# A STUDY OF ATTITUDES TOWARDS MATHEMATICS AMONG LEARNERS IN GRADE 10 IN NAMIBIA

By

POLLIKARPUS ANDIMA

Higher Diploma in Education
University of the Western Cape
Bellville, South Africa
1992

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 2001

A STUDY OF ATTITUDES TOWARDS

MATHEMATICS AMONG LEARNERS

IN GRADE 10 IN NAMIBIA

Thesis Approved:

Patricia Sanjahure Jordan

Thesis Advisor

Kay Reinke

Scott E Segall

Dean of the Graduate College

## ACKNOWLEDGMENTS

I wish to extend my sincere appreciation to Dr. Patricia Jordan, my adviser and chairperson of the advisory committee for her encouragement, support, and guidance in the preparation of this study.

Grateful appreciation is also extended to the other members of the advisory committee, Dr. Kay Reinke and Dr. William Segall. Special thanks to Dr. Dale Fuqua who guided me through the statistical analysis of the study.

Special thanks also need to be extended to the learners who completed the questionnaires and also those who sat in patiently during the interviews. I also have to thank the Ministry of Basic Education, the head teachers and teachers who allowed me to conduct the study.

As this chapter of my life comes to an end, I especially want to thank my parents, brothers, sisters, my in-laws, my sponsors (ATLAS/AAI), and all my friends for their continuous support and encouragement.

This study is dedicated to my wife and best friend, Hendrina. Her love, encouragement, support, and patience guided me throughout the completion of this study. To her I owe the greatest debt of all.

Above all I wish to thank the Almighty God who made everything possible right up to the end of this study. May He bless all those who contributed to the completion of this study in various ways?

TABLE OF CONTENTS

Chapter Page

## LIST OF TABLES

LIST OF FIGURES

Figure Page

# CHAPTER I

# INTRODUCTION

## Namibia

Namibia is in Southern Africa and shares borders with Angola to the north, Botswana to the east, South Africa to the south, and to the west is the Atlantic Ocean. In 1996 the population of Namibia was about 1.6 million. Its area is about 824,292-sq. km (318,261 sq. miles) with a population density of about 2.0 people per sq. km. The most spoken languages in Namibia are Oshiwambo, Otjiherero, Khoekhoegowab, Rukwangali, Silozi, Afrikaans, and German. English was introduced as the official language of communication at independence in 1990.

## History

Namibia like all the countries on the African continent was a colony. It was colonized by Germany from the 1800s until the end of 1915, with the defeat of Germany during World War I. Since then Namibia was placed under the South African apartheid regime by the League of Nations. The country gained its independence from the apartheid regime in 1990 when South West Africa People's Organization (SWAPO) won the first ever-democratic election held in the country.

## Educational System in Namibia

According to Amukugo (1993), education for black Namibians during the colonial period went through the following phases: pre-Bantu Education before 1962, Bantu Education in 1962-1976, and post-Bantu Education from 1977 onwards.

The pre- Bantu Education phase was characterized by missionary education. Among the missionary groups were Anglican, Catholic, Finnish, and Rhenish. Each missionary group established its own schools in different parts of the country. Although they established separate schools, they followed a similar pattern of education. The missionary education provided basic literacy and numeric training to the African people. Amukongo (1993) wrote that the missionary education system "was shaped by both the missionaries' religious motivation to convert Africans to Christianity and the political motivation to convince Africans of the need for state protection"(p.40). The influence of the missionary education is very high in Namibian society, with about over 90 percent of the population being Christians.

In 1962, the apartheid regime in South Africa extended its policy of Bantu Education to Namibia. Bantu Education was designed, as part of the apartheid policy, to prepare Africans for subordinate positions within the labor market. According to Molteno (1984), the aim of Bantu Education "was never intended as a simple denial of educational opportunities but represented a more calculated attempt to subvert the political and economical aspirations of Black South Africans"(p.94). In order to achieve its objectives, the regime removed the control of education for Africans from the various missionary organizations and centralized its control within the government.

As a result of apartheid, the education system was unequally divided into eleven educational systems and authorities based on ethnicity. The policies of apartheid, under South African occupation, have left a legacy of different allocation of resources to different racial groups. There are presently a number of disparities in the education system in Namibia. Schools in the formerly disadvantage areas have higher percentage of

unqualified and under qualified teachers. The classrooms in those areas are overcrowded and poorly equipped. Disparity is also observed across regions. The learners in some regions are taught under difficult conditions such as fewer textbooks per learner. Rural schools are generally ill equipped and have inadequate resources needed for effective teaching.

Today the government owns over 95 percent of schools in Namibia. The church and private groups own the other portion. The Ministry of Basic Education and Culture (MBEC) is the overseer of primary, junior, and senior education. The Educational system has seven years of universal primary education (grade 1 to 7), three years of junior secondary education (grade 8 to 10), and two years of senior secondary education (11 to 12) followed by tertiary education.

The National Institute of Education Development (NIED), a directorate in the MBEC, is responsible for designing the curricula and syllabi used in all schools. In order for the Ministry to bring it services closer to the community, seven educational regions were organized covering different parts of the country. The regions are: Ondangwa East and West (in the north), Rundu (central north east), Katima (far north east), Khorixas (in the west), Windhoek (central), and Keetmanshoop (in the south).

Another important division within the MBEC is the directorate of Examinations and Assessments, which mainly oversee the grades 10 and 12 national examinations. At the end of grade 10, learners sit for the Junior Secondary Certificate (JSC) examinations. Grade 12 learners take the International General Certificate of Secondary Education (IGCSE) or the Higher International Gene :al Certificate of Secondary Education (HIGCSE) offered by the Cambridge Examination Syndicate in Britain.

Since independence the change in educational opportunity has led to a fast increase of enrollment at all levels, especially at the primary level. Due to the rapid increase in learners' enrollment, space in secondary schools (grades 11 and 12) is limited. Learners have to compete for space in secondary schools. As a result, many learners end up in "non-formal education". A newly formed institution, Namibia College of Open Learning (NAMCOL), offers classes to learners who could not be accommodated in formal education.

## Mathematics Education in Namibia

Prior to Namibia's independence in 1990, many schools for black learners did not offer mathematics and science at the secondary level partly because of a lack of qualified teachers. When qualified staff was available, mathematics was taught with strong emphasis on the memorization of facts with little connection to real life situations. Furthermore, learners were discouraged from taking mathematics and science at the secondary school level because mathematics was considered difficult, especially for the Africans. Hendrik Verwoerd, a former Minister of Bantu Education in South Africa (cited by Mwetulundila, 2000), said:

> What is the use of teaching a Bantu child mathematics when he cannot use it in practice? Education must train and teach people in accordance with their opportunities in life... It is therefore necessary that native education should be controlled in such a way that it should be in accordance with the policy of the state. (p. 23)

Mathematics and science were und :rdeveloped before independence. Both these subjects were optional from "standard 8", the equivalent of grade 10. As a result, only

few selected learners could continue with mathematics. Subsequently, the majority of the learners were denied the opportunity to study mathematics beyond grade 9. Today, however, more learners are taking mathematics because it is compulsory up to grade 10.

## Ondangwa Educational Region

Ondangwa educational region in this study refers to the combination of both Ondangwa East and Ondangwa West. These are two of the seven educational regions in Namibia. Ondangwa educational region is the largest region with the highest number of learners' enrollment. In 1998, 10 469 (east 4 238 and west 6 231) learners were enrolled in grade 10 mathematics in the region. The region is mainly rural with overwhelmingly majority of the population making a living from farming and commerce. Statistics from the directorate of Examinations and Assessments, taken in past years, have shown very poor results in mathematics. For example, about 51.9% of grade 10 learners in Ondangwa East were ungraded in mathematics in 1998 final examination, while for Ondangwa West it was 57.7%

## Statement of the Problem

There is a growing concern in Namibia about the poor performance of learners in mathematics, particularly, grades 10 and 12. Statistics from the Ministry of Basic Education and Culture (MBEC), taken in past years, have shown very poor results in mathematics across the country. Over the years, considerable research has been conducted on the beliefs and attitudes towards mathematics. Little research was done in Namibia on learners' beliefs and attitudes towards mathematics.

The poor performance of learners in mathematics may be linked to many different factors. The results of research pertaining to attitudes towards mathematics have found that positive effects lead to positive achievement. Thorndike-Christ (1991) wrote that

attitudes towards mathematics have been strongly linked to mathematics achievement. Many studies showed that positive attitudes towards mathematics have a significant impact on mathematics achievement (Mather, 1994). The way students respond to mathematical situations is reflective of their attitudes or beliefs about themselves and mathematics as a discipline (Shoenfield, 1985). Poor student attitudes towards mathematics can influence students negatively, thus, contributing to poor results and a decline in students' enrollment in mathematics courses (Thorndike-Christ, 1991).

In the past, learning mathematics, teaching of mathematics was underdeveloped, considered difficult, and only a few learners were encouraged to pursue mathematics. This atmosphere provided a good opportunity to examine the attitudes of grade 10 learners towards mathematics. Furthermore, the poor performance of grade 10 learners in mathematics provides an additional rationale for investigating their attitudes towards learning mathematics. Attitudes are of particular interest as more learners are being encouraged by the Namibian government to study mathematics. The Namibian government has declared mathematics and science as priority areas. Considerable attention is being given to enhancing mathematics education across the country.

## Purpose of the Study

The purpose of the study is to investigate grade 10 learners' attitudes towards mathematics in the Ondangwa educational region.

## Research Questions

In order to investigate the learners' attitudes towards mathematics, the following questions, which served to guide the deve opment of this study, would be addressed:

1. Are there significant differences between perceptions of male and female learners regarding mathematics as a male-dominated field?
2. Are there significant differences between perceptions of male and female learners regarding mathematics as a discipline?
3. Are there significant differences between perceptions of male and female learners regarding the perceived usefulness and relevance of mathematics?
4. Are there significant differences between perceptions of male and female learners regarding themselves as learners of mathematics?

Another area of particular interest was to investigate whether there were significant differences in perceptions between learners in Ondangwa East and Ondangwa West. Therefore, the following similar questions were asked:

5. Are there significant differences between perceptions of learners in Ondangwa East and West regarding mathematics as a male-dominated field?
6. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding mathematics as a discipline?
7. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding the perceived usefulness and relevance of mathematics?
8. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding themselves as learners of mathematics?

## Limitations and Assumptions

1.The fact that not the entire population but only a sample was used may give superficial results. The subjects of this study were limited to only 248 learners. Secondly, the time period for conducting the study seems very short.

2. It is assumed that attitudes are measurable.

3. It is further assumed that the instruments used in this study can measure the attitudes of the learners.

4. Because the instrument had been previously used as a component of the Second International Mathematics Study, the researcher assumed that the reliability coefficient is positive and significant and thus would increase the validity of the findings.

5. It is assumed that all the participants responded honestly to the instruments used in this study.

## Definition of Terms

For the purpose and the understanding of this study, the following frequently used terms are clarified:

Attitudes towards mathematics refer to things such as liking or disliking of mathematics, a tendency to engage in or avoid mathematics, and a belief that mathematics is useful or useless (Neale, 1969).

A grade 10 learner is the equivalent of a tenth grade student.

Ondangwa East is one of the seven educational regions in Namibia.

Ondangwa West is one of the seven educational regions in Namibia.

Ondangwa education region refers to the combination of both Ondangwa East and Ondangwa West.

## Outline of the Report

This report is divided into five chapters. Chapter I describes the context in which the study was conducted. It covers background information on Namibia, particularly, the educational system with the main focus on mathematics education. Following this are the statement of the problem, the purpose of the study, the research questions, the limitations and assumptions, and the definitions of frequently used terms in the study. Chapter II presents a selective overview of relevant literatures under the following headings: Nature of Attitudes, Factors Influencing Attitudes, and Mathematics Attitudes and Achievement. Chapter III presents the design and methodology, participants, descriptions of the instruments, and the collection of data. The results are reported and analyzed in chapter IV while the conclusions and recommendations are presented in chapter V.

## CHAPTER II

## REVIEW OF THE LITERATURE

A brief review of the literature related to the study is presented under the following headings:

1. Nature of Attitudes.

2. Factors Influencing Attitudes.

3. Mathematics Attitudes and Achievement.

### Nature of Attitudes

Attitude has been defined in a variety of ways; here are few examples: According to Brito (1996, quoted by Utsumi and Mendes, 2000):

> ...Attitude can be defined as a personal inclination, idiosyncratic, present in all individuals, directed to objects, events or people, that takes on a different direction and intensity according to the experiences each individual has had. Besides, it presents components from the affective, cognitive and motor domain.(p.238).

"An attitude is a mental and neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Fishbein, 1967, p.8).

According to Sorenson (1964) an attitude refers to a particular feeling about something. That "something" can be a person, an idea, or an object. Attitude is not inherent but acquired by the individual. Shaw and Wright (1967) agreed when they suggested that attitudes are not innate but learned, and are developed through many learning experiences. Aiken (1972) referred to attitudes as meaning the same thing as enjoyment, interest, and to some extent, level of anxiety. Attitudes may also refer to feelings about mathematics and feelings about oneself as a learner.

How a person feels or what he or she believes cannot be measured directly. Therefore, attitudes cannot be measured directly. However, it can be inferred from their behavioral manifestation through the use of questions, or by obtaining the individual's expressed reaction to statements. Attitude is observable and measurable (Green, 1954). Green described attitude as a psychological construct, or latent variable, inferred from observable responses to stimuli that are assumed to mediate consistency and co variation among these responses.

Some studies dealing with attitudes suggested that attitudes are formed at an early age. Fedon (1958) inferred from his study that children formed opinion about mathematics by the third grade. Dutton (1956) concurred with Fedon and further stated that at an early stage in the educational sequence children are influenced to take a stand, either for or against mathematics, which appears quite permanent. Dutton also found evidence that attitudes towards mathematics steadily decline through the intermediate grades. It is, therefore, important to make sure that learning situations and conditions are pleasant for children at an early stage to a· oid negative attitudes. Suydam (1984) argued that attitudes towards mathematics are formed and modified by many forces. Some of the

forces cited were teacher's enthusiasm and methods, parents and other adults, class mates and other children, self-concepts, learning styles, and experience with mathematics in and out of school. Knaupp (1973) stated that studies dealing with students' attitudes are difficult to interpret since (1) the type of attitudes being measured were not clearly defined, (2) the instruments used to measure attitudes were questionable, and (3) controls on extraneous variables were very difficult to effectively employ. Thus, a clearly defined and valid attitude-measuring device is needed.

## Factors Influencing Attitudes

Considerable research has been done in the field of attitudes and beliefs towards mathematics from a variety of perspectives and among various groups. Many social factors, such as attitudes of teachers and parents towards mathematics as well as the personal experiences with mathematics, were identified as playing a role in forming and modifying attitudes towards mathematics. It is widely assumed that teacher attitudes towards mathematics and feelings about the teaching of mathematics influence the student's attitudes towards mathematics. Some studies were found to be supportive of the relationship between teacher's attitudes and student's attitudes towards mathematics, while others were found to be contradictory. Banks (1964, quoted by Riedesel) stated:

> An unhealthy attitude towards arithmetic may results from a number of causes. Parental attitudes may be responsible... Repeated failure is almost certain to produce a bad emotional reaction to the study of arithmetic. Attitudes of his peers may will have their effects upon the child's attitudes. But by far the most significant contributing factor is the attitude of the teacher. The teacher who feels insecure, who dreads and dislike the subject, for whom arithmetic is largely rote manipulation, devoid of understanding, cannot avoid transmitting her feelings to

the children...On the other, a teacher who has confidence, understanding, interest and enthusiasm for arithmetic has gone a long way towards insuring success. (p. 232)

The results of Garner (1966, cited by Gilbert, 1976) supported Banks's assertion. Garner found a significant relation between the attitudes and feelings of competency of a teacher and the competency of the students. Phillips' (1973) study revealed a significant relation between the arithmetic attitude of the student's most recent teacher and the arithmetic attitude of the student. The study revealed, however, that student achievement in arithmetic is not significantly related to the arithmetic attitudes of the student's most recent teacher. Peskin (1964, cited by Phillips, 1973) in a study of seventh grade teachers and students in New York City found no significant relation between teacher attitude and student attitude nor between teacher attitude and student achievement.

Several studies have been conducted to examine attitudinal differences in mathematics between male and female students. Fennema and Sherman (1977) found that differences in attitudes are in favor of boys over girls at junior high level and beyond. A study done by Stone, Beckman, and Stephens (1983, cited by Aksu, 1991) on factors that may influence attitudes towards mathematics, found that pre-calculus college students' attitudes towards mathematics are not significantly affected by sex. It further found that first-year college students have significantly better attitudes towards mathematics compare to sophomore and juniors. In a longitudinal study, Aksu (1991) found that the results on sex and departmental differences in attitudes towards mathematics were quite different. For the year 1986 and 1988 he found that freshman females were significantly more positive than males.

Other studies have found differential treatment of male and female students by teachers. Fennema (1984), for instance, found that teachers interact more with boys than they do with girls. In addition, it was found that boys received more criticism for their behavior than girls do and also boys received more positive feedback than girls. Reyes (1980) in a study with twelve seventh grade teachers found tremendous variation in the behavior of teachers. Some teachers asked many more high level questions of boys than they did of girls.

Parents play an important role in shaping attitudes of their children. Fabricant (1985) stated that parents who express negative attitudes towards mathematics might end-up teaching those negative attitudes to their children. Contrary to Fabricant, other researchers (Parsons, Adler, & Kaczala, 1982; Sherman, 1982) did not find much support for Fabricant. Perhaps one of the worst problem facing women and girls in mathematics education is the notion held by society that males are more intelligent in mathematics than females. Thus, creating the impression that males have, generally, a positive attitudes towards mathematics, whereas, females are seen as having negative attitudes towards mathematics. Fennema (1984) wrote that society's stereotyping of mathematics, as a male domain is a partial cause of females' less positive attitudes towards mathematics.

Discussing the stereotype attitudes about girls, Mwetulundila (2000) wrote the following:

> Many Namibian girls always say " I am not good in Mathematics." In fact, at one time, I had also totally accepted, as did my parents, that I can never do

Mathematics, because it was just too difficult, and because of that I never bother to learn it. (p. 30)

Such perception could have negative effects on females' ambitions and confidence in mathematics, therefore, affecting their attitudes towards mathematics negatively.

## Mathematics Attitudes and Achievement

Over the years, numerous studies have been conducted to investigate students' beliefs and attitudes towards mathematics. Some of the studies have shown a correlation between mathematics attitudes and achievement. Aiken (1976) in his study on attitudes towards mathematics showed that there was a significant correlation between attitudes and achievement, the correlations were low. Fennema and Sherman (1977, 1978 cited by Kloosterman, 1994) found that students with positive attitudes, for example, students who believe that mathematics is useful and are confident in their ability about mathematics have higher achievement than those who do not.

Some research reported that the relationship between attitudes and achievement might vary with ability level. One such study was by Schofield (1982), who did find few significant correlations between mathematics attitudes and achievement among girls in any grade level. The correlations were generally low but positive. In that study, the fifth grade recorded a negative correlation between mathematics attitudes and achievement. The correlation between attitudes and achievement when only boys were considered was positive and significant. When both boys and girls were compared, the relationship was low. Husen (1967) found that achievemen' was positively correlated with interest in mathematics at all levels in all twelve countries he studied.

At elementary schools level, Suydam (1984) found that there was no significant difference in the attitudes of girls and boys. She noted that the attitudes towards mathematics remain positive until sixth grade and then become increasingly less positive as students progress through school. Suydam (1984) found a low correlation between students' attitudes towards mathematics and their achievement.

A longitudinal study by Anttonen (1967 cited by Neale, 1969) found that attitudes towards learning mathematics become increasingly less favorable as the child progresses in school. The students' attitudes were measured over a period of six years from either fifth or sixth and again retested in the eleventh or twelfth grade. The results revealed that the mean score had declined one standard deviation over the six-year period. The decline was, however, somewhat less than one standard deviation for those students who took the full years of mathematics.

Hart (1976), in a study of 179 students found a significant correlation between attitudes and achievement. The study revealed that less than 20 percent of the variance in attitudes could be attributed to achievement variance. Hart, however, cautioned that there might have been other variables that were not disclosed by statistical analysis. Therefore, even when a significant correlation occurred, it is difficult to determine whether the attitude towards mathematics affects the achievement or vice versa.

## Summary of the Literature

The following areas of review of related literature have been presented in this chapter:

1. The concept of the natur of attitudes, its importance, how it is acquired, and when it is formed.

2. The role of attitudes towards mathematics in mathematics achievement can be used to explain some of the variation in achievement. Positive or negative attitudes towards mathematics are formed and modified by many other forces such as teachers, methods, parents, self-concept, and experience with mathematics in and out of school.

3. The possible influence that teachers and parents have on children's attitudes as well as the influence of society with special focus on gender differences.

4. Despite the extensive research done on the relationship between mathematics attitudes and achievement in many countries, no study, as far as the researcher is aware, have attempted to address the question of attitudes towards mathematics in Namibian. The objective of this study was to find answers as to what are the attitudes of grade 10 learners towards mathematics.

# CHAPTER III

## DESIGN AND METHODOLOGY

The survey was conducted between the beginning of June 2000 through the end of July 2000 in 27 government-supported schools in Ondangwa East and Ondangwa West education regions. The total number of schools offering grade 10 in both regions was 183 (year 2000). Permission to conduct the survey was obtained from school administrators and class teachers. The questionnaires were delivered at all the participating schools and then gathered by the researcher after two to three weeks. The questionnaires were piloted with eleven grade 10 learners of mathematics in Windhoek region. Minor revisions were made based on the pilot group.

### Participants

Participants in the study were grade 10 learners from both Ondangwa East and Ondangwa West education regions. Initially, 908 learners participated in the study. Of those who participated, 440 were females, 384 were males, and 84 did not disclose their gender. Due to time constrains and the fact that the questionnaire was quite extensive, a decision was made to use a stratified random sampling technique. Then it was decided to select a sample of the survey from each school, the researcher selected 14 surveys from each of two schools. To limit the number of surveys to be analyzed, the researcher then decided to select only 10 surveys from each of the remaining school. This accounting for the total of 248 surveys, 124 male and 124 female, and 124 learners from Ondangwa East and 124 learners from Ondangwa West.

## Instrument

The study used two main methods for collecting data: the questionnaire and interview.

## Questionnaire

The questionnaire for the learner was devised to explore aspect of the learners' attitudes and perceptions towards mathematics. The questionnaire was a revised form of an instrument developed during the Second International Mathematics Study (SIMS). It was adapted for use by the grade 10 learners in Ondangwa region. Since the majority of the learners use English as a second language, minor changes were made in the wording of some of the items so that the learners could more easily understand them. For example, on item 2 the word "worthwhile" was dropped because the researcher felt that some of the learners may not know its meaning. On item 3 in the SIMS questionnaire the phrase " more mathematics" was replaced with "mathematics in grade 11". On the SIMS questionnaire the statement "I have little use for mathematics outside of school", was changed to "I use little mathematics outside school." For all the items, learners were required to tick the appropriate response from a set of three alternatives: "yes" if they agreed, "no" if they disagreed, and "unsure" if they were not sure about the answer. Of the 1080 questionnaires for the learners, 908 were returned, a returned rate of 84.1%. Although 908 questionnaires were returned, only 248 questionnaires were considered for this report. Efforts were made to assure that participation was representative of the wide range of abilities in any school. For example, in a school with more than one grade 10 class, the teachers were requested by the researcher to distribute the questionnaires randomly across all the grade 10 classes. Each teacher was given a letter explaining the purpose of the study. The learners were asked not to write their names on the

questionnaires. No incentives or rewards were offered for completing the questionnaires. The teachers collected the questionnaires from the learners and forwarded them to the researcher.

## Interviews

In addition to the questionnaire, information was also obtained through interviews from fourteen randomly selected grade 10 learners (from the same sample used for the questionnaires). Interviews with individual learners were conducted to corroborate questionnaire findings.

The grade 10 mathematics teachers were asked to randomly select one (in some cases two) learner(s), as a result, fourteen learners were selected on teachers' recommendation, with an attempt to include those who "like" and "dislike" mathematics. Incidentally, seven boys and seven girls were selected for the interviews. The interview questions were mainly designed to measure attitudes and perceptions associated with mathematics. The interviews were conducted in such a way that each interviewee was asked the same set of questions as others. The interviewer had the flexibility to lead the interviewees into directions that he deemed would be productive. All the interview sessions were recorded on audiotapes. In order to protect anonymity the names were not mentioned.

All the interviews were conducted during school hours, especially, during breaks and during teachers' administrative periods. The following set of questions were asked during the interviews:

1. Do you like mathematics? Wh; ?
2. What do you like most about mathematics? Why?

3. What do you like least about mathematics? Why?
4. Do boys have more natural abilities to do mathematics than girls? Why?
5. Do you think that some people are naturally good or poor in mathematics? Why?
6. Is mathematics a useful subject? Explain.
7. Is it important to know mathematics to get a good job? Explain.
8. Are you looking forward to take mathematics in grades 11 and 12? Why.

## CHAPTER 4

### Results

As indicated in Chapter I, the purpose of this study was to investigate grade 10 learners' attitudes towards mathematics. A total of 248 learners, 124 males and 124 females, were scored in this report. The age of the learners range from 14 to 25 years with the mean equal to 16.8930 years and a standard deviation of 1.6099. The age distribution of learners across schools is shown in Table I.

Table I:

Age distribution of learners across schools.

| Age | Frequency | Percent |
|---|---|---|
| 14 | 8 | 3.2 |
| 15 | 40 | 16.1 |
| 16 | 53 | 21.4 |
| 17 | 69 | 27.8 |
| 18 | 41 | 16.5 |
| 19 | 17 | 6.9 |
| 20 | 10 | 4.0 |
| 21 | 2 | .8 |
| 22 | 2 | .8 |
| 25 | 1 | .4 |
| Total | 243 | 98.0 |
| Missing system | 5 | 2.0 |
| Total | 248 | 100.0 |

A questionnaire containing forty items that addressed learners' attitudes and perceptions regarding mathematics was used to investigate their attitudes towards mathematics. The items were selected from the Second International Mathematics Study. The items have been categorized into four sections with each section containing items related to mathematics attitudes and perception. The four categories of attitudes were: mathematics as a male-dominated field, mathematics as a discipline, mathematics and society, and mathematics and oneself.

For each item, the learners were required to select one response from a set of three alternatives: "yes" if they agreed, "no" if they disagreed, and "unsure" if they were not sure about the answer. Cronbach's alpha was used for the purpose of conducting reliability calculations. Cronbach's alpha value was .640. Only "yes" and "no" responses were scored and analyzed statistically. The data was analyzed using the statistical package SPSS (1999) software program. Non-parametric analyses, a Chi-square ($\chi^2$) Test at $\alpha = .05$, was conducted on each item to determine if there were significant differences in perceptions between male and female learners and also between learners in Ondangwa East and West.

First Research Question

Six items were identified to determine whether there were significant differences between perception of male and female learners regarding mathematics as a male-dominated field. The results are shown in Table II. Of these six items, two revealed statistically significant differences between perception of male and female learners. A statistically significant difference in the responses given by males and females was obtained in item 10, $\chi^2 = 7.608$, $p < .05$. About 65% of males seemed to support the idea

that "men are better at mathematics than female are," whereas, about 60.5% of females disagreed. Regarding item 22, $\chi^2 = 14.515$, $p < .05$. A high percentage (87.3%) of males disagreed with the statement that "men are not better than women as scientist and engineers," while 54.8% of females disagreed.

Although items 17, 24, 29, and 34 did not reveal statistically significant differences between perceptions of male and female learners regarding mathematics as male-dominated, they still provided information on learners' attitudes and perceptions regarding mathematics. For item 17, not surprisingly, more males (64.1%) agreed that they have more abilities to do mathematics compared to 47.7% females who seemed to agree with the statement. Responses to item 29 indicated a high percentage support that "Girls need to know mathematics just as much as boys do". Fifty percent and more of each group said "yes" to item 34. They felt that women are logical enough to do well in mathematics just like men.

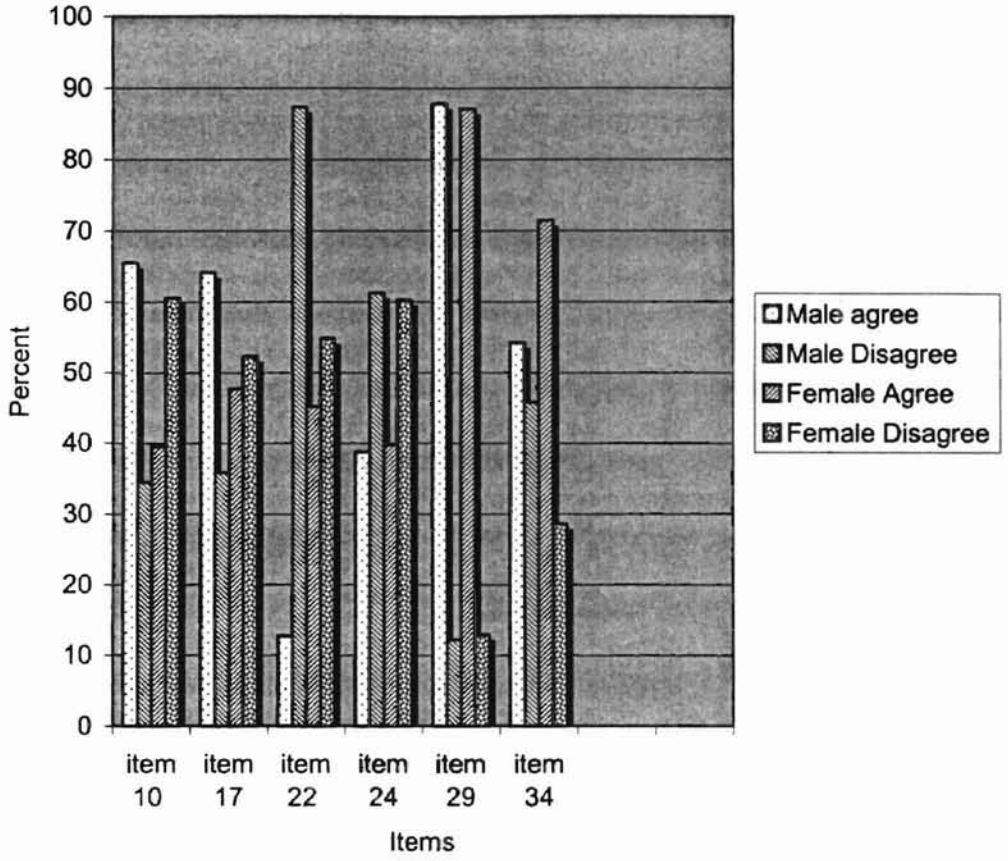
Table II:

Responses of Males and Females to Statements regarding Mathematics as a male-dominated field.

| Statement | Percent Responding | | | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| | Gender | Agree | Disagree | | | |
| 10. Male are better at mathematics than female are. | Male | 65.5 | 34.5 | 7.608 | 1 | .007* |
| | Female | 39.5 | 60.5 | | | |
| 17. Boys have more natural abilities to do mathematics than girls. | Male | 64.1 | 35.9 | 2.872 | 1 | .090 |
| | Female | 47.7 | 52.3 | | | |
| 22. Men are not better than women as scientist and engineers. | Male | 12.7 | 87.3 | 14.515 | 1 | .000* |
| | Female | 45.2 | 54.8 | | | |
| 24. It is hard to believe a female could be good in mathematics. | Male | 38.8 | 61.2 | .000 | 1 | 1.000 |
| | Female | 39.8 | 60.2 | | | |
| 29. Girls need to know mathematics just as much as boys do. | Male | 87.8 | 12.2 | .000 | 1 | 1.000 |
| | Female | 87.1 | 12.9 | | | |
| 34. Women are certainly logical enough to do well in mathematics. | Male | 54.2 | 45.8 | 2.930 | 1 | .087 |
| | Female | 71.4 | 28.6 | | | |

* Results significant at the $P < .05$ level

Figure 1: Responses of Males and Females to Statements regarding Mathematics as a male-dominated field




Second Research Question

For the second research question, eight items were included in this category. These items dealt with perceptions of mathematics as a process-oriented versus rule-oriented subject. The data pertaining to this category did not show any statistically significant differences associated with gender. The results shown in Table III revealed some interesting findings. For example, according to the responses given to item 1, both male and female learners seemed to strongly agree with the idea that mathematics helps them to think according to strict rules. There was also strong support from both groups regarding the usefulness of mathematics. A relatively higher percentage of learners

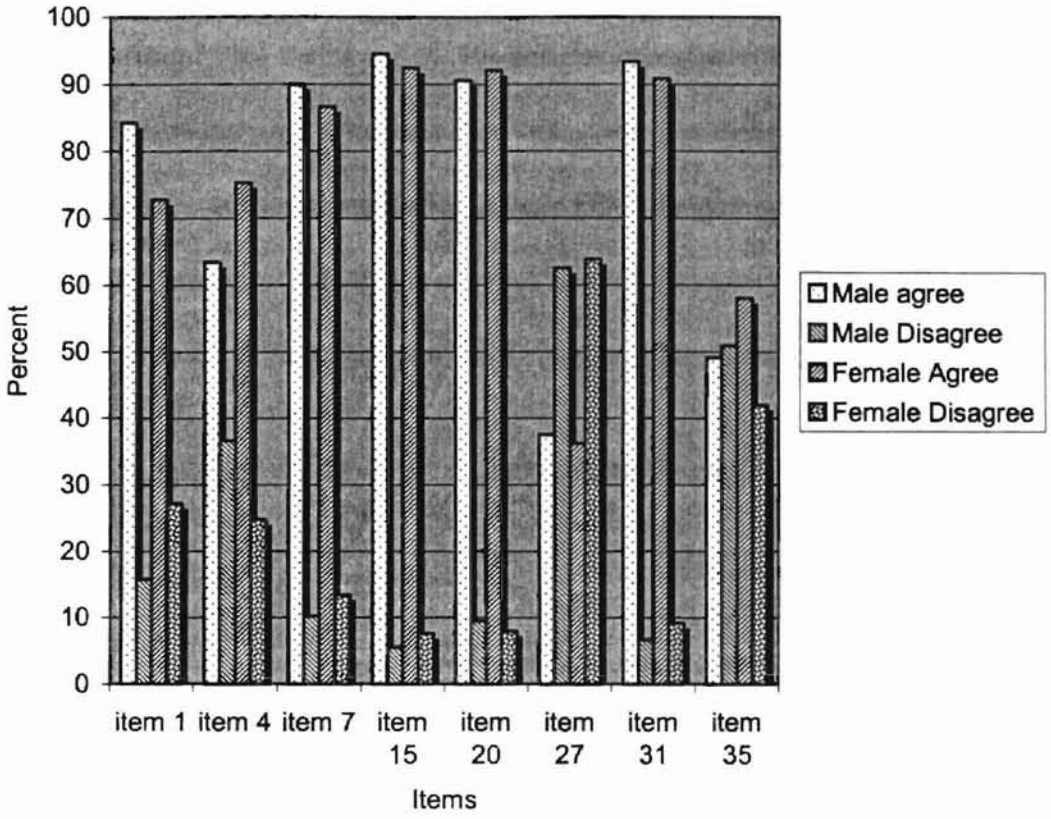
agreed with the statement that mathematics helps them to think logically (89.9% males and 86.6% females). Both males and females appeared to recognize that mathematics problems could be solved using different ways. They, however, strongly agreed that "there is always a rule to follow in solving mathematics problems." More females than males stated that mathematics follow a particular set of rules. Responses to item 27, which suggested that "trial and error" is useful in solving mathematics were surprising. The learners seemed to recognize the fact that "trial and error" is a useful tool in solving mathematics. Approximately half of the males (50.9%) disagreed with the statement that learning mathematics is mostly memorizing, whereas, 42% of the females disagreed with the statement.

Table III

Responses of Males and Females to Statements regarding Mathematics as a process-oriented versus rule-oriented subject.

| Statement | Percent Responding | | | $\chi^2$ | DF | P |
|---|---|---|---|---|---|---|
| | Gender | Agree | Disagree | | | value |
| 1. Mathematics helps one think according to strict rules. | Male | 84.3 | 15.7 | 2.580 | 1 | .108 |
| | Female | 72.8 | 27.2 | | | |
| 4. Mathematics follows a particular set of rules. | Male | 63.4 | 36.6 | 2.245 | 1 | .134 |
| | Female | 75.3 | 24.7 | | | |
| 7. Mathematics helps me to think logically. | Male | 89.9 | 10.1 | .248 | 1 | .619 |
| | Female | 86.6 | 13.4 | | | |
| 15. There are different ways to solve mathematics problems. | Male | 94.5 | 5.5 | .122 | 1 | .727 |
| | Female | 92.4 | 7.6 | | | |
| 20. There is always a rule to follow in solving a mathematical problem. | Male | 90.5 | 9.5 | .022 | 1 | .883 |
| | Female | 92.0 | 8.0 | | | |
| 27. Trial and error is not very useful in solving mathematics problems. | Male | 37.5 | 62.5 | .000 | 1 | 1.000 |
| | Female | 36.2 | 63.8 | | | |
| 31. Mathematics is a good field for creative people. | Male | 93.3 | 6.7 | .164 | 1 | .686 |
| | Female | 90.8 | 9.2 | | | |
| 35. Learning mathematics involves mostly memorizing. | Male | 49.1 | 50.9 | 1.314 | 1 | .252 |
| | Female | 58.0 | 42.0 | | | |

Figure 2: Responses of Males and Females to Statements regarding Mathematics as a process-oriented vesus rule-oriented subject.




## Third Research Question

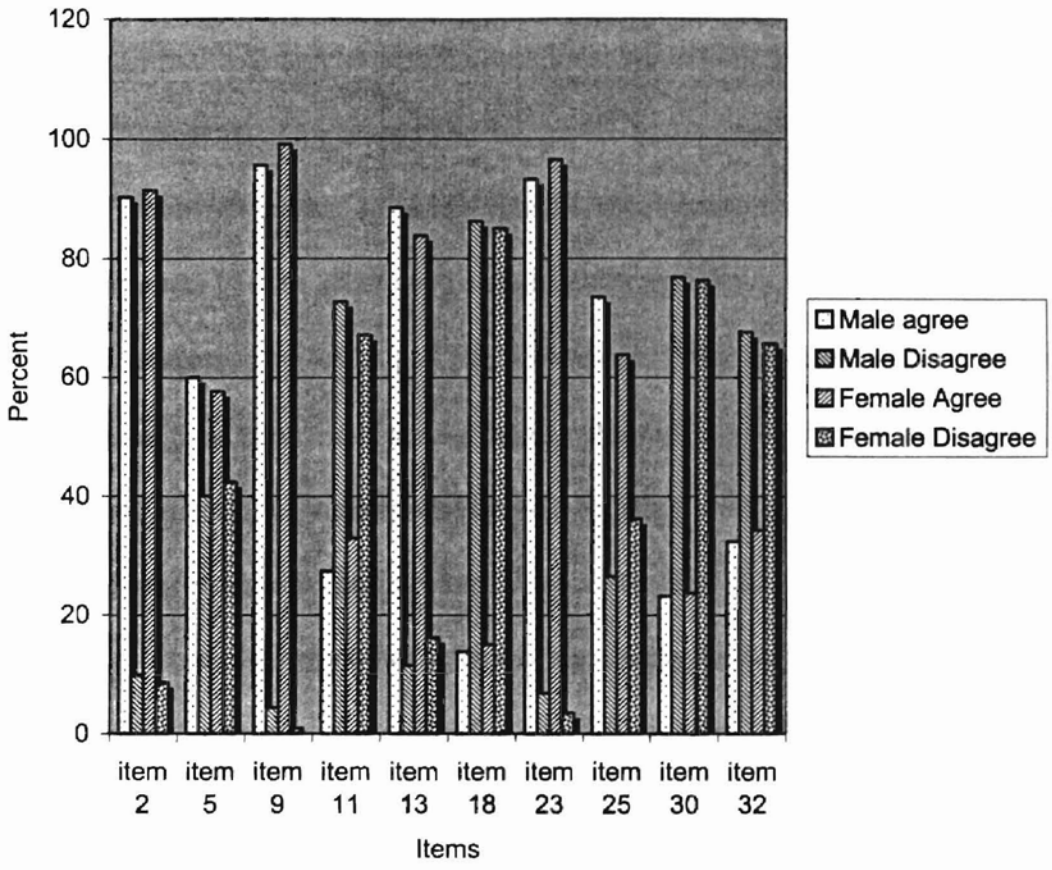
For the third research question, ten items were included in this category to gauge learners' responses regarding the usefulness and relevance of mathematics. The results are shown in Table IV. Although the data pertaining to this category did not show any significant differences associated with gender, it still provided information on learners' attitudes regarding mathematics. There was strong support from both males (90.2%) and females (91.4%) regarding the usefulness of mathematics. This was also evident from the responses obtained from items 18, 25, and 32. The learners viewed mathematics as an important component of every day existence. Interestingly, however, they seem to use

little mathematics outside school. This was evident from responses on item 5, in which over half of the learners seemed to agree with the statement that they "use little mathematics outside school". Furthermore, the data indicated an overwhelmingly support for item 9. About 95% males and 99.1% females recognized that "most mathematics has practical uses on the job". Over one third of the learners disagreed with the idea that "most people do not use mathematics in their jobs." In general, the learners seemed to recognize the important role that mathematics plays in society. This result is consistent with the reports on attitudes towards mathematics (Lamphere, 1996).

Table IV
Responses of Males and Females to Statements regarding the usefulness and relevance of Mathematics

| Statement | Percent Responding | | | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| | Gender | Agree | Disagree | | | |
| 2. Mathematics is a useful subject. | Male | 90.2 | 9.8 | .010 | 1 | .921 |
| | Female | 91.4 | 8.6 | | | |
| 5. I use little mathematics outside school. | Male | 60.0 | 40.0 | .055 | 1 | .814 |
| | Female | 57.6 | 42.4 | | | |
| 9.Most mathematics has practical uses on the job. | Male | 95.6 | 4.4 | 1.434 | 1 | .231 |
| | Female | 99.1 | .9 | | | |
| 11.Most people do not use mathematics in their jobs. | Male | 27.3 | 72.7 | .441 | 1 | .506 |
| | Female | 32.9 | 67.1 | | | |
| 13.I would like to work at a job that lets me use mathematics. | Male | 88.5 | 11.5 | .685 | 1 | .408 |
| | Female | 83.8 | 16.2 | | | |
| 18. Mathematics is not needed in everyday life. | Male | 13.8 | 86.2 | .003 | 1 | .956 |
| | Female | 15.0 | 85.0 | | | |
| 23. It is important to know mathematics in order to get a job. | Male | 93.2 | 6.8 | .660 | 1 | .416 |
| | Female | 96.5 | 3.5 | | | |
| 25. Mathematics is useful in solving everyday problems. | Male | 73.5 | 26.5 | 1.718 | 1 | .190 |
| | Female | 63.8 | 36.2 | | | |
| 30. A knowledge of mathematics is not necessary in most occupation | Male | 23.2 | 76.8 | .000 | 1 | 1.000 |
| | Female | 23.7 | 76.3 | | | |
| 32. I can get along well in everyday life without mathematics. | Male | 32.4 | 67.6 | .022 | 1 | .882 |
| | Female | 34.3 | 65.7 | | | |

Figure 3: Responses of Males and Females to Statement regarding the usefulness and relevance of Mathematics.




## Fourth Research Question

For the fourth research question, eleven items were included in this category (see Table V). These items were designed to determine learners' perception of themselves as learners of mathematics. In general, the learners' responses in this category showed a positive trend in the way they perceive mathematics. Item 3, for example, indicated that 84.4% of the male learners and 85.8% of the female learners were, indeed, looking forward to continuing with mathematics in grade 11. More males than females stated that they disagreed with item 6. Encouraging were the responses to item 8. Over two third (69.9%) of the female learners agreed that they, "can do more difficult mathematics,"

whereas, 61.5% of the male learners agreed. There was, however, a statistically significant difference in the responses given by the males and females to item 12, "mathematics is one of my difficult school subject," $\chi^2 = 4.030$, $p < .05$. Sixty-seven percent of the males disagreed with the statement while only 53.8% of the females disagreed. Almost all of the learners seemed to do best in mathematics when compared to their other schoolwork. Only 1.7% males and 6.8% females disagreed with item 14.

Responses to item 26 showed a statistically significant difference between male and female learners, $\chi^2 = 4.835$, $p < .05$. More males (76.5%) agreed that it was easier to talk in front of their mathematics class mates, whereas, only 62.2% females agreed. Although the majority of the responses in this category were positive, there were, however, disagreements regarding item 33. More females (61.1%) seemed not to view mathematics easier than any other school subject. Only 51.4% males shared the same sentiment. Finally, more males seemed to strongly agree with the statement that they can get good grades in mathematics. Slightly less than three quarters of the females agreed with this statement.

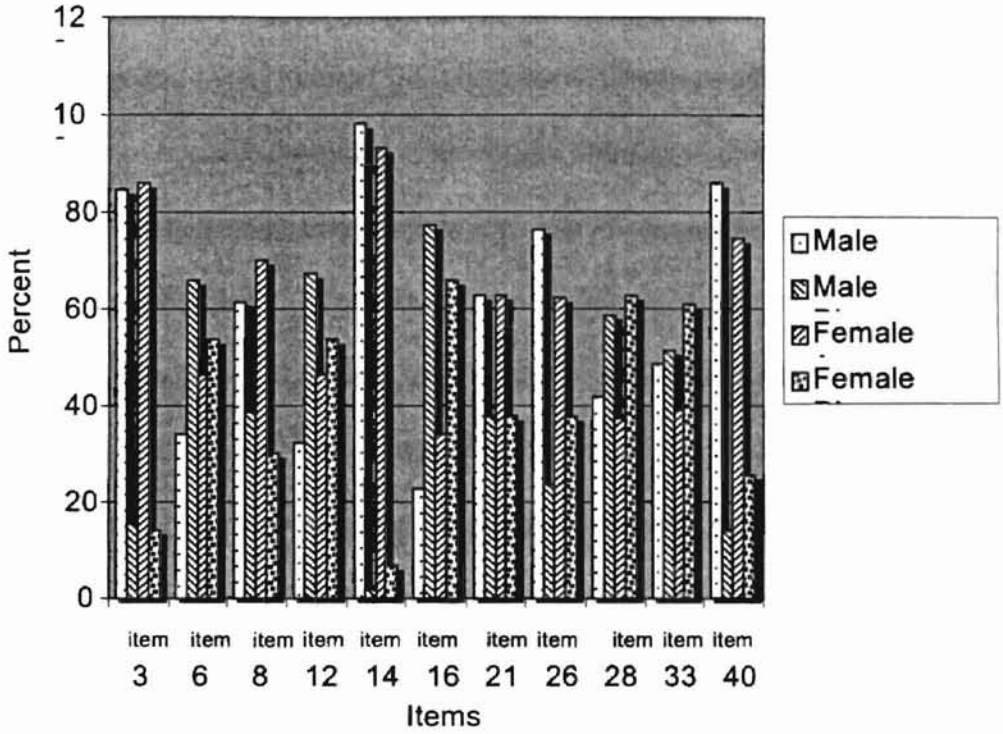
Table V

Responses of Males and Females to Statements regarding Mathematics and oneself.

| Statement | Gender | Percent Responding Agree | Disagree | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| 3. I am looking forward to taking mathematics in grades 11. | Male | 84.4 | 15.6 | .013 | 1 | .911 |
| | Female | 85.8 | 14.2 | | | |
| 6. Mathematics is more difficult for me than it is for most other learners. | Male | 33.9 | 66.1 | 2.885 | 1 | .089 |
| | Female | 46.2 | 53.8 | | | |
| 8. I think I can do more difficult mathematics. | Male | 61.5 | 38.5 | 1.079 | 1 | .299 |
| | Female | 69.9 | 30.1 | | | |
| 12 Mathematics is one of my difficult school subjects. | Male | 32.5 | 67.5 | 4.030 | 1 | .045* |
| | Female | 46.2 | 53.8 | | | |
| 14. I try to do my best schoolwork in mathematics. | Male | 98.3 | 1.7 | 2.612 | 1 | .106 |
| | Female | 93.2 | 6.8 | | | |
| 16. No matter how hard I try, I cannot understand mathematics. | Male | 22.6 | 77.4 | 2.983 | 1 | .084 |
| | Female | 34.0 | 66.0 | | | |
| 21 I cannot understand why some learners think mathematics is fun. | Male | 62.7 | 37.3 | .000 | 1 | 1.000 |
| | Female | 62.7 | 37.3 | | | |
| 26. It is easy for me to talk in front of my mathematics class. | Male | 76.5 | 23.5 | 4.835 | 1 | .028* |
| | Female | 62.2 | 37.8 | | | |
| 28. I am often discouraged with my mathematics schoolwork. | Male | 41.8 | 58.2 | .245 | 1 | .621 |
| | Female | 37.4 | 62.6 | | | |
| 33. Mathematics is easier for me than any other school subject. | Male | 48.6 | 51.4 | 1.769 | 1 | .183 |
| | Female | 38.9 | 61.1 | | | |
| 40. I can get good grades in mathematics | Male | 85.7 | 14.3 | 2.352 | 1 | .125 |
| | Female | 74.6 | 25.4 | | | |

* Results significant at the $p < .05$ level.

Figure 4: Responses of Males and Females to Statement regarding Mathematics and oneself




Fifth Research Question

Six items were identified to determine whether there were significant differences between perception of learners in Ondangwa East and Ondangwa West regarding mathematics as a male-dominated field. The results are shown in Table VI. Only two statistically significant differences were observed in this category. Like in the first research question, item 10 revealed a significant difference between perception of learners in Ondangwa East and Ondangwa West. Fewer learners in Ondangwa East (36.7%) agreed with the statement that "Male are better at mathematics than female are." compare to 62.0% in Ondangwa West.

Although items 17, 22, 24, 29, and 34 did not reveal statistically significant differences between perceptions of learners in Ondangwa East and Ondangwa West, the results still provided information on learners' attitudes and perceptions towards mathematics. There was strong support from learners in Ondangwa West that men are better in mathematics because they have more natural abilities in doing mathematics. This was evident from responses given to items 10 and 17. Regarding item 22, more learners from Ondangwa East (73.2%) disagreed with the statement that "Men are not better than women as scientist and engineers." As for item 24, the majority of the learners from both the regions disagreed that "It is hard to believe a female could be good in mathematics." Finally, the overwhelmingly majority of learners, however, seemed to acknowledge the fact that "girls need to know mathematics just as much as boys do" and "women are certainly logical enough to do well in mathematics."

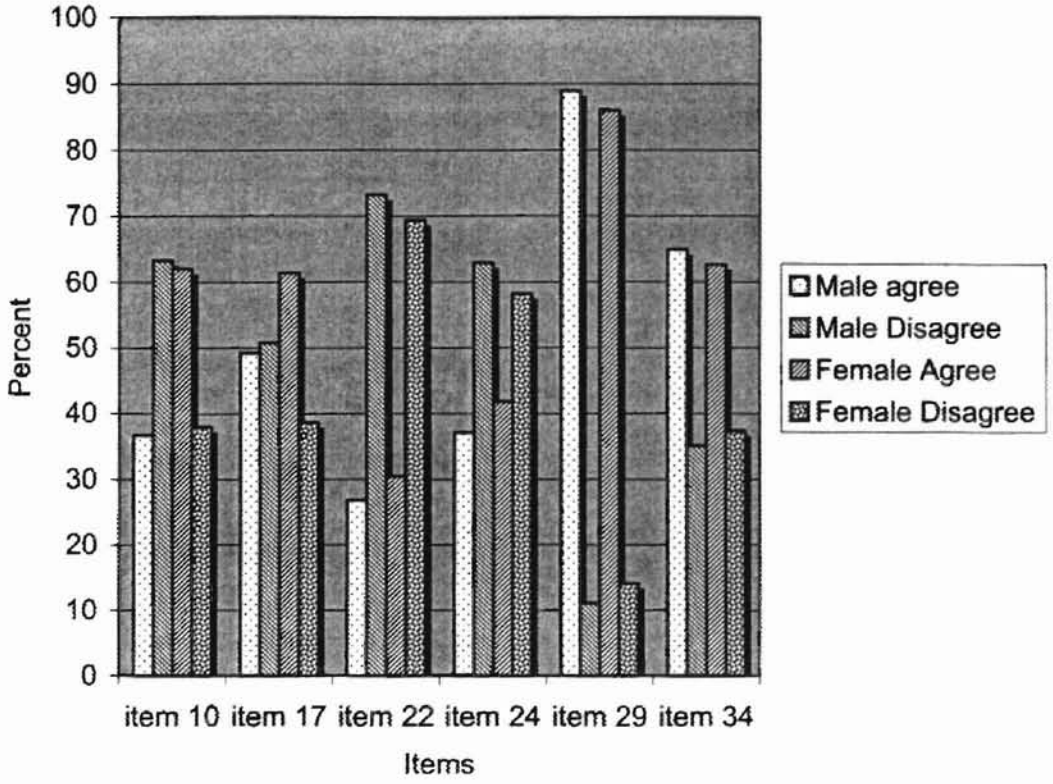
Table VI

Responses of learners in Ondangwa East and West to Statements regarding Mathematics as a male-dominated field.

| Statement | Region | Percent Responding Agree | Disagree | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| 10. Male are better at mathematics than female are. | East | 36.7 | 63.3 | 7.348 | 1 | .007* |
| | West | 62.0 | 38.0 | | | |
| 17. Boys have more natural abilities to do mathematics than girls. | East | 49.2 | 50.8 | 1.490 | 1 | .222 |
| | West | 61.4 | 38.6 | | | |
| 22. Men are not better than women as scientist and engineers. | East | 26.8 | 73.2 | .062 | 1 | .803 |
| | West | 30.4 | 69.6 | | | |
| 24. It is hard to believe a female could be good in mathematics. | East | 37.1 | 62.9 | .215 | 1 | .643 |
| | West | 41.8 | 58.2 | | | |
| 29. Girls need to know mathematics just as much as boys do. | East | 88.9 | 11.1 | .169 | 1 | .681 |
| | West | 85.9 | 14.1 | | | |
| 34. Women are certainly logical enough to do well in mathematics. | East | 64.9 | 35.1 | .098 | 1 | .754 |
| | West | 62.6 | 37.4 | | | |

* Results significant at the $p < .05$ level.

Figure 5: Responses of learners from Ondangwa East and West to Statements regarding Mathematics as a male-dominated field




Sixth Research Question

For the sixth research question, eight items were included in this category. These items dealt with perceptions of mathematics as a process-oriented versus rule-oriented subject. The data pertaining to this category did not show any statistically significant differences associated with region. The results are shown in Table VII.

Overwhelmingly, learners agreed that mathematics is rule-oriented. This was evident from responses obtained from items 1, 4, and 20. They, however, agreed, "Mathematics helps me to think logically." Interestingly, both groups of learners tend to support the idea that there are many different ways for solving mathematics problems. As to whether "Learning mathematics involves mostly memorizing", only 46.7% of the

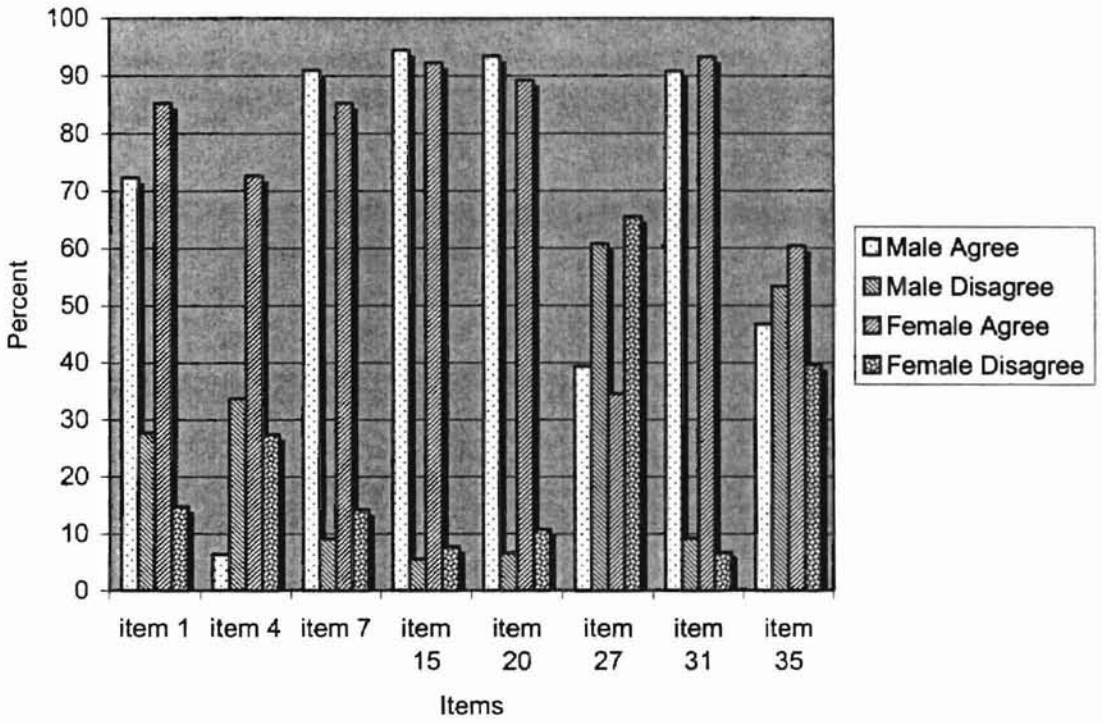
learners from Ondangwa East agreed, whereas, a majority (60%) from Ondangwa West agreed.

Table VII

Responses of learners from Ondangwa East and West to Statements regarding Mathematics as a process-oriented versus rule-oriented subject.

| Statement | Percent Responding Gender | Agree | Disagree | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| 1.Mathematics helps one think according to strict rules. | East | 72.3 | 27.7 | 3.329 | 1 | .068 |
| | West | 85.2 | 14.8 | | | |
| 4. Mathematics follows a particular set of rules. | East | 66.3 | 33.7 | .523 | 1 | .469 |
| | West | 72.6 | 27.4 | | | |
| 7. Mathematics helps me to think logically. | East | 90.9 | 9.1 | .826 | 1 | .364 |
| | West | 85.8 | 14.2 | | | |
| 15. There are different ways to solve mathematics problems. | East | 94.5 | 5.5 | .148 | 1 | .700 |
| | West | 92.3 | 7.7 | | | |
| 20. There is always a rule to follow in solving a mathematical problem. | East | 93.4 | 6.6 | .732 | 1 | .392 |
| | West | 89.2 | 10.8 | | | |
| 27. Trial and error is not very useful in solving mathematics problems. | East | 39.3 | 60.7 | .103 | 1 | .748 |
| | West | 34.5 | 65.5 | | | |
| 31. Mathematics is a good field for creative people. | East | 90.8 | 9.2 | .164 | 1 | .686 |
| | West | 93.3 | 6.7 | | | |
| 35. Learning mathematics involves mostly memorizing. | East | 46.7 | 53.3 | 3.367 | 1 | .067 |
| | West | 60.4 | 39.6 | | | |

Figure 6: Responses of learners from Ondangwa East and West to Statements regarding Mathematics as a process-oriented versus rule oriented subject




## Seventh Research Question

For the seventh research question, ten items were included to gauge learners' responses regarding the usefulness and relevance of mathematics. The results are shown in Table VIII. There was a statistically significant difference in the responses given by learners from Ondangwa East and Ondangwa West to the statement, "I use little mathematics outside school," ($\chi^2 = 3.956$, $p < 0.05$). Slightly more than half of the learners from Ondangwa East agreed with the statement while over two thirds of the learners from Ondangwa West agreed.

On several of the items, the learners from both regions showed positive attitudes towards mathematics. They, for instance, strongly viewed mathematics as a useful

subject. It was encouraging to observe that, in general, the learners recognized the importance of mathematics and also the role that mathematics holds for their lives and for their future careers. This was quite evident from the high percent agree responses from most of the items in this category.

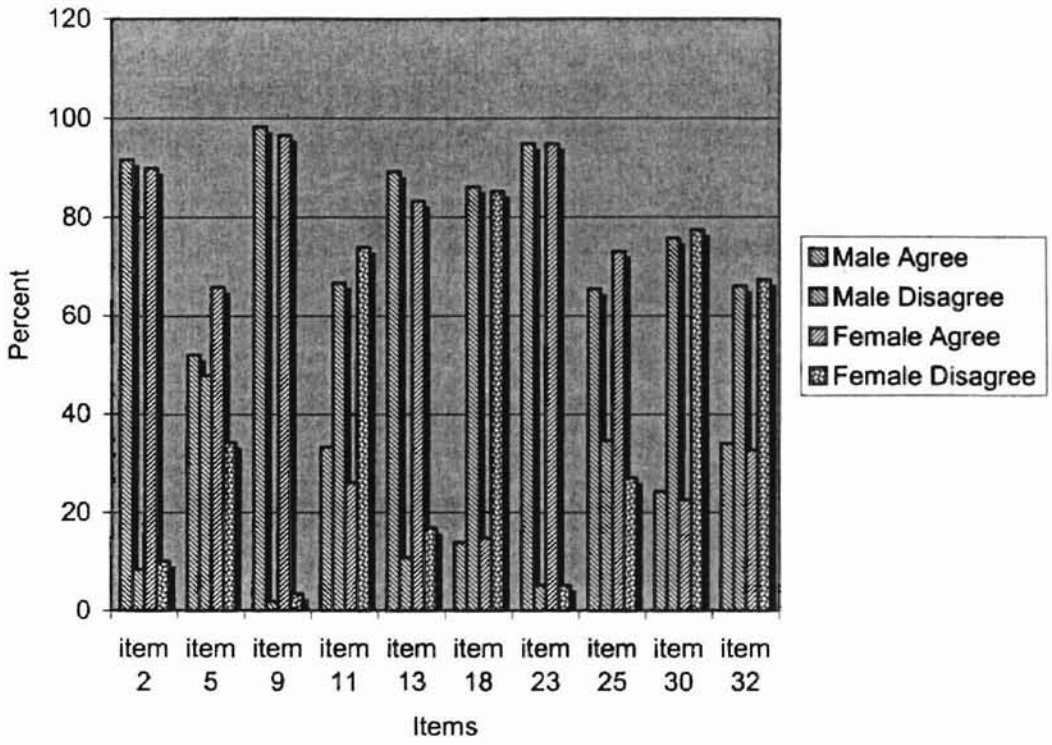
Table VIII

Responses of learners from Ondangwa East and West to Statements regarding the usefulness and relevance of Mathematics.

| Statement | Percent Responding Region | Agree | Disagree | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| 2. Mathematics is a useful subject. | East | 91.6 | 8.4 | .050 | 1 | .823 |
| | West | 89.9 | 10.1 | | | |
| 5. I use little mathematics outside school. | East | 52.1 | 47.9 | 3.956 | 1 | .047* |
| | West | 65.8 | 34.2 | | | |
| 9.Most mathematics has practical uses on the job. | East | 98.2 | 1.8 | .153 | 1 | .695 |
| | West | 96.5 | 3.5 | | | |
| 11.Most people do not use mathematics in their jobs. | East | 33.3 | 66.7 | .801 | 1 | .371 |
| | West | 26.1 | 73.9 | | | |
| 13.I would like to work at a job that lets me use mathematics. | East | 89.2 | 10.8 | 1.226 | 1 | .268 |
| | West | 83.2 | 16.8 | | | |
| 18. Mathematics is not needed in everyday life. | East | 13.9 | 86.1 | .000 | 1 | 1.000 |
| | West | 14.8 | 85.2 | | | |
| 23. It is important to know mathematics in order to get a job. | East | 94.8 | 5.2 | .000 | 1 | 1.000 |
| | West | 94.8 | 5.2 | | | |
| 25. Mathematics is useful in solving everyday problems. | East | 65.4 | 34.6 | .983 | 1 | .322 |
| | West | 73.0 | 27.0 | | | |
| 30. A knowledge of mathematics is not necessary in most occupations | East | 24.3 | 75.7 | .012 | 1 | .912 |
| | West | 22.6 | 77.4 | | | |
| 32. I can get along well in everyday life without mathematics. | East | 34.0 | 66.0 | .002 | 1 | .960 |
| | West | 32.7 | 67.3 | | | |

* Results significant at the $p < .05$ level.

Figure 7: Resposes of learners from Ondagwa East and West to Statements regarding the usefulness and relevance of Mathematics




Eighth Research Question

For the eighth research question, eleven items were included (see Table IX). These items were designed to determine learners' perception of themselves as learners of mathematics. Surprisingly, the overwhelming majority of learners are looking forward to doing mathematics in grade 11. One reason for this response could be attributed to the importance that mathematics has for their lives and for their future careers (as reported in the previous research question).

Sixty-three percent of learners from Ondangwa East agreed with the statement, "I think I can do more difficult mathematics," while 68.5% learners from Ondangwa West agreed. Only 40.7% of the learners from Ondangwa East agreed to the statement,

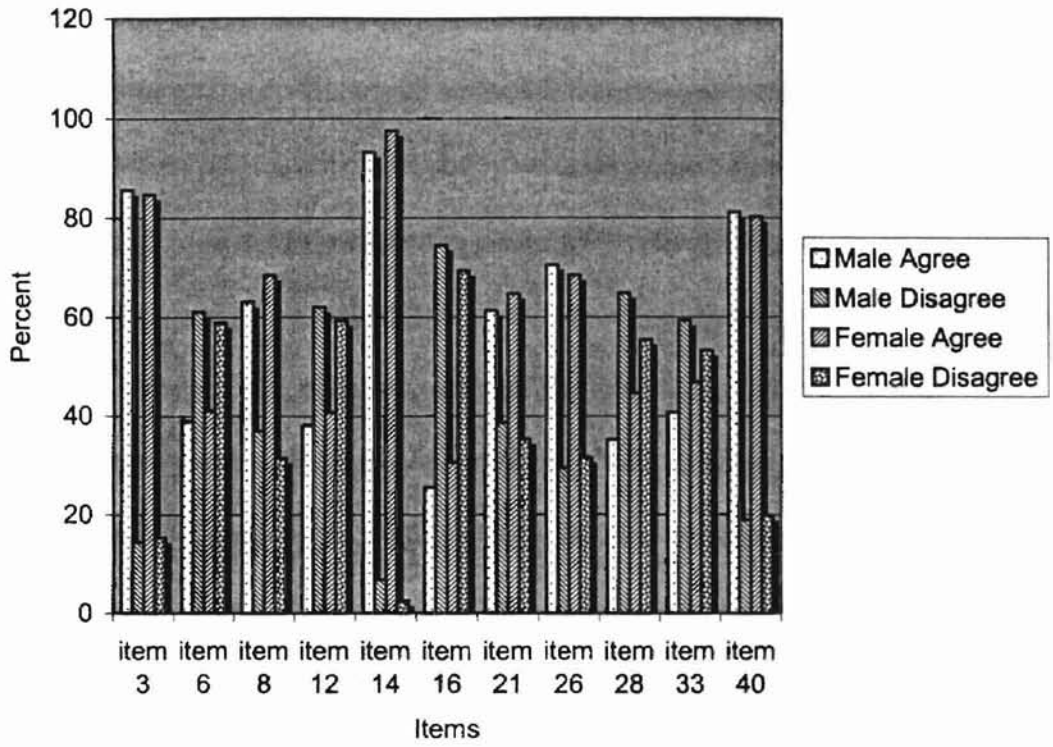
"Mathematics is easier for me than any other school subject," while 46.8% of the learners from Ondangwa West agreed. For the most part, the learners seemed to have positive attitudes regarding their abilities to do more and difficult mathematics.

Table IX:

Responses of learners in Ondangwa East and West to Statements regarding Mathematics and oneself.

| Statement | Percent Responding Region | Agree | Disagree | $\chi^2$ | DF | P value |
|---|---|---|---|---|---|---|
| 3. I am looking forward to taking mathematics in grades 11. | East | 85.6 | 14.4 | .000 | 1 | 1.000 |
| | West | 84.7 | 15.3 | | | |
| 6.Mathematics is more difficult for me than it is for most other learners. | East | 38.9 | 61.1 | .038 | 1 | .845 |
| | West | 41.1 | 58.9 | | | |
| 8. I think I can do more difficult mathematics. | East | 63.0 | 37.0 | .386 | 1 | .534 |
| | West | 68.5 | 31.5 | | | |
| 12 Mathematics is one of my difficult school subjects. | East | 38.0 | 62.0 | .083 | 1 | .774 |
| | West | 40.7 | 59.3 | | | |
| 14. I try to do my best schoolwork in mathematics. | East | 93.2 | 6.8 | 1.168 | 1 | .280 |
| | West | 97.5 | 2.5 | | | |
| 16. No matter how hard I try, I cannot understand mathematics. | East | 25.5 | 74.5 | .499 | 1 | .480 |
| | West | 30.6 | 69.4 | | | |
| 21 I cannot understand why some learners think mathematics is fun. | East | 61.3 | 38.7 | .039 | 1 | .844 |
| | West | 64.7 | 35.3 | | | |
| 26. It is easy for me to talk in front of my mathematics class. | East | 70.5 | 29.5 | .040 | 1 | .0841 |
| | West | 68.4 | 31.6 | | | |
| 28. I am often discouraged with my mathematics schoolwork. | East | 35.2 | 64.8 | 1.415 | 1 | .234 |
| | West | 44.6 | 55.4 | | | |
| 33. Mathematics is easier for me than any other school subject. | East | 40.7 | 59.3 | .626 | 1 | .429 |
| | West | 46.8 | 53.2 | | | |
| 40. I can get good grades in mathematics | East | 81.1 | 18.9 | .000 | 1 | 1.000 |
| | West | 80.2 | 19.8 | | | |

Figure 8: Responses of learners from Ondangwa East and West to Statements regarding Mathematics and oneself



## Interview Results

Interviews were conducted with fourteen grade 10 learners. During the interviews each learner was asked to respond to the same set of questions. In each set of questions, there were four main questions with several follow-up questions. The main questions attempted to determine learners' attitudes towards mathematics and also to determine how the learners felt about mathematics. As mentioned in Chapter III, all the interview sessions were recorded on audiotapes. The interview analyses were done from summary comments written by the researcher after all the interviews were completed.

One of the noteworthy, although not surprising, findings of the interviews was the message that mathematics is a useful subject. All fourteen interviewees indicated that mathematics is useful and important. When asked to elaborate, almost all the learners commented that mathematics is used in daily life. Among the examples cited were: counting livestock, counting money, in the banking sector, and building and construction.

Of more interest is the fact that over half of the learners interviewed were regarded as liking mathematics. Twelve of the fourteen interviewees felt strongly about liking mathematics. They ranked mathematics as their favorite subject. When asked why they liked mathematics, the most common response was that they will need mathematics in their future careers. One learner said, "Mathematics is one of my favorite subjects. Mathematics is all rules. I like rules. It helps keep order to everything."

Surprisingly, when asked if boys have more abilities to do mathematics than girls, the responses varied by gender. Three girls and one boy commented that there were no differences between boys' and girls' abilities to do mathematics. The reasons given by one girl were, "We are all equal. We were all created equally by God." In addition, the

others said that it all depends on how an individual feels about mathematics. Three girls and four boys agreed that boys have more abilities to do mathematics. On a follow-up question, most responded by referring to their classroom experience. It seems that they have noticed that boys were doing better than girls in their mathematics classes. In addition, one learner commented that boys have the skills and understand better than girls. Of the fourteen interviewed, one girl and two boys reversed the question. They, instead, indicated that girls have more abilities to do mathematics than boys. Like the previous group, they based their arguments on their own classroom experience.

On the question of whether some people are naturally good in mathematics, there were mixed responses.

# CHAPTER IV

## CONCLUSIONS AND RECOMMENDATIONS

Observations have shown that in Namibia, mathematics is one of the most poorly learned subject in grades 10 and 12, especially among learners in former disadvantaged regions. As mentioned in Chapter I, 51.9% of grade 10 learners from Ondangwa East were ungraded in mathematics on the 1998 national final examination, while for Ondangwa West it was 57.7%. Mathematics is a compulsory subject from grade 1 through grade 10. In grade 12, the so-called "good learners in mathematics" usually take more mathematics. It was for this reason that the researcher decided to focus on grade 10 learners only. As indicated in Chapter I, the purpose of the study was to investigate grade 10 learners' attitudes towards mathematics in Ondangwa educational regions. The participants for this study consisted of 248 learners. In order to investigate the learners' attitudes towards mathematics, the following questions, which served to guide the development of this study, were addressed:

1. Are there significant differences between perceptions of male and female learners regarding mathematics as a male-dominated field?
2. Are there significant differences between perceptions of male and female learners regarding mathematics as a discipline?
3. Are there significant differences between perceptions of male and female learners regarding the perceived usefulness and relevance of mathematics?

4. Are there significant differences between perceptions of male and female learners regarding themselves as learners of mathematics?
5. Are there significant differences between perceptions of learners in Ondangwa East and West regarding mathematics as a male-dominated field?
6. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding mathematics as a discipline?
7. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding the perceived usefulness and relevance of mathematics?
8. Are there significant differences between perceptions of learners in Ondangwa East and Ondangwa West regarding themselves as learners of mathematics?

## Conclusions

There were various findings related to the study. Following is a summary of the most important findings with a discussion of their relationship to the guiding research questions mentioned above.

Of the six items dealing with perceptions of mathematics as male-dominated field only two revealed statistically significant differences between male and female learners. The first significant difference was found when it was stated "males are better at mathematics than females are." More male s tend to agree with the statement while the

majority of the females disagreed with the statement. The second significant difference was found when it was stated "men are not better than women as scientist and engineers."

One particular note of interest was the way the learners responded to these six items. The majority of both male and female learners possessed, generally, positive attitudes towards mathematics. Most females, however, seemed to reject the notion that men are better in mathematics than women and also that men have more natural abilities to do mathematics. This finding is similar to the study of Kaiser-Messmer (1993) who found that the overwhelming majority of girls and boys consider women as equally talented to do mathematics as men. From this result it can be inferred that female learners are rejecting the stereotypical attitudes where they are perceived as less capable than males in mathematics.

Regarding mathematics as a discipline, no statistically significant differences in perceptions between male and female learners were found. There were, however, interesting results. For example, the majority of responses from both genders seemed to view mathematics as a rule-oriented subject. This was evident from responses obtained when the learners were asked whether mathematics helps them to think according to strict rules and also whether mathematics follows a set of rules. This result implied that the teaching of mathematics is rule-oriented for most of the learners. The result reinforces Lamphere (1996) and Telese (1999) findings. They both found that students held a view that mathematics is rule-oriented. Therefore, suggesting that the teaching of mathematics is traditional for most learners. Most research on pedagogy argues for decreased emphasis on teaching mathematics from a rule-oriented point of view. Battista (1999) wrote that traditional methods of teaching mathematics are ineffective and, therefore,

seriously stunt the growth of student's mathematical reasoning and problem solving skills. Teachers may need to re-examine they instructional approach, practice, and attitudes towards the teaching of mathematics. It is evident that teachers' attitudes towards mathematics, effectiveness in mathematics, and instructional practice are viewed as being prime determiners of learners' attitudes and performance in mathematics.

As to the usefulness and the relevance of mathematics, no statistically significant differences in perceptions between males and females were found. The findings showed that the majority of the grade 10 learners, regardless of gender or region, possessed positive attitudes towards mathematics. The vast majority of learners viewed mathematics as important, useful, and relevant. These results were consistent with the findings of Lamphere (1996) and Telese (1999). They found that students viewed mathematics as a worthwhile endeavor that is an important component of their lives. This result concurred with the result obtained from the interviews. The interview summary, however, revealed that learners' knowledge about the usefulness of mathematics in "daily life" was mainly limited to counting objects. These results are in accordance with the work of Perlmutter, Bloom, Rose, and Rogers (1997), in which they revealed that the students' awareness of the usefulness of mathematics was limited. More need to be done in this regard. Furthermore, many learners realized the importance of mathematics for meeting career aspirations. This raises some more important questions. How does this result reflect on learners' experience? Perhaps the academic expectations of the school have made these learners focus on the doing of mathematics as an end in itself. The learners should be made aware of the real life uses of mathematics as they progress through lower grades. Do teachers illustrate the usefulness of mathematics in daily life? It

is important for the teachers to create a learning environment in which the learners experience the usefulness and importance of mathematics.

Only two statistically significant differences were found between males and females regarding their perceptions of themselves as learners of mathematics. Interestingly, the results indicated that the female learners are generally positive about themselves as mathematics learners despite the fact that mathematics had been traditionally viewed as a male-oriented subject. The positive attitudes of females might be due to the fact that females are being encouraged to learn more mathematics. Overall, most respondents, regardless of gender or region, appeared to have strong, positive attitudes regarding their abilities to do well in mathematics.

Regarding perceptions between learners in Ondangwa East and Ondangwa West, the results in all the four categories are similar to the results dealing with gender. Only two statistically significant differences were observed. One in the category dealing with mathematics as a male-dominated field, while the another one was found in the category dealing with the usefulness and relevance of mathematics.It was encouraging to observe that, for the most part, the learners responded very positively to the statements in all the four categories that were used to measure they attitudes towards mathematics.

While the results of this study provide an optimistic picture regarding learners' attitudes towards mathematics in Ondangwa educational region, there are, however, implications for those in mathematics education. In order to keep with current mathematics curriculum reform requirements and suggestions world wide, there is a need to review the pedagogical approach to mathematics topics. The application of mathematics knowledge to real life situations needs to be addressed in grade 10

mathematics syllabi and in teacher education programs. Such approaches would enhance understanding among learners and help them realize the usefulness and relevance of mathematics in every day life.

Although for the most part both genders responded positively to the statements regarding their attitudes towards mathematics, there is a need to close the gap between boys and girls in the way they perceive mathematics. The learners should be encouraged to develop skills in mathematics that would help them view mathematics as a dynamic rather than a static subject. In order to facilitate such as approach, the current grade 8 –10 mathematics curriculum needs to be reviewed and redesigned. In addition, mathematics educators within both pre-service and in-service teacher education need to take the leading role.

## Recommendations

The following recommendations are made for further study in this area for those who are involved in mathematics education:

The results of this study indicated that attitudes of grade 10 learners in Namibia were significantly positive. Because this study was exploratory in nature, a replication of the study could be considered with a larger sampling of grade 10 learners across the country. The results could then be compared to those of this study to determine if the findings are consistent.

Attention should be given to the development of various instruments that may be used in measuring learners' attitudes. For instance, a larger sample of interviewees should be used. This might help to increase the validity of the findings. Furthermore, a

longitudinal study (from grade 8 through grade 10) should be considered in order to monitor attitudes over a longer period.

Further research is needed to examine more carefully the perceived impact that teachers and parents have on attitude development, and the role that learning styles play. Other variables that could be included are learners' socio-demographic characteristics and characteristics of individual classroom environment.

Although the results of this study revealed that learners have positive attitudes towards mathematics, future studies could be undertaken to examine the factors that may cause changes in attitudes.

Finally, it is the belief of the investigator that this study has been an attempt to identify factors that might contribute to the poor state of mathematics in Namibia. Hopefully, educators and curriculum developers would find the information necessary for improving and developing the mathematics education program.

**References**


Aiken, L. R. (1972). Biodata Correlates of Attitudes Towards Mathematics in three age and two Sex Groups. School Science and Mathematics, 72, 386-395.

Aiken, L. R. (1976). Update on Attitudes and other Effective variables in Learning Mathematics. Review of Educational Research, 46, 293-311.

Aksu, M. (1991). A Longitudinal Study on Attitudes Towards Mathematics by Department and Sex at the University Level. School Science and Mathematics, 91(5), 185-192.

Amukugo, E.M. (1993). Education and Politics in Namibia: Past Trends and Future Prospects. Windhoek: Gamsberg Macmillan publishers Ltd.

Battista, M.T. (1999). The Mathematics Miseducation of American Youth: Ignoring Research and Scientific Study in Education. PHI Delta Kappan, 425-433.

Dutton, W.H. (1956). Attitudes of Junior High Pupils Towards Arithmetic. School Review LXIV (Jan.), 18-22.

Fabricant, M. (19985). Are you predisposing your child to develop math anxiety? The Creative Child and Adult Quarterly, 10, 30-33.

Fedon, J. P. (1958). The role of Attitudes in Learning Arithmetic. The Arithmetic Teacher, V (Dec.), 304-310.

Fennema, E.(1984). Women and Education: Equity or Equality. Edited by Fennema, E. and Ayer, J. McCutchan Publishing.

Fennema, E. & Sherman, J. (1977). The study of mathematics by high school girls and boys: Related variables. American Educational Research Journal, 14, 159-168.

Fischbein, M. (1967). Readings in Attitudes Theory and Measurement. John Wiley & Sons. Gilbert, C. D. (1976). The Relationship Between Teacher / Student Attitudes and the Competency Level of Sixth Grade Students. School of Science and Mathematics, 76, 469-477.

Green, B.F. (1954). Attitudes Measurement. Handbook of Social Psychology. Gardner Lindzey (Ed.). Reading, Massachesetts: Addison-Wesley.

Hart, K. (1976). Mathematics achievement and attitudes of nine and ten-years-old, effects of games and puzzles. Ed.D. Thesis, Indiana.

Husen, T. (1967). International Study of Achievement in Mathematics. Vol. 1 and 2. New York: John Wiley & Sons, 1967.

Kaiser-Messmer, G. (1993). Results of an Empirical Study into Gender Differences in Attitudes Towards Mathematics. Educational Studies in Mathematics, 25, 209-233.

Kloosterman, P & Cougan, M. C. (1994). Students Beliefs about Learning School Mathematics. The elementary School Journal, 4, 375 – 388.

Knaupp, J. (1973). Are Children's Attitudes Towards Learning Arithmetic Really Important? School Science and Mathematics, 73, 9-15.

Lamphere, P. M. (1996). Survey of Junior Secondary Chinese Students' Attitudes Towards Mathematics. Paper Presented for the Sixth Five National Conference on Mathematics Education in Huhhot, China.

Mather, J.R.C (1994). Student perceptions in the mathematics classroom: A study of how African, Hispanic, Native American, and white fifth and sixth graders perceive mathematics and the classroom. A Dissertation submitted for the Doctor of Philosophy at Oklahoma State University.

Meyer, M. & Koehler, M. (1990). Internal influences on gender differences in mathematics. In E. Fennema & G. Leder (Eds.), Mathematics and Gender. New York: Teacher College Press.

Molteno, F. (1984). The historical foundations of the schooling of Black South Africans. In P. Kallaway (Ed.), Apartheid and education. Johannesburg: Ravan.

Mwetulundila, P. N. (2000).Why girls aren't fully participating in science and mathematics in Namibia. Reform Forum. Journal for Educational Reform in Namibia, number 11, 23-35.

Neale, D. C. (1969). The role of attitudes in learning mathematics. Arithmetic Teacher, 16, 631-640.

Parson, J. E., Adler, T.F., & Kaczala, C.M. (1982). Socialization of achievement attitudes and beliefs: Parental influence. Child development, 53, 310-321.

Perlmutter, J., Bloom, L., Rose, T., and R ›gers, A. (1997). Who Uses Math? Primary Children's Perceptions of the Uses of Mathematics. Journal of Research in Childhood Education, 12(1), 58-70.

Phillips, R. B, Jr. (1973). Teacher Attitudes as Related to Student Attitudes and Achievement in Elementary School Mathematics. School Science and Mathematics, 73, 501-507.

Reyes, L. H. (1980). Attitudes and Mathematics. In Selected Issues in Mathematics Education, Edited by Lindquist, M. M. Berkeley, Calif: McCutchan Publishing.

Reyhold, A.J. & Walberg, H. J. (1992). A process model of mathematics achievement and attitudes. Journal of Research in Mathematics Education, 23, 306-328.

Riedesel, C. A. (1972). Using research in Teaching: Research on Attitudes Towards Mathematics. Arithmetic Teaching, 19, 229-233.

Shaw, M. E & Wright, J. M. (1967). Scales for the Measurement of Attitudes. New York: McGraw-Hill.

Sherman, J.A. (1982). Mathematics the critical filter: A look at some residues. Psychology of Women Quarterly, 6 , 428-443.

Schoenfield, A.H. (1985). Mathematics problem solving. San Diego: Academic Press.

Sorenson, H. (1964). Psychology in Education (4th Ed.). New York: McGraw-Hill Book Company.

Suydam, M.N. (1984). Research report: Attitudes towards mathematics, Arithmetic Teacher, 32, 12.

Telese, J.A. (1999). Mexican American High School Students' Perceptions of Mathematics And Mathematics Teaching. Hispanic Journal of Behavioral Science, 21 (2) , 154-169.

Thorndike-Christ, T. (1991) Attitudes toward mathematics: Relationships to mathematics achievements, gender, mathematics course taking plans, and career interest. (ERIC Document Reproduction Service No. ED347 066).

Travers, K. J., Oldham, E. E., and Livingstone, I. D. (1989). Origin of the Second International Mathematics Study. In K. J. Travers and I. Westbury (eds.), The IEA Study of Mathematics 1: Analysis of Mathematics Curriculum Oxford: Pergamon Press), 1-14.

Utsumi, M. C. & Mendes, C. R. (2000). Researching the Attitudes Towards Mathematics in Basic Education. Educational Psychology, 20 (2) , 237-243.

# APPENDIX

# APPENDIX A

# QUESTIONNAIRE FOR THE LEARNERS

## Questionnaire for the Learners

## IMPORTANT: DO NOT WRITE YOUR NAME ON THIS PAPER.

**Part I**: General Information:

Name of the School:_____ Name of Town/Village:_____

Age:_____

Put an x in the box applicable to you

Gender: Male ☐ Female ☐

Region: Oshikoto ☐ Omusati ☐ Ohangwena ☐ Oshana ☐

**Part II: Directions:** Read each of the following Statement.
Put an x in the box under " Yes" if you agree.
Put an x in the box under " No" if you disagree.
Put an x in the box under " Unsure" if you are not sure about the answer.
If you do not understand a question, you can ask the teacher who gave you this paper.

| | Yes | No | Unsure |
|---|---|---|---|
| 1. Mathematics helps one think according to strict rules. | 1.☐ | ☐ | ☐ |
| 2. Mathematics is a useful subject. | 2.☐ | ☐ | ☐ |
| 3. I am looking forward to taking mathematics in grades 11. | 3.☐ | ☐ | ☐ |
| 4. Mathematics follows a particular set of rules. | 4.☐ | ☐ | ☐ |
| 5. I use little mathematics outside school. | 5.☐ | ☐ | ☐ |
| 6. Mathematics is more difficult for me than it is for most other learners. | 6.☐ | ☐ | ☐ |
| 7. Mathematics helps me to think logically. | 7.☐ | ☐ | ☐ |
| 8. I think I can do more difficult mathematics. | 8.☐ | ☐ | ☐ |
| 9.Most mathematics has practical uses on the job. | 9. ☐ | ☐ | ☐ |
| 10.Males are better at mathematics than females are. | 10☐ | ☐ | ☐ |

| | Yes | No | Unsure |
|---|---|---|---|
| 11.Most people do not use mathematics in their jobs. | 11☐ | ☐ | ☐ |
| 12 Mathematics is one of my difficult school subjects. | 12☐ | ☐ | ☐ |
| 13.I would like to work at a job that lets me use mathematics. | 13☐ | ☐ | ☐ |
| 14. I try to do my best schoolwork in mathematics. | 14☐ | ☐ | ☐ |
| 15. There are different ways to solve mathematics problems. | 15☐ | ☐ | ☐ |
| 16. No matter how hard I try, I cannot understand mathematics. | 16☐ | ☐ | ☐ |
| 17 Boys have more natural abilities to do mathematics than girls. | 17☐ | ☐ | ☐ |
| 18. Mathematics is not needed in everyday life. | 18☐ | ☐ | ☐ |
| 19. My parent(s) want me to learn more mathematics. | 19☐ | ☐ | ☐ |
| 20. There is always a rule to follow in solving a mathematical problem. | 20☐ | ☐ | ☐ |
| 21 I cannot understand why some learners think mathematics is fun. | 21☐ | ☐ | ☐ |
| 22. Men are not better than women as scientist and engineers. | 22☐ | ☐ | ☐ |
| 23. It is important to know mathematics in order to get a job. | 23☐ | ☐ | ☐ |
| 24. It is hard to believe a female could be good in mathematics. | 24☐ | ☐ | ☐ |
| 25. Mathematics is useful in solving everyday problems. | 25☐ | ☐ | ☐ |
| 26. It is easy for me to talk in front of my mathematics class. | 26☐ | ☐ | ☐ |
| 27. Trial and error is not very useful in solving mathematics problems. | 27☐ | ☐ | ☐ |
| 28. I am often discouraged with my mathematics schoolwork. | 28☐ | ☐ | ☐ |
| 29. Girls need to know mathematics just as much as boys do. | 29☐ | ☐ | ☐ |
| 30. A knowledge of mathematics is not necessary in most occupations. | 30☐ | ☐ | ☐ |
| 31. Mathematics is a good field for creative people. | 31☐ | ☐ | ☐ |
| 32. I can get along well in everyday life without mathematics. | 32☐ | ☐ | ☐ |

| | Yes | No | Unsure |
|---|---|---|---|
| 33. Mathematics is easier for me than any other school subject. | 33☐ | ☐ | ☐ |
| 34. Women are certainly logical enough to do well in mathematics. | 34☐ | ☐ | ☐ |
| 35. Learning mathematics involves mostly memorizing. | 35☐ | ☐ | ☐ |
| 36. My teacher encourages me to study more mathematics. | 36☐ | ☐ | ☐ |
| 37. I like the mathematics textbook we are using in class. | 37☐ | ☐ | ☐ |
| 38. My teacher helps me with mathematics' problems. | 38☐ | ☐ | ☐ |
| 39. I always refer to the textbook or class notes when working on mathematics problems. | 39☐ | ☐ | ☐ |
| 40. I can get good grades in mathematics. | 40☐ | ☐ | ☐ |

**THANK YOU VERY MUCH FOR TAKING TIME TO ANSWER THIS QUESTIONNAIRE**

# APPENDIX B

# INSTITUTIONAL REVIEW BOARD FORM

## Oklahoma State University
## Institutional Review Board

Protocol Expires: 9/21/01

Date : Friday, September 22, 2000 IRB Application No ED00205

Proposal Title: A STUDY OF ATTITUDES AND INSTRUCTIONAL PRACTICE THAT INFLUENCE PERFORMANCE OF LERANERS IN GRADE 10 MATHEMATICS

Principal Investigator(s) :


Pollikarpus Polli Andima
247 Willard
Stillwater, OK 74078

Dr. Patricia Lamphere-Jordan
247 Willard
Stillwater, OK 74078


Reviewed and Processed as: Expedited (Spec Pop)

Approval Status Recommended by Reviewer(s) : Approved

---

Signature :

Carol Olson, Director of University Research Compliance

Friday, September 22, 2000
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

# VITA

Pollikarpus Andima

Candidate for the Degree of

Master of Science

Thesis: A STUDY OF ATTITUDES TOWARDS MATHEMATICS AMONG LEARNERS IN GRADE 10 IN NAMIBIA

Major Field: Curriculum and Instruction

Biographical:

Personal Data: Born in Windhoek, Namibia, March 5, 1967, the son of Simson and Hulda Andima.

Education: Graduated from Dr. Lemmer High School, Rehoboth, Namibia, in December, 1986; received the Senior Secondary Certificate; received the Higher Diploma in Education from the University of the Western Cape, Bellville, South Africa in 1992; completed requirements for the Master of Science degree in Curriculum and Instruction at Oklahoma State University in May 2001.

Professional Experience: Mathematics Teacher at Otjikoto Senior Secondary School, Tsumeb, Namibia 1993-94. Mathematics Lecturer at Ongwediva College of Education 1995-97. Mathematics Lecturer at Windhoek College of Education 1998-99.