A STUDY OF THE ATTITUDES OF PRE-SERVICE TEACHERS TOWARDS
MATHEMATICS IN SOME PRIMARY TEACHERS' COLLEGES

BY

TUMBO MAUNDU MARTIN E.
E55/7517/89

A PROJECT SUBMITTED IN PARTIAL FULFILMENT FOR
THE DEGREE OF MASTER OF EDUCATION (P.T.E.)
IN KENYATTA UNIVERSITY

1991
DECLARATION

This project is my original work and has not been presented for a degree in any other university.

TUMBO MAUNDU MARTIN E.

The project has been submitted for examination with my approval as a university supervisor.

MR. E. K. WANJALA
Tutorial Fellow, Department of Communication and Technology, Kenyatta University.
ACKNOWLEDGEMENTS

My greatest appreciation goes to Mr. Wanjala E. K. who was my supervisor and great friend. His cooperation and assistance enabled me to complete the project on time.

I am also grateful to the Ministry of Education for having granted me the postgraduate scholarship.

Thanks also goes to the Principals, Tutors and students of the colleges I visited during the research period for whatever part they played in the project.

I would like to express my gratitude to my postgraduate colleagues in the Department of Communication and Technology for moral support and assistance in various ways. More gratitudes goes to Prof. M. M. Patel for his assistance given during the seminars for discussing the project.

My thanks also go to my wife Agnes, and my children Antony, Nzioka and Muthikwa for enduring in a most understanding manner with the conditions of life during the course. My thanks also go to my parents Tumbo M. and Muthikwa J. whose efforts to educate me have resulted in this project.
ABSTRACT

This study investigated the attitudes of pre-service teachers towards mathematics in some Primary Teachers' Colleges. The study examined the attitudes of the trainees based on a number of variables which included sex of the student, sex of mathematics teacher in secondary school, level of education, experience of teaching as untrained teachers and the nature of secondary school (single sex or mixed) attended by the students.

The subjects of the study consisted of a total of 88 second years from two Primary Teachers Colleges in Kenya composed of 42 females and 46 males. A likert type attitude scale was adapted and given to all the trainees selected for the study.

The results revealed that mathematics is not that much hated subject as many people believe. Males had a more positive attitude towards mathematics than females. Those students who had attended single sex schools had a more positive attitude than those who had attended mixed schools. It was also found out that even though majority of mathematics teachers in upper primary and secondary schools are male, any teacher whether male or female can influence the attitudes of the pupils positively. It was also found out that in recruiting pre-service teachers to colleges, it never mattered whether one had teaching experience or not since the mean
attitude score for those who had not taught at all was even higher than those who had taught. The results also showed that those students who had reached form six had a more positive attitudes than those who had reached form four.

In conclusion it was felt that ways should be researched to try and promote positive attitudes towards mathematics for about 25% students who had negative attitudes. This was so because the students were expected and required to teach the subject after completing the two years course and it was felt that it was possible to pass these negative attitudes to the pupils they will teach.
# TABLE OF CONTENT

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>ii</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>iii</td>
</tr>
<tr>
<td>Abstract</td>
<td>iv</td>
</tr>
</tbody>
</table>

**CHAPTER ONE**

<table>
<thead>
<tr>
<th>1.0</th>
<th>Background to the Problem</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Statement of the Problem</td>
<td>4</td>
</tr>
<tr>
<td>1.2</td>
<td>Research Questions</td>
<td>5</td>
</tr>
<tr>
<td>1.3</td>
<td>Objectives of the Study</td>
<td>6</td>
</tr>
<tr>
<td>1.4</td>
<td>Assumptions of the Study</td>
<td>7</td>
</tr>
<tr>
<td>1.5</td>
<td>Scope/Limitation of the Study</td>
<td>8</td>
</tr>
<tr>
<td>1.6</td>
<td>Significance of the Study</td>
<td>8</td>
</tr>
<tr>
<td>1.7</td>
<td>Definitions of Terms</td>
<td>9</td>
</tr>
</tbody>
</table>

**CHAPTER TWO**

<table>
<thead>
<tr>
<th>2.0</th>
<th>LITERATURE REVIEW</th>
<th>10</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>2.1</th>
<th>When and How Attitudes Develop</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Attitudes, Learning and Teaching</td>
<td>17</td>
</tr>
<tr>
<td>2.3</td>
<td>Attitudes and Achievement</td>
<td>20</td>
</tr>
<tr>
<td>2.4</td>
<td>Attitudes and the Sex of the Student</td>
<td>23</td>
</tr>
<tr>
<td>2.5</td>
<td>Teacher Education</td>
<td>28</td>
</tr>
</tbody>
</table>

**CHAPTER THREE**

<table>
<thead>
<tr>
<th>3.0</th>
<th>RESEARCH DESIGN AND METHODOLOGY</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research Sample and it's Selection</td>
<td>33</td>
</tr>
</tbody>
</table>

vi
### TABLE OF CONTENTS (CONTINUED)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Research Instrument</td>
<td>34</td>
</tr>
<tr>
<td>3.2 Method and Procedure of Questionnaire Administration</td>
<td>34</td>
</tr>
<tr>
<td><strong>CHAPTER FOUR</strong></td>
<td></td>
</tr>
<tr>
<td>DATA ANALYSIS AND DISCUSSIONS</td>
<td>36</td>
</tr>
<tr>
<td>4.0 Introduction</td>
<td>36</td>
</tr>
<tr>
<td>4.1 Scoring of the Questionnaire</td>
<td>36</td>
</tr>
<tr>
<td>4.2 Analysis and Discussions</td>
<td>37</td>
</tr>
<tr>
<td><strong>CHAPTER FIVE</strong></td>
<td></td>
</tr>
<tr>
<td>SUMMARY, IMPLICATIONS AND RECOMMENDATIONS</td>
<td>52</td>
</tr>
<tr>
<td>5.1 Summary</td>
<td>52</td>
</tr>
<tr>
<td>5.2 Implications of the Study</td>
<td>53</td>
</tr>
<tr>
<td>5.3 Recommendations for Further Research</td>
<td>55</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>57</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>60</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>63</td>
</tr>
</tbody>
</table>
1.0 BACKGROUND TO THE PROBLEM

Mathematics is a subject of very wide applications in everyday life and is mainly taught and has been made compulsory in our schools and Teachers' Colleges because of its utility. Every person on leaving school should have a clear idea of numbers, their operations and the way they are applied to measures of all varieties. He should also be able to apply his knowledge of mathematics to a wide range of problems that continually occur in his everyday life. Students should learn how to use resource materials, how to make use of other people's work, and how to tackle problems and all these are widely applied in the Jua Kali Sector in Kenya. Mathematics is also a tool used in other subjects in our education system such as geography, agriculture, science, arts, crafts and also home science. The importance of mathematics need not be stressed further in that it is a subject which crosses subject boundaries as can be noted from several reports in Cornelius (1982, p. 188) dealing with mathematics across the curriculum. Mathematics should enable a student to lead a rich and successful life for success instils confidence. Hence one of the general aim of mathematics teaching in Kenya is that the pupil should acquire and preserve desirable attitudes about themselves and their relationship with the environment.
At school the teachers should assist pupils to have positive attitude towards mathematics, since when a student curiosity and concern are aroused learning becomes automatic. This calls for the teacher to have positive attitude towards the subject. As Evans (1965) says:

"... attitudes and interest can be and are learned. What form they will take is not determined at birth or earlier but depends on environment in which the child grows up and the treatment he receives" p. 10.

The environment of the child is the school and home. It is therefore important to know the attitude held by primary teacher trainees towards mathematics because they are to make a part of the school environment. This calls for the need of the teacher trainees to have positive attitudes towards mathematics because as attitudes play an important part in the learning process, the teachers have also a heavy responsibility in helping children develop favourable attitudes towards mathematics.

In spite of the important role that mathematics play in our daily life and school curriculum, it has been labelled a very difficulty subjects by most of the students. Even though some changes have been made in the teaching of mathematics in the colleges to emphasize teaching of methodology as indicated by Kenya National Examination Council (K.N.E.C.), mathematics report (1980, P. 40) various researchers have suggested that mathematics is still a much disliked subject and the teacher
has key role to change this image. In a study by McDer- 
mont (1958) in Stright V (1960) on "Factors that Cause 
Fear and Dislike of Mathematics" has noted that

"It is only too certain that today's 
mathematically ill prepared teachers, 
many of whom are ill-disposed towards 
the subjects, are injecting too many 
large numbers of our boys and girls 
with an enduring fear and hatred to-
wards the subject" p. 177.

Stollerby (1974) in his study on "The task before 
us - 1962" asserts that teachers with neutral or nega-
tive attitudes can either avoid the teaching of mathema-
tics or pass the negative attitudes along the young pupil. 
The author further concludes "... that unless the teacher 
is attracted towards mathematics all the content and 
teaching methods which he may have learned can serve no 
good purpose whatever" (p. 243). The depth of the feel-
ings that the students have towards mathematics is pot-
rayed later on in their professional life in that many 
do not want to teach the subjects.

Therefore there is a need for a more positive atti-
tude towards mathematics on the part of the teacher 
trainees. Since attitudes are not inborn as noted ear-
lier but learned, positive attitudes towards mathematics 
can be taught. Who then is responsible for the develop-
ment of positive attitudes to the pupils? There may be 
many societal forces such as parents, peer groups on atti-
tude development but the major responsibility however for 
the development of positive attitudes towards mathematics
must be the mathematics teacher. As Haans in Philip (1973) noted:

"the large number of teachers who dislike or fear mathematics have become a factor in children attitude towards the subject. The effects of teacher attitudes are widespread like all other attitudes, dislike of mathematics is readily communicated to children either directly or unconsciously. It contributes to routinized teaching of mathematics and also to outright neglect" p. 44.

The weight of expert opinion seem overwhelmingly to favour the view that teacher's attitude towards mathematics is an important factor in learning mathematics. This study was intended to find out the attitudes of teacher-trainees who will very soon be helping in shaping pupils attitudes towards mathematics. Hence the need of the study.

1.1 STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the attitudes of pre-service teachers towards mathematics in some Primary Teachers' Training Colleges as measured by a likert type attitude scale. More specifically the study was conducted as an initial investigation of five variables believed by the investigator to be relevant in analyzing the attitudes of pre-service teachers. These variables included:

(i) sex of the student.

(ii) level of education of the trainee.
1.2 RESEARCH QUESTIONS

The following research questions were investigated:

(a) Just what are the attitudes taken by the teacher trainees in the colleges towards mathematics?

(b) Is mathematics still a much dislike subject by the teacher-trainees?

(c) Does the sex of the trainee play a part in attitude development towards the subject?

(d) Does the level of education have any influence on the attitudes of the trainees towards mathematics?

(e) Does the sex of mathematics teachers who taught the trainees in secondary school have any influence on their attitudes towards mathematics?

(f) Does the experience of teaching as untrained teacher influence the attitudes towards mathematics?

(g) Does the type of secondary school (co-educational or single sex) the trainees learned have any
Influence on their attitudes?

If the above questions are answered, it may be possible to understand reasons for attitude development towards mathematics of the trainees.

1.3 OBJECTIVES OF THE STUDY

(a) To investigate whether the level of education has any influence on the attitudes towards mathematics.

(b) To investigate the attitudes of the trainees towards mathematics on the items in the Likert-type attitude scale by sex.

(c) To investigate the type of attitudes held by the trainees.

(d) To investigate whether experience of teaching of the trainees as untrained teachers (UT) has any influence on their attitudes towards mathematics.

(e) To find out whether there is any difference between the mean attitudes of males and females on the likert-type attitude scale.

(f) To examine whether the sex of the mathematics teacher who taught the trainees in secondary school has any influence on their attitudes towards mathematics.
To investigate whether the secondary school (co-educational or single sex) where the trainees learned has any influence on their attitudes.

1.4 ASSUMPTIONS OF THE STUDY

(a) The sex of the trainee has an influence on their attitude towards the subjects.

(b) The levels of education has an influence on the attitudes towards the subject.

(c) The experience of teaching of the trainee has an influence on their attitudes toward mathematics.

(d) The reading and interpreting ability of the trainees on the Likert-type attitude scale is homogeneous.

(e) The pre-service teachers have already a well developed attitude towards mathematics.

(f) The sex of the teacher who taught the trainee in secondary school has an influence on the attitude towards mathematics.

(g) The type of secondary school attended by the trainee has an influence on his attitude.
1.5 **SCOPE/LIMITATION OF THE STUDY**

The researcher realizes that this research has definite limitations.

(a) The area of study was limited to two colleges which train P1 teachers. Therefore the findings may not be used for generalization to all the colleges especially those which train P2, P3.

(b) There was no provision made for individual differences in the trainees ability to read and interpret the attitude scale.

(c) No attempt have been made to compare achievement and attitudes.

(d) There has been no attempt follow up to note change in attitudes from month to month or year to year.

1.6 **SIGNIFICANCE OF THE STUDY**

The research findings and recommendations will be of great help in that;

(a) It may help curriculum designers to start programmes aimed at changing attitudes towards mathematics.

(b) Tutors in colleges will get information aimed to change the attitudes of the trainees towards mathematics.
(c) Pre-service teachers will be able to know their attitudes and this may help them to change the attitudes completely for the better.

1.7 DEFINITIONS OF TERMS

(a) An attitude was defined by Kartz (1960) in Dawes M. (1970) as:

"the pre-disposition of the individual to evaluate some symbol or object or aspect of his world in favourable or unfavourable manner ... Attitude include the affective or feeling core of liking or disliking and the cognitive or belief element which describes the effects of the attitudes, its characteristics and its relation to the object" p. 16.

(b) Pl stands for "Primary Teacher One" who is a qualified teacher of form four division three standard and has undergone two years training.

(c) 'O' level (KCE, KCSE) stands for an examination taken after four years secondary education. 'A' levels (K.A.C.E.) stands for an examination taken two years after 'O' levels in the former education system.
CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Most educators agree that attitudes play an important role in the learning and teaching process. Attitudes formed early in life persist through life. In this chapter attempts have been made to review literature related to attitudes. The main areas covered in the review include: how and when attitudes develop, attitude, learning and teaching, attitude and achievement, attitude and sex and lastly teacher education. Though much of the reference was expected from Kenya and E. Africa, scarcity of literature related to the study has led to reviewing more studies elsewhere.

2.1 WHEN AND HOW ATTITUDES DEVELOP

Attitudes can be measured and when psychologists speaks of attitudes, they are generally speaking about an effect or a preparedness to respond in a certain way toward a phenomenon. Various researches carried out by psychologists and educators have shown that attitudes develop at home and also throughout the school life. In research carried out by Stright V. M. (1960, p. 281) on the attitude of third, fourth and sixth grades towards mathematics found out that even at a tender age of eight
years the child has a good notion of what he is expected to say and what adults will reward him for saying. This according to Stright brings in some sort of problem in acquiring true feelings using the attitude scale and instead acquiring the expected feelings or inaccurate feelings. Fedon J. P. (1958, p. 304 - 310) in his study on the Role of Attitude in Learning Arithmetics inferred that children were already forming opinions about mathematics by the third grade. Dutton H. (1962, p. 421) on a similar research found out that very soon after that they develop quite strong feelings about mathematics either for or against. Jersid (1952) in Maritim E. K. (1983) notes:

"the child from an early age, without being deliberate about it, acquires ideas and attitudes about himself and other. These are woven into the pattern of his life. They may be true or false, healthy or morbid. Their development is left largely to change and this not as it should be" p. 8.

This tends to support the research conducted by Fedon and Dutton. It seems from the above researches that at an early stage in the educational sequence children are influenced to take a stand that appears quite permanent.

Holt (1964) in his study on 'how children fail' found out that most children get fed up with learning the dull facts in mathematics and quit before they get enough of them to do or even want to do anything interesting with them. Dutton (1962) in a similar study
using secondary school children found that students recalled disliking mathematics because they did not understand what they were doing, they were many pages of word problems and they were afraid of making mistakes. This agrees with the findings of Holt who found out that children fail in school because they are afraid, bored and confused.

According to Piaget (1973) in Cornelius (1982, p. 60) children develop from an ego centric stage where basic feelings such as pleasure, success, fear and failure are predominant, to a formal orbrational stage associated with questions of values and judgement. Emotional development will therefore have a bearing on the type of satisfaction a pupil can derive from his mathematical experience. Young children derive a great deal of satisfaction from getting answers right. We may justify categorising answers as right or wrong in the belief that they are simply an objective indication of mathematics skills alone but for pupils they are often associated with strong feelings of warmth or dissapproval.

Poffenberger and Nurton (1963, p. 13) on a study of the factors determining attitudes towards mathematics and arithmetics points out that attitudes towards mathematics are a result of many factors including home background and previous experiences. They went further to suggest that attitudes towards mathematics is a culminating phenomena caused by one experience building upon
another. Attitudes are developed at home and carried to school. In the first grade the child is not only affected by his teacher and number readiness but also by his/her parental attitudes towards the subject. They further conclude that self concept in regard to mathematics ability are well established in the early school years and that it is very difficult even for the best teacher to change them. They further noted that circumstances surrounding the learning experience influence the attitude and hence the learning situation should be made a pleasant one for the formation of positive attitudes.

Lerch H. H. (1961) in his study on "How Arithmetic instruction changes pupil attitude toward arithmetic" concludes that:

"Experience in arithmetic classes play a major role in development of attitude towards arithmetics. The importance of development and maintaining desirable attitude towards arithmetic suggest that teachers at all grade levels should be aware of their pupil attitude towards the subjects and strive to use teaching methods that will help develop favourable attitude towards the subject" p. 119.

Lyda and Morse (1963 p. 436 - 38) in their study on 'attitudes, teaching methods and arithmetic achievement concludes that meaningful methods of teaching mathematics cause changes to take place in student attitude towards the subject. Negative attitude become positive and positive attitude become enhanced. Therefore
Callahan J. "on adolescent attitudes towards mathematics" (1971, p. 751) found out that lasting attitude for mathematics are developed at each level of education, however grade six and seven were given as the most important for attitude development. These findings are supported by a similar research carried out by Dutton H. who noted that the most crucial years for development of attitudes towards mathematics seem to be while pupils are enrolled in grade four through eight. Smith F. (1964, p. 475) in a similar study noted that more than half of the students in his research mentioned the elementary school years as the period in which feelings towards mathematics developed. Piagent in Cornelius (1982) also noted that:

"by the time the pupil has reached an age when he can make a rational assessment of his feelings and accept and analyse failure and critical comments in a non personnel way, the scale are heavily weight against the subject and attitude once formed are notoriously difficulty to change" p. 62.

Thus if a student develops negative attitudes then the chances of his liking the subject are reduced drastically. This calls for a study on the attitudes of the pre-service teachers who are almost at the terminal point of schooling before entering the profession, to see whether they are positive or negative. The teachers will have a very important role in passing the positive or negative attitude to his/her pupil in future.
Anthony in Cornelius (1982) has noted that our own attitudes of a young child's mathematics performance may have more influence on his future development and emotional reaction to the subject than the special characteristics of the subject itself. As they grow older pupils and adults learn to preserve their self image by devaluing the importance of the subject or by taking positive satisfaction in belonging to groups with anti-mathematical opinions. The most unfortunate consequences of such a stand to adults and the pre-service teachers is that these values can be transmitted to others and the teacher has an upward struggle to improve the dislike and difficulty image of mathematics that some children acquire from parents and bring them to school. But for the teacher to change the attitudes of the pupils, he must have positive attitude hence the need to know what type of attitudes the teachers hold.

The behaviour of the pupils is controlled by the attitude of the teacher. The teacher's appreciation of mathematics as an important, dynamic subject must be real and deep. His attitude to student must be sympathetic and understanding; his interest in learning must be great. If the teacher's attitude or interest are less favourable or the same as those of the student, no transmission of enthusiasm can take place. The teacher should always make his students feel that his attitude will be friendly regardless of success or failure of the student. The student with proper attitude will derive pleasure from
his contact with mathematics. The findings of the studies definitely indicates some relevance to the assumption that teachers influence pupils attitudes towards mathematics, hence the need to study the attitudes of the pre-service teachers towards mathematics.

2.2 ATTITUDES, LEARNING AND TEACHING

There seem to be some contradictions from various studies on whether attitudes and will to learn are related. Fishbein M. (1973, p. 9 - 15) in a "survey of the research on attitudes" concludes that knowledge of an individual towards some object does not allow one to predict the way he will behave towards the object. He goes further to suggest that attitudes and behaviour are unrelated since just as attitude is learned, so is the corresponding response. Consequently the behaviour for a given attitude will differ for each individual.

Neale Daniel (1969, p. 633) in his study on the "Role of attitudes in learning mathematics" is not sure that scientific study verifies claims that favourable attitudes towards school subjects maximizes the possibility that the student will willingly learn more, remember better and use what he has learned. In general there is a question as to whether a favourable attitude actually cause more and better learning.

Neale goes further to conclude that certain fundamental characteristics of the school as an institution
overpower the influence that attitude might have toward learning. He suggests that given the present nature of schools, children do not have the opportunity to let their attitudes influence their learning. Neale in discussing the results of International Study on Mathematics Achievement edited by Torsten (1967) noted that you may have students who think highly of mathematics yet be unable or prefer not to do mathematics. He further concludes that positive or negative attitudes towards mathematics appear to have only slight casual influence on how much mathematics is learned, remembered and used.

On the other hand, many writers feel that attitudes play a major role in the learning process. Sears R. (1973) states that:

"In any thoughtful attack upon the improvement of education for people who must live in this modern world, one is immediately struck by the fundamental role of attitude and motivation in the child's learning process. Children must want to learn or they will not learn" p. 10.

Johnson A. et al (1972) has noted that attitudes are fundamental to the dynamics of behaviour. They largely determine what student learn. He went further to suggest that:
"the mathematics student with positive attitude studies mathematics because he enjoys it, finds mathematics completely in his own reward. Attitude also determine not only his willingness to study mathematics but also his use of mathematics as well" p. 259.

It is not just known what role attitudes play in the learning process. But as Mager R. (1973) points out, it is not necessary for people to like a subject or activity in order for them to come in conduct with it, or use it or do something about it. But they are things that can be done to "improve the positive attitude and eliminate the negative attitudes." But whatever is done in the way of influencing the student, it should leave him with favourable feelings. This according to Mager seems to be an appropriate starting point to take in order to minimize the avoidance tendencies that students with poor attitude often show towards mathematics.

In relation to teaching; Munguti (1984) in his study on "factors affecting teaching and learning of mathematics" has this to say:

"Teacher attitude towards mathematics is a factor that may affect the teaching and learning of mathematics ... if the teachers' attitudes are negative towards mathematics, this in turn will affect his teaching of the subject and is reflected in pupils' performance" p. 40.

Stollerg (1974) in his research has shown that teachers with neutral or negative attitudes can either avoid the teaching of mathematics or pass the negative
attitude along to the young pupil. He further concludes unless a teacher is attracted to mathematics all the content and teaching methods which are learned can be of no use at all.

Phillips (1973) also notes that teachers who dislike mathematics teach the subject as a routine and sometimes leads to total neglect of teaching the subject.

The results of the above studies have shown the importance of positive attitudes to the teaching in learning and teaching mathematics. The present study would like to pay attention to the types of attitudes taken by the trainees to discover whether favourable or unfavourable and what type of attitudes are likely to be passed to our boys and girls by the future teachers.

2.3 ATTITUDES AND ACHIEVEMENTS

Several researches have been carried out to determine the relationship between attitudes and achievement with very contradicting results. This may be so because achievement is a multidimensional concept. Besides being dependent on a child's social and economic background, place of residence, school facilities, mental ability and personality, it is also dependent on pupils' attitude which the teacher may be a contributor. This is the reason why the present study by the researcher is concerned with the attitudes of the pre-service teacher since it is one of the factors in achievement. In recent years, the
focus of attack on children's failure has been directed to teachers who constitute the school environment and are seen as being accountable to the success or failure of pupils.

Maritim E. (1983) stated that mathematical achievement (A) is a function of the learner (L) and his environment (E). Therefore achievement is dependent on the learner and environment. The learner's environment is composed of teachers who influence the child in many ways. A teacher who has a negative attitude towards mathematics is less likely to encourage his pupils to work hard in mathematics and the outcome is poor performance by the pupil and general development of negative attitude towards mathematics. This led to the present study on attitudes of pre-service teacher who will soon enter the field as professionals to see what type of attitudes they hold towards the subject.

The researches on attitudes and achievement seem not to be conclusive.

Aiken (1972) revealed that teachers' attitudes and effectiveness are the determinants of student attitude and performance in mathematics.

Phillips (1973) showed in his study that the teachers' attitude towards mathematics is significantly related to students attitude and achievement.
Torsten (1967) in his research carried in 13 countries on a comparative basis found out that the correlation between achievement and attitude is weak but positive.

Bosham and Murphy (1964) however felt that prediction of achievement on the basis of attitude score for individual would rather be hazardous because of the difference in intensity of attitudes of pupils; some pupils are rather mild in their love and hatred, others are intense. He also sited extraneous (external) influences.

Okech, J. G. (1980) in his research on "attitude towards mathematics of grade six pupils and teachers in Kenya" found out that attitudes of teachers and pupils towards mathematics were significantly related:

Johnson (1972) stated that:

"It is the attitude that our student develop which are likely to stimulate or stop further study of the subject ... often it is the attitude as a teacher you build that are basis of your rank as a successful or unsuccessful teacher."

The above researches have led to the present study aimed to establish what type of attitude the teachers had since it has been shown that their attitudes are important in influencing the pupils attitudes and performance.
2.4 ATTITUDES AND THE SEX OF THE PUPIL

A considerable amount of data support the dislike of mathematics and as a result under-achievement by women. This pattern is evident among school children and continues into adulthood and employment where females are under-represented in mathematics related fields. Dougherty K. (1975) reported that this phenomenon had generally been explained on the women's mathematical anxiety, "an unspecified fear based on projected feeling of inadequacy vis-a-vis some contempted experience with mathematics" p. 1.

It has been observed and data suggest that parental attitudes influence children's attitude and that parent perceive mathematics as more appropriate for boys than for girls. In an international study of mathematics achievement edited by Torsten (1967), it was found that in the thirteen countries under study boys were more interested with mathematics than girls at all levels of education. In a number of these countries considered, the girls tended to indicate their wish to cease studying the subject and boys tended to indicate their plans to continue. Alpert in Torsten (p. 239) showed that students attitudes towards mathematics were linked to parents conception of the educational goals of school mathematics course and the extent of mathematics education desired for the child by the parents. It is possible that the differences that still remain are likely to be
attributed to the role expectation for girls and boys and to the common view in many countries that mathematics is a 'male' subject. This is clearly demonstrated in the pattern of the thirteen countries under Torsten (1967) study for males tend to specialise in mathematics in large proportion than females.

In a different study carried out by Fennema and Sherman (1981), on sex related differences in mathematics, they noted that starting in the early grades and continuing through high school, fathers were perceived as the family authority in mathematics and female therefore started being socialized to the image that mathematics was for male. Russel in Orton A. (1987) has also noted that pressure might act equally unfairly against both sexes in that girls are not encouraged to opt for mathematics where as boys are encouraged even when their ability and interest in the subject have best been minimum and inadequate. He went further and said that "boys often opt for mathematics not because they enjoy it, but it is expected of them" (p. 120). The society always appears to have conveyed the message that mathematics is a male subject and certain other subjects are for female.

Further research by Russel (1983) in Orton (1982) has shown that teachers tend to interact in the classroom much more with boys than girls, have paid more attention to boys, have given more positive encouragement to boys and have allowed boys to gain their
attention (p. 119). Hence the teacher has contributed much to attitude formation of the pupil towards the subjects. The attitude held against girls as concern mathematics by the teachers are bound to influence the kind of interaction between female pupils and mathematics teachers. This association is strengthened by sex of the mathematics teacher. The kind of interaction between male teachers and female pupils might be different from that between female teachers and female pupils. This brings in the need of the present study to see the present attitude of the future teachers and discover whether past interaction with male or female teachers had a positive or negative effect on their attitude towards the subject.

About four decades ago, Plank and Plank (1954) interpreted the existence of sex differences in mathematics performance from a psychanalytic viewpoint. These writers claimed that since a high level of controlled aggression was necessary for mathematical activities, mathematics was a masculine enterprise. They maintained that since mathematics was 'masculine' women who liked mathematics tended to identify with a strong male figure what they called the "masculine identification hypothesis." They are actually very few women who would like to be identified with this 'aggression' associated with male, hence probably the cause of negative attitudes towards the subject.
Further research carried out in Torsten (1967, p. 249) shows that boys in single sex school had more interest and positive attitude towards mathematics than boys in co-educational schools. In co-educational schools the difference in the attitude was greatest between male and female while in single sex schools the difference was not significant. For both sexes McGough in Orton (1967) found out that it was the perception of usefulness of mathematics and liking of the subject that determined the attitude towards the subject but not the difficulty of the subject. The results from Torsten prompted the researcher to look at school of origin of the trainees to see whether they have a similar effect on the attitude towards mathematics.

Sheikh Omar (1976) carried out "A study on sex difference among Form 3 students in Kenya" and found out that girls had significantly more unfavourable attitudes towards mathematics and enjoyed mathematics far less than boys. The present researcher wanted to establish whether these results by Sheikh were true also at the teacher training level by looking at the attitudes of the trainees and compare them with their sex. Some differences may be expected because student at this level are more mature and have had more exposure than those in Form 3.

Contrary to the above results, another study carried by Stright (1960) on attitudes of students and teachers towards mathematics found out that in the
sample selected at different levels of education girls liked mathematics more than boys. This study seem to contradict other studies on similar topic. Hence the researcher wanted to study the trainees attitudes and see whether they agree with Stright findings by sex.

Summarizing a number of researches Hochchild (1973) on sex differences explained that: "the sexes differ in the way they think (Macuby), 1966), perceived (Bieri, 1958), aspire (Turner, 1964), experience anxiety (Sinnick, 1956), day dream (Singer, 1958)" p. 253.

From research carried out by Maritim (1979), he found out that the differences in the attitude of boys and girls lie in the differences in academic self perception. The female view themselves as being incapable of doing mathematics and therefore form a very negative attitude towards the subject. It is the hope of the researcher that this will be confirmed by the present study and will hold in making recommendation to change female attitude towards the subject. According to Maritim female have learnt to give up at the slightest difficulty encountered in solving a mathematical problem. The types of roles expected of female does not rigidly require mathematics as a pre-requisite as do the male. On such grounds the female give up and work hard in subjects related to their future roles such as domestic science and arts subject.
From the above researches, the researcher has the feelings that the issues of sex differences in mathematics attitudes is not easy to resolve.

2.5 TEACHER EDUCATION

Teacher education in Kenya has not been given the attention in deserves and may be the main cause of negative attitude towards the subject. The curriculum is overloaded and students are forced to take a total of 14 subjects whether they are good or poor or whether they like them or not. As Sears (1973) noted about being forced to learn "somebody must want to learn or he will not learn." He is supported by Johnson (1972) who also noted that the type of attitude held by a student determines not only his willingness to study mathematics but also his use of mathematics. Stollerby (1974) has shown that teachers with negative attitude will avoid the teaching of mathematics or if forced to teach the subject, will either teach it as a routine or neglect the subject completely. The question to pose remains; should the Teacher education programme allow students to select what they are interested in and capable of teaching? The answer to this question needs serious consideration from all those concerned if one takes into consideration the results of the above researches.

According to Gachathi Report (1976), it recommend "to require an E.A.C.E. pass in mathematics as a minimum requirement to enter Primary Teachers Colleges" (p. 28).
This report had recognized the problem of training prospective teachers of primary school who had failed in mathematics. But by as late as 1981, according to Mathematics Primary Teacher Report from K.N.E.C. (1980), it was noted that "about 30% admitted to Teachers' Training Colleges had grade 9 in mathematics" (p. 20). The finding of this report is also supported by another research conducted by Nyangayo (1981) on "attitudes and achievement" who noted that 32% of his sample entered the colleges with grade 9. Sifuna (1988) in "A study carried out to observe the quality of student recruited to Teachers' Colleges" concluded that those recruited were those who did not perform highly. To support Sifuna and Nyangayo, Castle in Sifuna (1986) had noted that:

"in any discussion of the education of young teachers it must be borne in mind that almost every training college student is a failed candidate for the academic high school or university. He does not enter the college with the appropriate aspiration for he starts his training for a difficulty career wishing he were elsewhere" (p. 23).

In the study of Sifuna (1986), he found out that 34.3% of the trainees did not really intend to become teachers. They joined teaching after failing to get their desired jobs. In a different study by Smith (1962) on "Attitudes towards mathematics", the result indicated that too many pre-service teachers had negative attitude towards a subject they will be required or expected to teach. This prompted the researcher to look at what
type of attitudes are taken by the trainees in colleges to ascertain whether the same situation is true in Kenya.

Studies in the effective area of mathematics education point to the role of parents and teachers as models who are influential in inculcating positive attitude towards mathematics on the part of the student. Fanne (1961) noted that "when the student comes to college his attitudes have largely been crystallized and they determine his reception towards the subject" (p. 25). This is true in Kenya where it is very difficult to change the attitude of the trainees towards the subject because they carry the attitude right away from lower levels of education. A study carried by School Mathematics Study Group (S.M.S.G.) in U.S.A. tends to support the result. The result of S.M.S.G. found out that:

"Student attitudes towards mathematics seem to be favourable at the beginning of fourth grade and improve slightly during the remainder of elementary school. However at the beginning of Junior High School students attitudes towards mathematics begin a slow but steady drop that continues to the end of high school" [Mathematics Teacher 1973 60: 212].

Okech (1980) also found out that student attitude towards mathematics are positive in the early years of primary schooling but a decline appear as they progress.

A similar research on attitudes and achievement carried out by Nyangayyo (1986) also found out that by the end of Form 3 already 85.5% of prospective teachers
in his sample had found mathematics very difficult and by Form 4, 100% of the trainees found mathematics very difficult. This would imply by Four 4 the negative attitude have already been crystallized and certainly the reception of the subject in the college would be negative.

Nyangayo also noted that there was a positive change of attitude among prospective teachers as compared to their negative attitude during secondary school. Contrary to the above result the tutors in his study blamed the trainees of having negative attitude towards mathematics and they believed that this is the major cause of poor performance. The present research intends to ascertain whether the tutors blame was false or true by looking at the trainees attitudes and classifying them whether positive or negative.

In conclusion it can be seen that from the above discussions a considerable amount of data support the dislike of mathematics. Therefore the development of positive attitude towards mathematics is of fundamental concern to all teachers. The teacher should act as "model" in which the pupil seek identification hence the need of positive attitudes. It serves as a good example for the teacher to have his own interest and curiosity about mathematics to serve as a model for his pupil. The teacher should be able to communicate
the essential relevance of his subject both as a form of knowledge and in terms of its practical relevance to everyday life and employment. All the above aspects should be provided in the Teacher Education Programme, otherwise mathematics will continue to be viewed negatively.
CHAPTER THREE

DESIGN AND METHODOLOGY OF THE STUDY

This chapter is aimed at providing guidelines on the procedure which were used in the implementation of the study.

3.0 RESEARCH SAMPLE AND ITS SELECTION

The population of this study was selected from two Primary Teacher's Colleges which train PI teachers. In Kenya the Colleges admit both male and female students, untrained teachers and pupils direct from school, Form Four and Form Six students, students from co-educational and single sex schools. The two colleges were selected randomly from the seven colleges in Eastern and Central Province. The first college had twelve classes and class K was selected randomly to be included in the study. The total number of subjects in that class were 45. In the second college which had ten classes, class B was selected randomly and had 43 subjects.

The sample of the study was selected from second year students in each of the colleges. The first years were not used in the research because quite a few had not arrived by the time the questionnaire were administered and the few who had arrived had not acquired enough exposure in the colleges due to the short period of stay having arrived in late September. Therefore the
sample selected for the study consisted of 88 subjects. Since all the classes were filled randomly as the student arrived during admission, all the subjects in the two selected classes were included in the research.

3.1 RESEARCH INSTRUMENT

A Likert-type attitude scale for the pre-service teachers was adapted by the researcher based on methods used by Dutton W. H. (Arithmetic Teacher 1962: 419) in his study. The scale consisted of 20 statements on attitude towards mathematics. The student was expected to respond anonymously to each of the 20 attitude statements, with the following options; Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD)." Out of the 20 statements ten were positive and ten were negative statements. The Likert type attitude scale used is shown in Appendix A.

3.2 METHODS AND PROCEDURE OF QUESTIONNAIRE ADMINISTRATION

The researcher made a personal visit to each college and gave the letter of introduction provided by the Department of Communication and Technology of Kenyatta University to the Principals and requested for the necessary assistance in conducting a research in their institutions. In both the colleges the research was directed to the Head of Mathematics Department who assisted in conducting the research on the selected class and date.
In the first college the questionnaire were administered during the fourth week of October. In both cases the researcher used the double lesson of mathematics to administer the questionnaires. The students were instructed not to write their names so that each could remain anonymous and this the researcher hoped was to help the trainees to be more free and give true views about mathematics.
CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

4.0 INTRODUCTION

The researcher conducted a simple survey type of research. The findings of this research were therefore derived from what the researcher himself found in the field through responses the prospective teachers gave to the questionnaires at the time of the time of the study. This chapter presents the method used in data analysis, the results and discussions.

4.1 SCORING OF THE QUESTIONNAIRE

All the 88 students in the sample selected gave responses to the 20 items on the questionnaire. A marking scheme for scoring was prepared as shown in Appendix B. The lowest score was 20 while the highest score was 100. A score of 60 was taken as the neutral point and a score of 60 had a positive attitude, while below 60 had a negative attitude towards mathematics.

In scoring positive statements the alternatives were weighted 5, 4, 3, 2, 1 points while negative statement were weighted in the reverse order that is 1, 2, 3, 4, 5.
4.2 ANALYSIS AND DISCUSSIONS OF THE RESULTS

The questionnaires were analysed based on an initial investigation of five variables believed by the investigator to be important in analysing the attitudes of pre-service teachers towards mathematics. Each statement was analysed based on a three category classification which includes agree, undecided and disagree. This classification was used to make comparison easier.

Means, standard deviations and percentages were concerned. The findings were interpreted based on these descriptive statistics. The standard deviations (S.D.) indicated the spread of the data about the mean. The smaller the S.D. the more the data tended to be very close to the mean. Each questionnaire was tabulated according to the variables under study.

It has already been stated elsewhere in this study that the students who completed the questionnaires were not identified by name. It was felt that perhaps this would tend to present a truer picture than if the students were under pressure to give answer they felt were wanted or knew were acceptable. The researcher realises that true attitudes are very difficult to measure.
The tabulated data is provided in the following tables. The table below shows the percentages of students by sex who have selected the items on the attitude scale. The students have been classified as male (m), female (f) and combined (c) to represent percentages of both males and females. The percentages have been rounded to one decimal place.

**TABLE 4.1**

PERCENTAGE TABLE OF THE ITEMS SELECTED ON THE LIKERT TYPE SCALE BY SEX

<table>
<thead>
<tr>
<th>NO. ATTITUDE STATEMENT</th>
<th>CHOICES IN PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AGREE</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td>1 I avoid mathematics because I am not good with figures</td>
<td>20.5</td>
</tr>
<tr>
<td>2 Mathematics is very interesting</td>
<td>77.2</td>
</tr>
<tr>
<td>3 I am afraid of doing word problems</td>
<td>18.2</td>
</tr>
<tr>
<td>4 I have always been afraid of mathematics</td>
<td>17.1</td>
</tr>
<tr>
<td>5 Working with numbers is fun</td>
<td>61.4</td>
</tr>
<tr>
<td>NO</td>
<td>ATTITUDE STATEMENT</td>
</tr>
<tr>
<td>----</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I would rather do anything else than do mathematics</td>
</tr>
<tr>
<td>7</td>
<td>I like mathematics because it is practical</td>
</tr>
<tr>
<td>8</td>
<td>I day dream during mathematics classes</td>
</tr>
<tr>
<td>9</td>
<td>I have never liked mathematics</td>
</tr>
<tr>
<td>10</td>
<td>Sometimes I enjoy the challenged presented by mathematics problems</td>
</tr>
<tr>
<td>11</td>
<td>I am completely indifferent towards mathematics</td>
</tr>
<tr>
<td>12</td>
<td>Mathematics thrill me and I like it than any other subject</td>
</tr>
<tr>
<td>13</td>
<td>Mathematics is very difficulty for me to understand</td>
</tr>
<tr>
<td>14</td>
<td>I expect to be able to excite students about mathematics</td>
</tr>
<tr>
<td>15</td>
<td>I think about mathematics problem outside of school and I like to work them</td>
</tr>
<tr>
<td>16</td>
<td>I am afraid that young pupils will ask me mathematics that I cannot answer</td>
</tr>
<tr>
<td>17</td>
<td>I am looking forward to teaching mathematics to primary school pupils</td>
</tr>
<tr>
<td>18</td>
<td>My mathematics classes have been boring</td>
</tr>
<tr>
<td>19</td>
<td>Pre-supposing adequate knowledge about mathematics, I would enjoy teaching the subject to children</td>
</tr>
<tr>
<td>20</td>
<td>I cannot see much value in mathematics</td>
</tr>
</tbody>
</table>

Key M - Male F - Female C - Combined Female and Male
Responses to the 20 questions on the attitude scale were tabulated. In order to help in making comparisons of the responses of each statement, the data were converted into percentages.

Since studies have shown that boys tend to achieve better than girls in mathematics, the results of the questionnaires formed an interesting comparison between the attitudes of females and males. The following results seemed to be most worthwhile and interesting.

(a) 77.2% of males and 70% of females thought that mathematics was very interesting.

(b) 17.1% of males and 35% of females said that they have always been afraid of mathematics while 63.4% of males and 72.% of females disagreed with the statement.

(c) 16.5% of males and 29.5% of females agreed that they better do anything else than do mathematics while a large percentage disagree with the statement. 13.6% of males and 20.5% of females agreed with the statement that they had never liked mathematics. A big percentage disagreed with the statement.

From the above findings it implies that contrary to popular opinion, mathematics is a much liked subject by the students under study. These results do agree with
the findings of Nyangayo (1986) who found out that there was a change of attitudes among prospective teachers as compared to the negative attitudes during secondary school. The results also disagrees with the opinions of the Tutors in Nyangayo study who blamed the prospective teachers for having negative attitudes towards mathematics. Since this is a very common feeling among the tutors, they actually need to re-evaluate themselves to see whether they may be a cause of the negative attitudes among the students.

(d) 13.2% of males and 35% of females agreed that mathematics is a very difficult subject. Therefore for the majority of students under study thought that mathematics was easy. These results contradict the types of grades that appear in the teacher examinations where mathematics is one of the poorest performed subject. This may be so because thinking and doing are two different things. This tends to agree with the findings of Torsten (1967) who found out the correlation between achievement and attitude is weak but positive. As Murphy and Borsham (1964) felt, the researcher tends to agree with them that prediction of achievement on the basis of attitudes scores can be very hazardous, since it is not only attitudes alone that influence achievement but achievement is a multi-dimensional concept.
(c) 64.9% of males and 59% of females agreed with the statement that they will be able to excite students about mathematics. 89% of males and 64.9% of females disagreed with the statement that they are looking forward to teaching mathematics. This implies that many of the students are not looking forward to teaching mathematics to primary school children, which agrees with the opinions of many practising teachers who don't like teaching the subject and will panic when confronted with having to teach or even do mathematics. This does not imply that all the pre-service teachers will become poor mathematics teachers.

When the attitudes of all the students was computed from the data received from the attitude scale, the following results seemed to be most interesting.

(a) 70% felt they liked mathematics while 72% thought mathematics to be interesting. The results indicate that many of the students liked mathematics.

(b) 18% felt that they were looking forward to teaching mathematics while 64% felt that they will be able to excite students about mathematics.
(c) 42% felt that they liked mathematics more than any other subject while 55% thought about mathematics outside school. This means that a quite big percentage of students did mathematics outside school for leisure and this is an encouraging result contrary to the opinion that mathematics was a disliked subject.

(d) 25% felt that they avoided mathematics because they are not good with figures while 23% were afraid of doing word problems. These are two areas among many others where the Teacher Education Programme need special attention to remove the fear of the students.

(e) 26% thought that they have been afraid of mathematics while 24% thought that mathematics was a difficult subject and 23% felt that they better do anything else than do mathematics. This implies that too many prospective teachers have negative attitudes to a subject they will be expected and required to teach and therefore are likely to pass these attitudes to their pupils.

(f) 85% of all the students thought that mathematics was a valuable subject while 70% of all the students thought that mathematics was a practical subject. This shows the importance the students give to mathematics.
The following two tables show the numbers and percentages of students who received more or less than 60 in the attitude scale.

**TABLE 4.2**

NUMBER OF STUDENTS SCORING LESS OR MORE THAN 60 ON THE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>SCORE</th>
<th>more than 60</th>
<th>less than 60</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>39</td>
<td>7</td>
<td>46</td>
</tr>
<tr>
<td>Female</td>
<td>27</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22</td>
<td>88</td>
</tr>
</tbody>
</table>

**TABLE 4.3**

PERCENTAGES OF STUDENTS SCORING LESS OR MORE THAN 60 ON THE ATTITUDE SCALE

<table>
<thead>
<tr>
<th>Percentage</th>
<th>more than 60</th>
<th>less than 60</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>44.3%</td>
<td>8%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Female</td>
<td>30.7%</td>
<td>17.0%</td>
<td>47.7%</td>
</tr>
<tr>
<td>Total</td>
<td>75.0%</td>
<td>25.0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

After marking the 20 items on the questionnaire the number of students who get less than 60 and more than 60 were counted according to sex and percentages calculated. These informations were represented in two
contingent tables as shown above. The following results seem interesting and worthwhile from the data gathered from the two tables.

(a) The tables show that 39 males (44.3%) and 27 females (30.7%) got a score of more than 60 on the attitude scale. The tables also show that 7 males (8%) and 15 females (17.0%) scored less than 60 in the attitude scale out of the total sample considered in the study. This implies that in general female tend to have more negative attitudes towards mathematics than males. The result tend to support the research by Sheikh Omar (1976) who found out that girls had a significantly more unfavourable attitudes than boys towards mathematics. But the results disagree with the findings of Stright M. who found out that in her sample selected at different levels of education girls liked mathematics more than boys. Comparing these results with the 13 countries under Torsten (1967) study, it was only in Sweden that girls showed more interest than boys in mathematics.

(b) A large percentage (75%) of the students considered in the study have a positive attitude towards mathematics while 25% have negative attitude. This is quite a worrying result in that 25% is a big percentage to have negative
attitude towards a subject they will be expected and required to teach once they graduate from college. Teacher education programme should strive to change these big percentage, otherwise the future teachers may inject fear in their pupils. Research has shown that many of the practising teachers tend to panic when confronted with doing or even teaching the subject.

The above result do agree with the finding of Smith F. (1962) who found that a big percentage of the prospective teachers in his study had a negative attitude towards mathematics. The worrying aspect of such results is negative attitudes will influence the teaching of the teachers which may lead to outright neglect of the subject and to routine teaching. The other aspect as seen from discussion in chapter 2 is this negative attitudes may be passed very easily to the student and hence if the teach has negative attitude towards mathematics, it has a multiplier effect on the pupils. This may be one of the reasons why mathematics is not a liked subject in several levels of education.

The following table shows the means and standard deviations of the students based on the variables under study. These include sex, level of education, teaching experience, type of school attended and the sex of mathematics teacher. The figures have been rounded to the nearest whole number.
### TABLE 4.4

**MEAN AND STANDARD DEVIATION ATTITUDE SCORES ON FIVE VARIABLES**

<table>
<thead>
<tr>
<th>NO</th>
<th>VARIABLES (FORCES)</th>
<th>Number of students</th>
<th>Mean</th>
<th>Student deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Male</td>
<td>46</td>
<td>78</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>(b) Female</td>
<td>42</td>
<td>70</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Level of Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) K.C.E. (K.C.S.E.)</td>
<td>68</td>
<td>73</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>(b) K.A.C.E.</td>
<td>20</td>
<td>76</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Teaching Experience as U.T.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Yes</td>
<td>37</td>
<td>69</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>(b) No</td>
<td>51</td>
<td>72</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Type of Secondary School Attended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Co-educational</td>
<td>40</td>
<td>71</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>(b) Single sex</td>
<td>48</td>
<td>78</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Sex of Math Teacher in Secondary School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) No male teacher</td>
<td>8</td>
<td>73</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>(b) One or more male</td>
<td>80</td>
<td>74</td>
<td>16</td>
</tr>
</tbody>
</table>
The 20 items on the questionnaire were marked, then the mean and standard deviation were computed based on the five forces under study. The results are shown on the table above. The standard deviation is a measure which was used to show the spread of data about the mean. The following results from the table seems to be the most interesting and worthwhile.

(a) The table shows that the mean score of 46 male respondents was 78; the mean of 42 female was 70, with a standard deviation of 17. The mean of the boys was higher than the mean of the girls. The scores of the boys are more closer to the mean than that of the girls if one considers the standard deviations. This supports research carried out by International Study on Evaluation and Assessment edited by Torsten (1967) and other researches by Sheikh Omar, Maritim, Okech and Phillips. Also other researches by Maritim, Russel and Fennema (Chapter 2) have shown that the society tend to Potray mathematics not as a female but male subject. Hence such result will be expected in Kenya. The above results implies that male have a more positive attitude than female towards mathematics.

(b) The mean score of 68 respondents who had reached 'O' levels (K.C.E., K.C.S.E.) was 73
with a standard deviation of 14 while of the 20 respondents who had reached 'A' levels (K.A.C.E.) was 76 with a standard deviation of 20. The respondents who had reached 'A' levels had a higher mean than those who had reached 'O' levels but their scores were widely spread away from the mean if the two standard deviations are compared. This implies the level of education does not have a lot influence on attitude formation towards mathematics. The result tends to show that it does not matter whether an ordinary or advanced level student is selected to enter college. This may be due to the fact that most of those considered to enter Primary Teachers' Colleges may have had an 'Arts' bias in their 'A' levels.

(c) The mean score of 37 respondents who had teaching experience as Untrained Teachers (U.T.s) was 69 with a S.D. of 17 and those who had no teaching experience at all was 72 with S.D. of 16. This is very interesting results because exposure to teaching is expected to have a positive influence on attitude formation but the results indicate the opposite. The only simple explanation that can be offered is probably those who had teaching experience never taught mathematics or even if they taught the subject, they had very little interest and were just doing so as a routine. This implies that teaching experience may not have a lot of influence
on attitude formation towards mathematics and any student whether he has taught or not can be selected to enter the colleges. This is contrary to the idea that one must have stayed out of school for more than a year before entering college.

(d) The mean of 40 respondents who had attended a secondary school which was co-educational was 71 with S.D. of 15; the mean for those who had attended a single sex school was 76 with S.D. of 15. The mean of those who had attended co-educational school was lower than those who had attended single sex schools. This implies that the type of school attended by the pre-service teacher has an influence on their attitude towards mathematics.

This finding tend to support research carried out by Torsten, who showed that boys in his study had more interest than girls towards mathematics in all the countries under study and those in single sex schools showed more interest than those in co-educational schools. In terms of achievement those in single sex schools showed a significant superiority as compared to those in co-educational schools. This is also true in Kenya when one looks at the results of the major examinations in secondary schools. This can only be explained in terms of the possible greater concern about role and self image where the two sexes are in the same school
than in schools where they are isolated. Single sex schools have been created for religious, vocational and other special reasons. From the evidence above, it would seem reasonable to recommend that all schools should be single sex which is one sided view.

(e) The mean score of 8 respondents taught only by female teachers in secondary school was 73 with SD of 13; the mean score of 80 respondent taught by one or more male teachers was 74 with SD of 16. The scores of the ones taught by one or more male teachers are more widely spread about the mean than those taught by no male teacher. This implies that even though majority of the mathematics teachers in schools are male, it would seem reasonable to conclude that either sex would have a positive effect on the mathematics attitude of their students. Therefore it does not matter whether mathematics teacher is male or female. Any of them can help to mould the attitude of the pupils in a positive way.

(f) In general the study has shown that mean scores on the attitude scale are on the positive side especially when considering the five forces believed by the researcher to have an important role in the development of attitude towards the subject for the trainees. This would imply that mathematics is not a disliked subject at this level contrary to the opinion of the tutors in Nyangayo (1986) study.
CHAPTER 5

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE STUDY

(a) Even though many of the mathematics teachers are male, any sex can have a positive influence on the attitudes of the students towards mathematics.

(b) The type of school attended by the trainees has an influence on attitude formation towards mathematics.

(c) Males have a more positive attitude towards mathematics than females. But also quite a large percentage of the trainees have negative attitudes towards a subject that they will be expected and required to teach once they graduate from the colleges.

(d) Teaching experience does not seem to have a lot of influence on attitude formation towards mathematics.

(e) Level of education does not seem to have a lot of influence on the attitude formation towards mathematics. Therefore it does not matter whether students selected to enter colleges are 'A' levels or 'O' levels.

(f) Many of the pre-service teachers have an interest in mathematics if one considers the
responses to statements 7, 8, 9, 11, 12, 13, 15. This results goes contrary to the believe that mathematics is a much disliked and feared subject.

(g) About 25% of the students are afraid of mathematics because they are not good with figures or fear word problems. These and other areas, tutors need to do something to improve since the students will also be required to teach the same and may pass the fear to their pupils.

(h) Many of the pre-service teachers are not looking forward to teaching mathematics. This can be concluded from the responses to statements 14, 16, 17, 18, 19. This does not mean that they will be poor mathematics teachers.

5.2 IMPLICATIONS OF THE STUDY

The purpose of this study has been to establish the attitudes of pre-service teachers towards mathematics. Attitudes are learned and pupils learn attitudes from their environment, home and school where the teachers play significant roles on attitude acquisition and development. The study has found out that many prospective teachers have negative attitudes towards a subject they will be expected and required to teach. Also it has been found that males in general tend to have more positive attitudes than females towards mathematics. Although one of the objectives of the Teacher
Education Programme is to help the students develop desirable attitudes towards the subject, there is nothing in the syllabus to suggest that this is being done. Instead much emphasis is placed on the teaching of content even at the expense of methodology.

Since the results show that many teachers have a negative attitude towards the subject, it seems necessary that:

(a) A more effective mathematics programme should be started forming a basis for developing positive attitudes toward mathematics in our primary teachers and consequently our primary school pupils. This calls for improvement in methodology teaching in the college mathematics programme to develop positive attitudes and give it more weight as the teaching of content. Hence the college mathematics syllabus should be geared towards development of positive attitudes and should provide the trainees with methods of teaching that encourage the development of positive attitudes. This raises the question of the tutors who teach mathematics. The tutors need to be qualified in teaching both methodology and content to be able to pass them over to the trainees. Hence more training is needed in these aspects instead of selecting secondary teachers to become tutors.
(b) Tutors in the colleges need to be trained to locate specific skills that their students lack and concentrate on them to improve trainees attitudes as recommended by Mathematics Report, Teachers' Examination (1980, p. 39).

(c) Methods need to be devised to encourage girls to develop positive attitudes towards mathematics and compete favourably with boys in the subject. This is only possible if the schools, career services and employers show more initiative in attracting girls with ability in mathematics into what can be called men related fields of engineering and so on.

5.3 RECOMMENDATIONS FOR FURTHER RESEARCH

(a) There is a general agreement that a student attitude towards learning mathematics is important. Presently, there is a need for more information concerning the attitudes of student towards specific activities and procedure used in teaching mathematics. Additional research can be done to determine the causal relationship of attitudes and learning mathematics.

(b) It would be helpful to explore various avenues that might lead to changes in attitudes and also explore the effects of changed attitudes on study habits and achievement in mathematics.
(c) Further research need to be done as a follow up of teachers after qualifying from the colleges to see whether there is a change in their attitudes towards the subject after some experience of teaching.

(d) Further research should be conducted to establish whether the differences between the means are significant for the five variables under study.


24. Sifuna Daniel M. "The Academic Achievement as a Predictor of Teaching Effectiveness Among Primary School Teachers" KERA Project, Kenyatta University, 1986.


A STUDY OF THE ATTITUDES OF PRE-SERVICE TEACHERS TOWARDS
MATHEMATICS IN SOME PRIMARY TEACHERS' COLLEGES

BY

TUMBO MAUNDU MARTIN E.
E55/7517/89

A PROJECT SUBMITTED IN PARTIAL FULFILMENT FOR
THE DEGREE OF MASTER OF EDUCATION (P.T.E.)
IN KENYATTA UNIVERSITY

1991
APPENDIX A

ATTITUDE SCALE FOR THE PRE-SERVICE TEACHER INSTRUCTIONS!

1. Do not write your name.
2. Fill all the questions on the space provided
3. Please note that this is not a test. The information provided will be used for research only.

PART A:

A List of twenty statements are provided to you and each statement is constructed that it might reflect one's thinking or views about mathematics. After every statement there are five choices for you to choose from:

<table>
<thead>
<tr>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Strongly Agree)</td>
<td>(Agree)</td>
<td>(Undecided)</td>
<td>(Disagree)</td>
<td>(Strongly Disagree)</td>
</tr>
</tbody>
</table>

Put only one tick in the column with the response that seems best to you for each statement. Your tick will show whether you strongly Agree or Agree or Undecided or Disagree or Strongly Disagree with the statement.

STATEMENT

<table>
<thead>
<tr>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
</tr>
</tbody>
</table>

1. I avoid mathematics because I am not good with figures.
2. Mathematics is very interesting
3. I am afraid of doing word problems.
4. I have always been afraid of mathematics
5. Working with numbers is fun

6. I would rather do anything else than do mathematics

7. I like mathematics because it is practical

8. I day dream during mathematics class

9. I have never liked mathematics

10. Sometimes I enjoy the challenge presented by mathematics problems

11. I am completely indifferent towards mathematics.

12. Mathematics thrills me and I like it than any other subject.

13. Mathematics is very difficult for me to understand.

14. I expect to be able to excite students about mathematics.

15. I think about mathematics problems outside of school and I like to work them out.

16. I am afraid that young pupils will ask me mathematics that I cannot answer.

17. I am looking forward to teaching mathematics to primary school pupils.

18. My mathematics classes have been boring.

19. Pre-supposing adequate knowledge about mathematics, I would enjoy teaching the subject to children.

20. I cannot see much value in mathematics.
PART B: GENERAL INFORMATION:

TICK ON THE SPACE PROVIDED

1. Sex of student; male ( ) Female ( )


3. Have you ever taught as untrained teacher Yes ( ) No ( )

4. Sex of mathematics teacher in Secondary School
   No male teacher ( ), One or more male teachers ( )

5. What type of school did you learn. In co-educational ( ) Single ( )
# APPENDIX B

MARKING SCHEME OF ATTITUDE SCALE

<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>POINTS OF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
</tr>
</tbody>
</table>