although mathematics anxiety is not inherited, it can be passed from generation to generation with comments from parents such as “I never was good in mathematics either.” Children who models parent’s behaviors often comes to realize that if it is too hard for parents, who they believe can do anything, it is too hard for them too. Parent’s attitudes and confidence in their own mathematics ability can definitely affect children’s attitudes. Likewise, parents’, teachers’ and peers’ attitudes toward gender and ethnicity can also increase or decrease confidence in mathematical skills (Shields, 2006). Pritchard (2004) stated that parental approaches to involvement in mathematics learning are influenced by their attitudes, beliefs and understandings of mathematics and mathematics education. It is possible that parents hold alternative views of the nature and function of mathematics.

Mathematics anxiety has been a prevalent concern among educators and others in the society for decades. Now, with the advent of computer technology, the need for the understanding of mathematics is critical. Teachers can play an important role in reducing the level of mathematics anxiety among their students (Furner & Berman, 2003). Students tend to have high level of nervousness, fear, or discomfort toward mathematics, due to their prior experiences with mathematics teachers and other influential persons (Baylor, Shen, & Warren, 2000).

Marshall, Richardson, and Ponder (2006) reported that mathematics anxiety in children is a learned response from the attitudes of parents and educators alike. Alleviating this problem involves many issues ranging from cognitive development to changes in environmental viewpoints. Changing these external biases seems to be the most basic solution. Parents and educators must change their perspectives of mathematical skills in a positive way. Students model the expectations and attitudes of their parents and educators. By embracing mathematics as an essential tool for success in our society, these adults can help create a new viewpoint among students toward skills that are so fundamental to so many aspects of life.
Mathematics educators need to recognize the causes of mathematics anxiety such as poor mathematics instruction, negative attitudes about mathematics, negative mathematics experiences, and low self-esteem and work to help students cope with these factors. Educators can become more informed about the effects of mathematics anxiety by reading related literature and attending workshops and conferences on the topic. Students should be made to realize that myths such as mathematics aptitude are genetic and mathematics being a male domain is simply not true (Woodard, 2004).

Changing negative attitudes about mathematics will require support from parents, teachers and society. If negative attitudes are not changed, students’ performance and college and career choices will be limited. Ultimately, society will suffer from a workforce of citizens that is incapable of not only performing basic mathematical functions, but that is also unable to apply mathematics to solve real-world problems (Shields, 2006). In conclusion, mathematics anxiety is a reality for many students. Educators should be knowledgeable about its causes and provide supportive learning communities that assist students in overcoming it (Barnes, 2006).

1.2 Problem Statement

In the modern world, a college degree increasingly dictates the likelihood of life success. At the same time, there has been an ever-increasing population of students who have not been prepared adequately through their high school education to learn the college or university level content (Taylor, 2006). Noraini binti Idris (2006) reported that some of Malaysian students are successful whereas others are anxious and fearful. The performance of Malaysian students in mathematics has been generally been not good. It has been realized that poor mathematics performance of students at the secondary level would result in a decrease in the number of students getting to the university. According to Shields (2006), students often develop
negative attitudes toward mathematics because they have not experienced a need for mathematics and they believe that they can function in life and a career without it.

Mathematics at university is different from mathematics in primary and secondary school. In the university, students have to attend classes or tutorials, only two or three times a week instead of going to class every day. The primary and secondary school students take a year to learn mathematics, but in college or university, all the knowledge of mathematics has to be covered in only fifteen weeks. If students are new to college experience, they should realize that it may take some time to adapt to the way things are done. They have to manage their time properly in order to learn mathematics and other subjects. This is due to the limited time given to them in one semester. Students who are unable to manage time and their study have a high possibility to face mathematics anxiety especially students that already weak in learning mathematics. According to Stubblefield (2006), many students mentioned mathematics as the enemy of persistence. Some of the students felt that they were not adequately prepared for college-level mathematics courses. Mathematics was mentioned many times as the reason for having thoughts of quitting college. Silva, Tadeo, Reyes, and Dadigan (2006) reported that many freshmen feel lost in college. Some even expressed that they received little or no direction and encouragement from others and that some teachers are indifferent to their adjustment difficulties. Whatever situations they may be into test how much they have achieved from the previous education given to them. If they are unable to rise above the pressures and difficulties that they face, they suffer academic failure.

According to Tobia (1991), there were intelligent students who do well in subjects they like get a task-specific disability in mathematics. Tobia (1991) believed that to do mathematics at the college level, students need to have a special gift for mathematics, a “mathematical mind”. Most average undergraduate students have all the cognitive equipment they need to do advanced algebra, intermediate level
statistics, and college calculus. The problem is that they do not believe they do and this is known as mathematics anxiety.

Mathematics anxiety is an extremely common phenomenon among college and university students today (Perry, 2004). Mathematics anxiety is an intense emotional feeling of anxiety that people have about their ability to understand and do mathematics. While mathematics anxiety may be perceived as an excuse for poor mathematics performance, it can be a valid, justifiable excuse as well. It is a problem. It can affects people everyday life, students’ academic careers, and even contribute to stress, which is well known to cause many other problems (Truttschel, 2002).

Therefore, the factors that cause mathematics anxiety have to be identified in order to alleviate this problem. The study by Shields (2006) stated that it is a problem that will require the support of teachers, parents, peer and society. To eliminate mathematics anxiety, knowledge of the problem and effective strategies must be taught. The study examined the origins of mathematics anxiety as well as students’ beliefs about how society, parents, teachers, peer and teaching strategies contributed to mathematics anxiety.

Thus, a study on the factors that cause mathematics anxiety was appropriate and timely in mathematics classroom for the college or university level. The study conducted to recognize the causes that can contribute to the existence of mathematics anxiety in order to find the solution in alleviating this anxiety.
1.3 **Research Objectives**

The general objective of this study was to investigate the factors that cause mathematics anxiety among undergraduate students. Specifically, the study intended to achieve the following specific objectives:

1. To determine the levels of mathematics anxiety of students
2. To determine influence of parents, peer, teachers and society on mathematics anxiety
3. To determine correlation between mathematics anxiety and the grade level at which the anxiety started
4. To determine correlation between mathematics anxiety and students’ perceptions of the value that society places on mathematics
5. To determine correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the contribution to mathematics anxiety
6. To determine correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the reducing of mathematics anxiety
7. To determine correlation between mathematics anxiety score, as measured on the MARS-S, and the students’ perceived level of mathematics anxiety

1.4 **Research Questions**

The research questions answering from the research objectives were:

1. What were the levels of mathematics anxiety of students?
2. Who among parents, peers, teachers and society did students perceive as having the greatest influence on their mathematics anxiety?
3. Was there a correlation between mathematics anxiety and the grade level at which the anxiety started?

4. Was there a correlation between mathematics anxiety and students’ perceptions of the value that society places on mathematics?

5. Was there a correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the contribution to mathematics anxiety?

6. Was there a correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the reducing of mathematics anxiety?

7. Was there a correlation between mathematics anxiety score, as measured on the MARS-S, and the students’ perceived level of mathematics anxiety?

### 1.5 Research Hypotheses

There were five null hypotheses that were tested in this study. They were:

H₀₁: There was no correlation between mathematics anxiety and the grade level at which the anxiety started

H₀₂: There was no correlation between mathematics anxiety and students’ perceptions of the value that society places on mathematics

H₀₃: There was no correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the contribution to mathematics anxiety
H₀₄: There was no correlation between mathematics anxiety and the perceived usefulness of certain teaching strategies in the reducing of mathematics anxiety.

H₀₅: There was no correlation between mathematics anxiety score, as measured on the MARS-S, and the students’ perceived level of mathematics anxiety.

1.6 Research Framework

The research framework for this study is shown in Figure 1.2.

Demographic variable

- Grade level at which mathematics anxiety started

Independent variables

- Parental/teachers/peer/society factor
- Students’ perceptions of the value that society places on mathematics
- Usefulness of teaching strategies

Dependent variables

- Students’ perceived level of mathematics anxiety
- Mathematics Anxiety Rating Scale – Short version (MARS-S)

*Figure 1.2* Research framework of the study