THE RELATIONSHIP BETWEEN ATTITUDE AND ACHIEVEMENT IN MATHEMATICS

A

THESIS

BY

RAM ACHAL SAH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION

SUBMITTED

TO

DEPARTMENT OF MATHEMATICS EDUCATION

CENTRAL DEPARTMENT OF EDUCATION

UNIVERSITY CAMPUS

TRIBHUVAN UNIVERSITY

KIRTIPUR, KATHMANDU, NEPAL

2016

LETTER OF CERTIFICATE

This is to certify that **Ram Achal Sah**, a student of academic year 2067/68 with campus Roll No. **145,** Thesis number **1113**, Exam Roll No: **281559** and T.U. Registration No. **9-2-589-56-2002** has completed this thesis under my supervision during the period prescribed by the rules and regulation of Tribhuvan University, Kathmandu, Nepal. This thesis entitled **"The Relationship between Attitude and Achievement in Mathematics"** embodies the results of his investigation conducted during the period of October 2015 to February 2016 in the Department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward that his thesis be submitted for the evaluation as the partial requirements to award the degree of Master of Education.

…………………………………..   …………………………………….

(Dr. Baua Lal Sah)   (Assot. Prof. Laxmi Narayan Yadav)

Supervisor   Head

Date………………..

A

Thesis

By

Ram Achal Sah

Entitled

The Relationship between Attitude and Achievement in Mathematics has been approved in Partial Fulfillment of the Requirements for the Degree of Master of Education.

Committee for the Viva-Voce   **Signature**

Assot. Prof. Laxmi Narayan Yadav   ……………………………………
    (Chairman)

Prof. Dr. Hari Prasad Upadhyay   ……………………………………
    (Member)

Dr. Baua Lal sah   ……………………………………
    (Member)

Date………………..

ACKNOWLEDGEMENTS

…………………..
Ram Achal Sah

ABSTRACT

There have been a number of studies investigating how attitudes affect students' academic achievement. This study was conducted to identify specifically the relationship between ninth grade students' attitudes and their achievement in mathematics. Gender was studied to determine its effect on attitude and achievement. Furthermore, three types of attitude cluster were studied including pupils' confidence, math usefulness, and attitude about math teacher to determine their effects on achievement. A total of 119 students as sample from nine community secondary schools of Dhanusha district were selected by multistage random sampling techniques. To gather the data a questionnaire based on a five point Likert scale was administered. The data were analysed descriptively using percentage, graphs and Pearson's correlation coefficients was used to determine relationship between attitude and achievement in mathematics. Multiple regression model was determined to observe the relationship between the three clusters of attitude with achievement in mathematics. Independent sample T- test was used to test whether gender affect attitude and achievement in mathematics. The results indicated that there is a significant relationship between attitudes and achievement in math (r=0.548). Considering gender, males (32.63) had a slightly positive attitude towards math compared to females (31.88) however not statistically significant but the achievement in mathematics of males (26.90) was higher than females (22.41) and this difference in achievement was significant. Lack of confidence (60.5%) was the major problems associated with attitude affecting learning and performance in mathematics.

TABLE OF CONTENTS

LIST OF TABLES & FIGURES

Chapter - I

INTRODUCTION

This chapter includes an overview of the background to the study, statement of the problem, and objective of the study, significance of the study, delimitation of the study, operational definition of the terms and organization of the thesis.

Background to the Study

Mastery of mathematics is a key literacy component that influences children's success in education and in future society (Engle, Grantham-McGregor, Black, Walker, & Wachs, 2007). The focus on mathematics learning and mathematics ability development has been a recurrent topic in educational and psychological studies. Such studies contributed to our knowledge about mathematics learning from a psychological perspective. Mathematics is a compulsory subject for all students at the secondary school level in Nepal. This is necessitated by the fact that knowledge of mathematics is essential for all members of society.

When students in secondary schools complete their secondary school education, they will not be limited in career choice and advancement. This view is held by curriculum developers, teachers, parents and students alike. Mathematics need not be learned by students in secondary for the sake of career choice or advancement but students should be able to learn mathematics with understanding and therefore be able to apply mathematical ideas later in life (Cockcroft, 1982; Stanic, 1995).

Learning of mathematics is a continuous process and is not limited to the classroom experience only. In secondary schools, more lessons of mathematics

are taught than those of sciences. Despite concerted efforts of teachers, school administrators, parents and all other education stakeholders to enhance learning of mathematics among secondary students, performance and success in learning mathematics is still not satisfactory.

Maritim (1979) concluded that when a student views self as being incapable in a subject, they develop a negative attitude towards the subject and will most likely not do well in it. Their previous performance can play a role in shaping attitude to studies even at the entry level to start a course. Reitzes and Mutran (1980) argue that high school grades form a background that influences a learner's academic performance in college. A student's attitude towards a subject greatly influences performance. It affects the individual's organized manner of thinking, feeling and reacting to a study subject (Evans, 1972). Hamachek (1971) observes that an individual's attitude towards a subject will influence their self-concept of academic ability. In assessing Mathematics performance and potential of students, attitudes towards Mathematics and Mathematics learning are frequently cited as factors contributing to success. Several studies have shown that positive attitudes are conductive to good performance.

The teachers may knowingly or unknowingly depict high achievers as the probable achievers in mathematics examinations but low-attainers to be the automatic failures in examinations and they show it openly (Wasiche, 2006). This may create a negative attitude towards the subject among the low achievers, who may not learn the subject effectively. Teachers' influence on student's attitudes and student's positive attitudes are very important factors needed in order to enhance students learning of any subject and more specifically mathematics.

The low grades may be improved if learning of the subject is enhanced by ensuring that students have favourable attitudes towards the subject and towards the learning process itself. Therefor the purpose of this study is to investigate the relationship between attitude towards mathematics and mathematics achievement among students in secondary schools in Dhanusha District and to find out the problems associated with such attitudes that contributes to poor learning of mathematics and consequently poor performance in mathematics among students in secondary schools in the district.

Statement of the Problem

Attitudes formed by students when learning mathematics tend to remain for a long time and these attitudes may help him/her to learn mathematics better (Evans, 1965). This is so if the attitudes were favourable. But this may not always be the case. Students also form unfavourable attitudes as they learn mathematics in secondary schools. A negative attitude towards mathematics has been found to be a contributing factor towards under-achievement in the subject. The negative attitude in the subject has created a lot of fear and anxiety among students who continue to perform dismally as they lack the interest, curiosity and patience needed for learning and performing related tasks concerning to the subject.

Studies on students achievements in mathematics have mostly pointed to the fact that student's attitude is a major contributor yet has received very little attention. There is therefore a need to study the effect of student attitudes and beliefs as is the integral part of socio-cognitive learning which affect the learning outcomes (Burstein, 1992). This study would concern itself with a variety of beliefs that students harbour and which have potential effects on their learning processes as would determine their ability and willingness to learn.

Many researchers have concentrated on extrinsic factors namely; availability of resources, teachers' qualifications and teaching experience, the learners' socio-economic background and learners' motivation to learn. There could be other factors such as student's attitudes which may hinder them to adequately learn mathematics that have not been fully explored in Nepalese context in general and Dhanusha district in particular.

The researcher thus chose to address attitude; an intrinsic factor that also has a bearing on performance. This study attempted to unravel the relationship between attitudes towards mathematics and mathematics achievement among students in secondary schools in Dhanusha district and the problem associated with attitude that affect the learning and performance in mathematics.

So in light of the foregoing discussion the following research questions were posed for this study:

- What attitudes do secondary level students form towards learning and performance in mathematics?
- Is there relationship between attitude of students and their achievement in mathematics?
- Does gender affect attitude and achievement in mathematics?
- What types of problems are associated with attitudes affecting learning and performance in mathematics?

Objectives of the Study

The study possesses the following objectives:

- To determine the attitudes of students towards learning mathematics.
- To find out correlation between attitude and achievement in mathematics.
- To explore the effect of gender on attitude and achievement in mathematics.

4

- To find out problems associated with attitudes affecting learning and performance in mathematics.

Significance of the Study

This study is important so that there can be more clarity concerning what allows students to succeed in math or what is hindering their success. Some reasons for difficulty include extreme anxiety that exists or a refusal to give effort; however, self-confidence has rarely been a consideration. If attitudes indeed prove to be a significant factor in students' achievement, then teachers can adjust their instruction to include more motivating elements, especially for low-achieving students. By determining a correlation between self-confidence and attitudes towards math and achievement in this area, this study helps identify factors that influence student success.

The findings may enlighten teachers, parents and students on the effect of attitudes formed towards learning and performance in mathematics by students. The conclusion of the study and findings and recommendation made, teachers in secondary schools should be enlightened on the need to foster favourable attitudes towards learning and performance of mathematics amongst students. All other education stakeholders be enlightened on the need to provide an enabling environment for learning of mathematics.

Delimitation of the Study

- The study covers only a single district (Dhanush district) out of 75 district of Nepal.
- The sample size is only 119 students selected from only nine community secondary schools running up to class X of Dhanusha district. So the result couldn't be generalized to the other population.

- Three cluster of attitudes; "pupils' confidence", "math usefulness", and "attitude towards math teachers" have only been taken in consideration for assessing the attitude of students towards mathematics.

Operational Definition of the Related Terms

- **Mathematics Achievement:** It is the level of academic performance in a given mathematics examination. In this study mathematics achievement has been defined as score obtained by students out of 50 full marks in mathematics paper held in the middle term examination of the specified schools. It could be very good, good or poor depending on a set pass mark.

- **Attitudes towards mathematics:** it refers to opinion or way of thinking or generalized feeling towards mathematics. In this study, attitude towards mathematics have been assessed by score obtained on modified Fennema Sherman Mathematics Attitude Scale adapted by the

Chapter - II

REVIEW OF RELATED LITERATURES

This chapter reviews literature related to the study on attitudes towards learning and performance in mathematics among secondary school students. This section contains; attitudes & attitude formation, students attitude towards mathematics and achievement and finally several factors that are likely to reinforce attitudes such as student's own experiences, school setting; teacher's influence; societal influence and gender factor.

Attitudes and Their Formation

Pupils could like, enjoy, or the opposite, could hate mathematics. Attitude could be described as a long-term positive or negative emotional disposition towards mathematics (Mc Leod, 1992). Therefore this attitude are rather stable, contain both affective and cognitive factors (Goldin, 2002). A bi-dimensional definition of the attitude contains only the emotions and beliefs associated with mathematics (Daskalogianni & Simpson, 2000). According to a multidimensional definition, the attitude has three components: emotional response, beliefs regarding mathematics, and behaviour related to the subject (Hart, 1989). Some factors that influence attitude towards mathematics are confidence, beliefs in the importance of mathematics and its utility in practice, and mathematical anxiety (Ashby, 2009).

Attitude is a central part of human identity. Everyday people love, hate, like, dislike, favour, oppose, agree, disagree, argue, persuade etc. All these are evaluative responses to an object. Hence attitudes can be defined as "a summary evaluation of an object of thought" (Bohner & Wänke, 2002). They are inclinations and predispositions that guide an individual's behaviour

7

(Rubinstein, 1986) and persuade to an action that can be evaluated as either positive or negative (Fishbein & Ajzen, 1975). Attitudes develop and change with time (Rubinstein, 1986). According to Multicomponent model of Attitude (Eagly & Chaiken, 1993), attitudes are influenced by three components. They are cognitive (beliefs, thoughts, attributes), affective (feelings, emotions) and behavioural information (past events, experiences) (Maio, Maio, & Haddock, 2010).

Attitudes formed by an individual mostly depends on his/her experience in the learning environment. Attitudes are further enhanced by interpersonal interaction. Heider (1946) explain that attitude is either positive or negative depending on whether a person likes or dislikes something or someone.

The social learning theories by Bandura postulate that individuals acquire attitudes through observing imitating and modelling the behaviours of others. They therefore form through direct experience with models, object or issues or ideas we interact with. They are learnt attributes which affect our behaviour. A student can develop positive attitude towards Mathematics because he or she learns to associate positive experiences or events with it.

Students' Attitudes towards Mathematics

Attitude towards mathematics presents a disposition towards an aspect of mathematics that has been acquired by an individual through his or her beliefs and experiences but which could be changed (Eshun, 2004). Some authorities regard attitude towards Mathematics as just a like or dislike for Mathematics, while others extend the meaning to embrace beliefs, ability, and usefulness of Mathematics.

For Zan and Martino (2007), attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics. This attitudes

8

if negative is reflected by the fact that students may shy away and would always try to avoid mathematics tasks. A positive attitude towards the subject is an important educational outcome that should be nurtured regardless of the achievement level of the learners who should be helped in order to bring out their best abilities. They influence our social thought and help us to organize and evaluate stimuli into pleasant or unpleasant or negative or positive or useful or not useful.

Attitudes have a strong effect on behaviour which helps in understanding and predicting peoples' behaviour in a wide range of contexts. Attitudes though not directly observable are inferred from observable responses and behaviours. They are elicited by certain stimuli and gradually get established into a consistency or a tendency.

Students Attitudes towards Mathematics and Achievement

Most research on attitudes points to the fact that attitude plays a crucial role in learning and achievement in mathematics (Zan and Martino, 2007) hence determines the student's success in the subject. It determines their ability and willingness to learn the subject, work on a variety of assigned tasks and their persistence in the tasks available. In general, the conceptions students hold about Mathematics determines how they approach mathematics tasks leading them into either productive or non-productive orientations.

Most of the researches done tried to establish of the relationship between student attitudes towards mathematics and academic achievement. Some of these studies accept the fact that there exists a positive correlation between student attitudes towards mathematics and student academic achievement. Nicolaidou and Philippou (2003) asserts that when students have positive attitudes towards mathematics they would achieve better which reflect a significant relationship between attitudes and performance. Georgiou et al.

(2007), showed that high achievement could serve to predict a positive attitude towards math, but such an attitude could not predict stronger achievement. However, these authors emphasize the role of teachers and schools in changing attitudes stating that, math achievement could be improved by, for example, better teaching methods, more motivated teachers or better course books, which were hoped would lead to the improvement of attitudes towards math.

Some researchers have, however, demonstrated that the correlation between attitude towards Mathematics and achievement in Mathematics was rather weak and could not be considered to be of practical significance. In a meta-analysis of 113 primary studies involving elementary and secondary school children, Ma and Kishor (1997), found that attitude towards Mathematics and achievement in Mathematics was positively and reliably correlated but not strong. The correlation shows that the more positive the attitude, the higher the level of achievement in the student however, the correlation was not statistically significant (Maria de laurdes Mata et al, 2012).

Factors Reinforcing Attitudes

The question which came to mind was what would be the likely sort of attitudes among students in secondary schools and what could be the reinforcing factors? Sources of negative or positive attitudes may not be pin-pointed. Their source may overlap depending on an individual's learning environment. When reviewing literature on student's attitude towards mathematics, it reveals that several factors play a vital role in influencing student's attitude. These factors can be categorised into following distinctive groups.

Individual Student's Experience

The factors associated with the student's experience include student's mathematical achievement score (Kö ce et al, 2009), anxiety towards mathematics, student's self-efficacy and self-concept, extrinsic motivation

(Tahar et al, 2010) and experiences at high school (Klein, 2004). Twoli (1986) asserts in his work that there is a relationship between achieved grades in earlier examinations at same level and attitudes formed by students towards learning sciences and mathematics. Repeated low academic achievement might lead to negative attitudes towards the subject which in turn may influence how a student will learn the subject in the subsequent years of education. But "learned helplessness" (Twoli, 1986:34) due to repeated low achievement in mathematics examination may lead to unfavourable attitudes towards mathematics learning. This study intends to identify existence of such cases among students in Dhanusha district.

Mathematics anxiety (MA) is an intense emotional and irrational fear of mathematics based on unrealistic feelings of frustration, hopelessness, and helplessness associated with repeated failure or lack of experience of success. MA is thus a non-productive experience that harms future learning as the student's inability to do numerical operations leads to psychological pain, discomfort, reduced interest and motivation as well as avoidance of mathematics and mathematics lessons (Richardson & Suinn, 1972). Previous research indicates that mathematics anxiety is rooted largely in teaching, teachers and poor academic performance (Williams, 1988). Recently, Daneshamooz and Alamolhodaei (2012) found that mathematics anxiety had a significant negative correlation with mathematics performance.

As students interact with each other in secondary schools, they influence each other with regard to their perception of mathematics. Peers may influence others, that mathematics is unfeminine (Costello, 1991). At this stage of learning, image issue is so pertinent that a student will not wish to be different from his/her peer group. This could lead to formation of attitudes which are also compounded by stereotyped slogan "bright girl fear success" or "nice girls don't do mathematics" (Costello, 1991).

Other unfounded statement is, "mathematics is done by real men". This could be internalized in the student's minds; hence they view mathematics differently from other subjects. Callahan (1981) stated that students are very important and that their feelings have a strong effect upon the amount of work, the effort put therein and the learning that is finally acquired. Student's experience of negative feelings towards learning of mathematics may lead to unfavourable attitudes to the subject. Such negative feelings could be as a result of excess work load or poor teachers teaching method and the teacher's failure to attend to individual difference.

Stanic (1995) stated that some boys enjoy more learning mathematics than girls. This is so depending on their earlier experience. But he asserted that if the learning environment created by the teacher is enabling, both sexes persist in doing mathematics. The various attitudes formed by students as they interact in school, have determined how they learn mathematics. Consequently, this determines their achievement in secondary school mathematics examinations.

Whenever attitudes are formed, especially negative attitudes, girls are usually the ones who are on the receiving end. Research by Kaino (1998) in Botswana found out that girls had more negative attitudes than boys. He also found out that girls feel harassed by boys when they do not answer questions correctly in class. This was so in mixed classes. That they feel shy when with the opposite sex, learning mathematics together. Boys on the other hand indicated that they cannot concentrate when they learn while sitting next to girls. Worse still, they claim girls make noise (Kaino, 1998). While this may be challenged, differences in achievement in mathematics amongst the sexes bear witness that attitudes formed may differently influence learning among the two sexes.

Mathematics Teacher's Influence

The factors associated with mathematics teacher that influence attitudes include are teaching materials used by teacher, teacher's classroom management, teacher's content knowledge and personality, teaching topics with real life enriched examples, other student's opinions about mathematics courses (Yilmaz, Altun & Olkun, 2010), teaching methods, reinforcement (Papanastasiou, 2000), receiving private tuition (Kö ce et al, 2009), teacher's beliefs towards mathematics (Cater & Norwood, 1997) and teacher's attitude toward mathematics (Ford, 1994, Karp, 1991).

The quality of classroom teaching and learning depends on the quality of the instructional interaction (Wang, Haertel, & Walberg, 1993). Fishbein and Ajzen (1975) argue that whenever a new concept is introduced in the syllabus or taught for the first time in class, an attitude towards it is formed both by the students and the teachers. The teacher's attitudes reinforce the attitudes formed by the students towards learning of the new concept or the consequent similar concepts.

Twoli (1986) in his work on sex-difference in science achievement, found out that teacher's characteristics influence learning. A teacher's way of looking at issues generally and in particular, mathematical concepts influence the learner. A student would like to learn a new concept depending on how the teacher presents it. Flanders (1965) also found that students of teachers who vary their teaching style have positive attitudes and these teachers are able to teach a concept (in mathematics) better and learning is made easier. She added that it is paramount for such a teacher to have a mastery of content being taught. If this be the case student's attitudes towards learning of mathematics may be enhanced.

Flanders (1965) adds that teachers who show acceptance, clarifications of student's feelings and praise have been associated with more positive attitudes towards a higher achievement by the students. Costello (1991) agrees that many teachers often unconsciously reinforce and validates student's perceptions of appropriate gender-related behaviour. He further asserts that boys are assigned assertive roles and when they do well they are told they have a talent. But girls may be assigned less assertive roles and when they do well in mathematics, they are reminded that they have at least worked hard to achieve such grades. Because of this unconscious reinforcement from teachers, boys and girls form different attitudes towards learning of mathematics. Teacher's gender may determine how he/she portrays mathematics. Unconsciously male and female teachers form attitudes towards the subject they are teaching. These attitudes formed by teachers depending on their own gender influence how their students will learn the subject being taught, mathematics included.

Societal Influence

The home environment and society also affect student's attitude towards mathematics. Factors such as educational background of parents, occupation of parents (Kö ce et al, 2009) and parental expectations (Tobias, 1993) play a crucial role in influencing student's attitude towards mathematics. Due to these several factors students have different attitude towards mathematics.

More often, the public image of mathematics is labelling it as a difficult, cold, abstract, theoretical and ultra-rational subject (Ernest, 2004). On the aspect of the learning environment, specifically to their relationship with parents and friends and the quality of interactions with them profoundly affect their achievement and social motivation. Students who are accepted by their peers and who have good social skills often do better in school and have positive academic achievement (Rubin, Bukowski, & Parker, 2006, cited in Suan, 2014).

However, rejected students, especially those who are highly aggressive is at stake of achievement problem, including low grades and dropping out.

Orton and Wain (1994) attributed the noticeable difference in learning among boys and girls to "societal attitudes and expectations". He asserted that influences of society and from the environment affect mathematical development of students at various levels amongst boys and girls. Boys and girls are socialized differently while playing children games. Boys are engaged in more vigorous activities while girls take more passive roles.

On the other hand difference in parental expectations and desires and pressure they exert at home on their sons and daughters has been attributed for attainment variations among the sexes (Orton and Wain, 1994). Society views mathematics as a male subject as Costello (1991) found out. This is especially when parents react and reinforce daughters and sons differently. When their children do something mathematical, daughters are told "you are really tried" meaning nothing much is expected from the female child. But to their sons, they are told "you can do far much better" (Costello, 1991).

Society treats and views mathematics as an unknown territory made up of x's and y's. Society also views mathematics teachers as sarcastic and impatient, didactic and scornful (Macnab and Cummine, 1986). These views are unconsciously picked by students and they come to mathematics classroom with an already distorted perception and attitudes towards learning of mathematics. Ying et al (1991) did a study comparing 894 students from 26 schools in Hong Kong. They undertook a study to identify correlations between mathematics achievement and expectations from parents and of students themselves. After conducting multiple regression analyses, they revealed that the parental expectation and student's achievement in mathematics had a strong correlation.

School Influence.

In any given year of learning a student spends more time in school than at home. Much influence on a student's learning could in school given this much time spend therein. While at school he/she goes through a planned school program. He/she is subjected to a curriculum of mathematics which is administered in a classroom. Access to learning resources available in school will determine how students learn mathematics.

If the school administration has not provided sufficient number of these resources, learners, especially girls, are likely to resent mathematics as being too involving and too much competitive. Frequent use of boys names in the end-of-topic exercises make girls to feel that they are "passengers" in mathematics learning. Many authors also suggest that the subject should be gender neutral activity especially in school. While these are good suggestions, and that hands-on activities have also been recommended for secondary school teaching and learning of mathematics, the students still perform dismally.

Gender Factor

Stanic (1995) identified that sex-difference in achievement in mathematics was related to a sex-difference favouring males in terms of confidence in doing mathematics. He asserts that teachers consciously or unconsciously reinforce the confidence of students while teaching mathematics. He further asserts that girls are reinforced differently from boys, an idea similarly shared by Costello (1991).

Gender difference in achievement in mathematics also comes as a result of sex difference in attitudes at secondary school where student's views of the difficulty of mathematics vary. Boys tend to underrate the level of difficulty, and over rate their own competence. Consequently they do less well than they expected. But secondary school girls are more likely to over rate the difficulty

16

and devalue their own expertise and they often achieve better results than they expected (Costello, 1991).

Worth noting also is that student's emotional response to mathematics is more evident in girls than among boys. They exhibit intense anxiety and become vulnerable and may misunderstand questions in an examination. In general girls are doubtful of their competence in mathematics and are less confident in their mathematics ability (Heider, 1946). The decrease in self-confidence and lack of interest leading to formation of attitudes towards learning of mathematics is as a result of the differential treatment of girls and boys receive while in school. Females have been found to be superior in manual dexterity and in rote learning ability while males do well in tests involving divergent thinking (Orton, 1987).

Conceptual Framework

The study seeks to investigate the relationship between two variables student attitude and achievement in mathematics. It does not seek to influence or manipulate either variable. The students' attitude was assessed based on the three clusters of attitude "pupils' confidence", "math usefulness" and "attitude about math teachers". As a correlational study, the variables themselves are neither independent nor dependent.
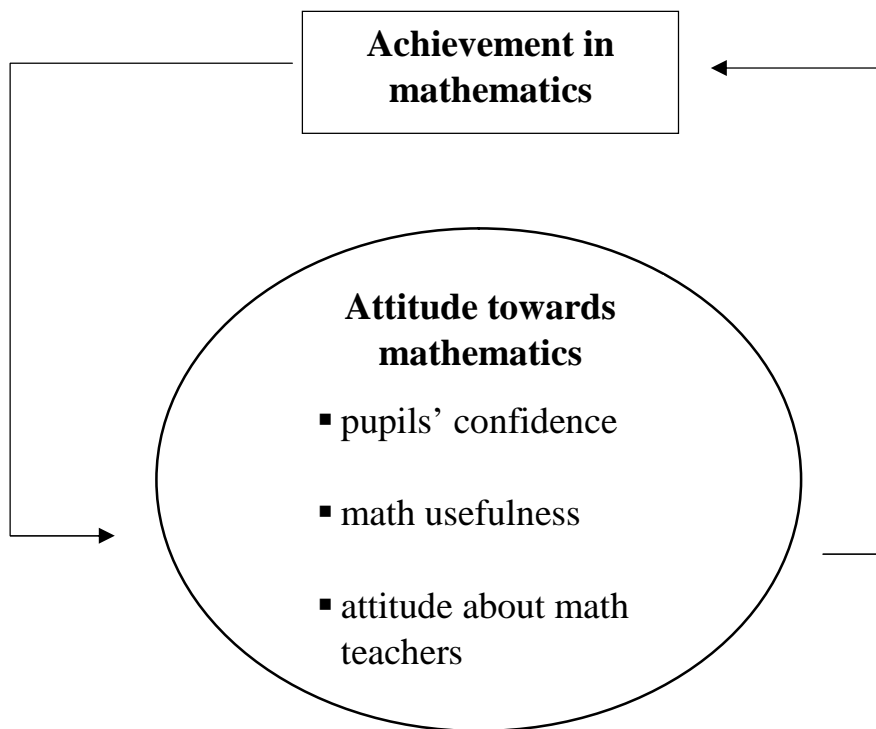
Figure 3.1: Conceptual framework for the study

METHODS AND PROCEDURES

This section highlights or discusses how the study was conducted. It outlines the procedure and strategies which were used to collect and analyse data. It consists of the description of the research design, target population, sampling techniques and sample size, research tools and their pilot study for maintaining validity and reliability, data collection procedures and data analysis.

Research Design

This is the arrangement of conditions for collection and analysis of data. This study adopted a descriptive survey design as it dealt with student's attitude and hence was relevant to the study area. The study seeks to investigate the relationship between student attitude and achievement in mathematics. It does not seek to influence or manipulate either variable. The variables investigated include student attitude and student achievement. Because this is a correlational

study, the variables themselves are neither independent nor dependent. The data was obtained through the use of attitude scale. The students' response was organized and analysed by quantitative approaches then summed up in a descriptive as well as inferential manner according to the objectives.

Target Population

The target population comprises of all the students from 57 community secondary schools running only up to grade X in Dhanusha district. Nine schools were selected for the study. The students from grade IX from each selected schools were particularly targeted due to the fact that at that level, they had been exposed to the greater extent of the mathematics curriculum which could have developed and stabilized their attitudes towards the subject with time.

Sampling Techniques and Sample Size

Multistage random sampling technique was used to select nine community secondary schools from 57 community secondary schools that were only running up to grade X given that most schools were performing the same in the SLC examination. The sampled school comprises about 15% of the total target population of schools.

In the nine sampled schools, there were about 796 students' in selected schools of grade IX. The students' population was categorized into two strata; boys and girls in each selected school and stratified random sampling was used to select students from each strata.

The total population of class nine students from the nine schools selected; School A=94 students, school B=92, school C=94 and school D=84students E=116, F=63, G=70, H=63 and I=120 giving a total of 796 students and the sample size calculated at 15% of 796= 119 participants in total who would be

engaged. The same figure was arrived at by calculating the 15% of the number of boys and girls students in each school.

Research Tools

The researchers conducted a research which is mainly quantitative. Attitude and mathematical achievement were treated as variable without specifying which is the cause and the effect. This enabled the researcher to use the Pearson's coefficient of correlation between the variables to find if there is relationship between attitudes and achievement in mathematics. The data was collected with the help of attitude scale developed by the researcher adopting 12 statements from Fennema-Sherman Mathematics Attitude Scale (1970). Fennema-Sherman Mathematics Attitudes Scales were modified to the meet the local context. The constructed scale consists of 12 statements with three attitude clusters: "pupils' confidence", "math usefulness" and "attitude about math teachers" with 5 possible answers for each using a Likert scale (Appendix A). The answers range from "Strongly Agree" to "Strongly Disagree." Since attitude as a construct, is qualitative in nature, it can be transformed to become a quantitative variable by using the Likert scale. The likert scale is summarized as follows: 5= Strongly Agree, 4= Agree, 3= Undecided, 2= Disagree, 1= Strongly Disagree, however this coding was reversed for negative statements. Each cluster was defined by four statements with two positive and two negative.

The minimum score of the attitude scale is 12 and the maximum score is 60. While for each cluster of attitude scale (consisting of four statements in each cluster), the minimum score is 4 and the maximum score is 20. Higher score than average value indicates more positive attitude whereas lower scores indicates negative attitude. Students who answer questions favouring confidence are more likely to confident in mathematical activity. Students scoring higher on "math usefulness" sub scale means they are more likely to

realize the fundamental value of mathematics and importance in real life. Similarly the higher score on sub scale "attitude about math teachers" represents the positive attitude towards math teacher.

One question regarding problems associated with attitude affecting learning and performance in mathematics was also mentioned in the questionnaire. All students were given the same questionnaire and were given sufficient time to complete it. The researchers obtained the test marks of middle term examination for each participant students in the research sample so as to compare pupil's achievement and their attitudes.

Pilot Study

This includes pre-test and test-retest techniques used to determine validity and reliability of the instrument respectively which were done before the actual data collection**.**

Validity

Validity was determined to ensure that the instrument measures what it purported to measure. A check was done by revising the questions to get rid of ambiguity, wrong phrasing of questions by exposing the instrument to an expert or the supervisor. The questions should convey the same meaning to all respondents. Validity was also determined through piloting or pre- testing. The instrument was administered in a school with the same status as the sampled schools but which was excluded in the final study.

The questions and responses were compared both from the same school and from different schools. Extremely different responses implied different interpretation which meant the question could be rephrased or adjusted so as to convey the same meaning to all respondents (Dahlberg & Mc caig, 2010). Validity was done by checking and comparing the responses with the objectives

stated. The questions also reflected the objectives for the study. This was confirmed by revising the questions against the stated objectives.

Reliability

Reliability concerns the degree to which a measuring instrument gives similar results over a number of repeated trials. Piloting was done in different schools apart from the sampled ones. The schools were of the same level or status in terms of facilitates or performance. By comparing the responses for the various items presented may reflect consistency though they may not be valid. A Test - Retest method was used to estimate the degree to which the same results could be obtained in a repeated trial. One school was be used to obtain responses in the same subjects but at different times e.g. difference of two weeks. It was expected that the response in the 1st and 2nd administration would be nearly the same if the instrument was reliable.

Data Collection Procedures

The constructed questionnaire was administered in Feb 2016. Once permission was granted from sampled school the necessary preparation was completed in order to administer the questionnaires. The researcher was not present during the actual administration of the questionnaire so that the students did not feel any unnecessary pressure. The questionnaires were given to the teachers for distribution. There was an administrative protocol for the classroom teachers to read to the class before the questionnaire was disseminated. The protocol document contained information for the students such as participation in this study would not affect their grades in school and was completely voluntary. In addition, the protocol contained specific directions on the questionnaire, how to respond to questions using a Likert scale was explained. After completion of the questionnaire, school administration was requested to

provide the test marks obtained by the selected students in the middle term examination.

Data Analysis

All the data was coded and entered into SPSS by the researcher's under the guidance of the supervisor to avoid bias, and statistical analyses were conducted. Descriptive statistics like frequency tables, percentage and graphs were used to interpret the findings. A Pearson correlation was conducted to determine the type and strength of relationship present between attitude and achievement in the sampled population. A multiple regression was run to determine which cluster of attitude had the greatest impact on achievement. Finally, a t-test was conducted to conclude if gender affects attitude or achievement.

Chapter - IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter presents the findings of the study based on the data collected from the students in relation to the objectives of the study. The objectives of the study were; to determine the attitudes of students towards mathematics; to examine the correlation between attitudes and achievement in mathematics among ninth grade students; to examine the effect of gender on attitude and achievement in mathematics and to find out problems associated with attitude affecting learning and performance in mathematics. The findings of this study has been presented below in accordance with the objectives stated.

Profile of Respondents

A total of 119 questionnaires were successfully filled and collected for this study. The 119 participants formed 15% of the class IX populations in the schools considered. The proportion of male 60(50.42) and female 59(49.58%) participants were almost equal.

Students' Attitude towards Mathematics

The study sought to identify the opinions of students towards learning and performance in mathematics. This helped in detecting the kind of attitudes they had formed towards the subject. The statements were subdivided into three subgroups; pupils' confidence about learning and performing mathematics, usefulness of mathematics and pupils' views on about mathematics teachers. The responses were put under five categories of a five-point Likert-scale which included strongly agree, agree, undecided, disagree and strongly disagree (Table 4.1).

Table 4.1: Pupils' confidence about mathematics

Item No.	Statement (N=119)	SA%	A%	U%	D%	SD%
C1	I think I could handle more difficult math	5.0	11.8	25.2	24.4	33.6
C2	I can get good grades in math	1.7	16.0	26.9	31.1	24.4
C3	Math is difficult for me	23.5	36.1	27.7	11.8	0.8
C4	I am not the type to do well in math	21.0	31.1	31.9	13.4	2.5

The highest number of pupils strongly agreed or agreed that math is difficult for them measuring a negative attitude towards mathematics. Similarly highest number of students (above 50%) strongly agreed or simply agreed that they can't do well in mathematics. Very few of them strongly agreed or simply agreed that they can get good grades in mathematics. At the mean time large proportion of students (above 50%) strongly disagreed or disagree that they could handle more difficult math. The data clearly shows lack of confidence in pupils tackling mathematical problem.

Table 4.2: Usefulness of mathematics

Item No.	Statement (N=119)	SA%	A%	U%	D%	SD%
U1	Knowing mathematics will help me earn a living	5.9	21.0	34.5	27.7	10.9
U2	Mathematics helps me to develop good reasoning abilities	5.0	21.8	40.3	21.0	11.8
U3	Learning math is a waste of time	16.0	33.6	30.3	17.6	2.5
U4	Math is not important for my life	10.9	18.5	40.3	28.6	1.7

Very few number of pupils who strongly agreed that knowing mathematics will help them to earn a living, and mathematics helps them to develop good reasoning abilities. 16% represented pupils who strongly agreed that learning mathematics is waste of time whilst 33.6% agreed, thereby giving a total 49.6% having negative attitudes on the importance of mathematics.

However, a large number of pupils were undecided about each statement on the usefulness of mathematics. That is, they might not have experienced the utilitarian value of mathematics so far. Thus most of the pupils have negative attitude on the usefulness of mathematics. The above results are contradictory with Lianghuo et al. (2005) who found out that Singapore students had high scores of (91%) on usefulness of mathematics. Lianghuo et al. (2005) stressed that there is need to change students' views from learning mathematics just as a compulsory subject in schools to realize the fundamental value of mathematics by exposing students to more authentic mathematics. According to Olatunde (2009), mathematics knowledge is essential not only for living effectively in society but for making useful contributions towards the development of one's environment.

Table 4.3: Pupils' views about mathematics teacher

Item No.	Statement (N=119)	SA%	A%	U%	D%	SD%
T1	My teachers have been interested in my progress in math	0	3.9	37	33.6	18.5
T2	My teachers have encouraged me to study more math	0	13.4	33.6	33.6	19.3
T3	My teachers think advanced math will be a waste of time for me	16.0	27.7	37.0	19.3	0
T4	Getting a teacher to talk seriously with me about math is a problem	32.8	33.6	26.9	5.9	0.8

Statement T1, T2, T3, and T4 were evaluating pupils' attitudes toward mathematics teachers. 18.5% strongly disagreed that mathematics teachers had interest about their progress in math along with 33.6% disagreement adding to 52.1%. Similarly one third disagreed that mathematics teachers encourage them to study more math with 19.3% strongly disagreed. Adding the proportion of strongly agreed (32.8%) or simply agreed (33.6%), more than half of the students think that they don't find any teacher who seriously talk about math with them. Similarly many of them agreed or strongly agreed their teacher think

that advanced math would be a waste of time for them. Thus the pupils' attitude towards mathematics teachers is negative.

Correlation between Attitude and Math Achievement

The Table 4.4 shows that there was a positive relationship between math attitude and achievement, r=0.548. The correlation is statistically significant at the .01 level. The three sub-categories or cluster of attitude considered in this study are "pupils' confidence"," math usefulness" and "attitude about math teachers" and were also significantly correlated with math achievement. Pupils' confidence had the highest positive correlation with math achievement than other two cluster of attitude.

Table 4.4: Correlation between attitude and math achievement

(N=119)	Math Achievement	
	Pearson correlation	Sig. (2-tailed)
Attitude about Pupils' confidence	0.847[*]	0.000
Math usefulness	0.469[*]	0.000
Math teachers	0.348[*]	0.000
Overall attitude	0.548[*]	0.000

[*]correlation is significant at 0.01 levels (2- tailed).

Multiple correlation coefficient (R=0.853) ensures that the three sub-categories of attitude are strong enough to predict mathematics achievement and 72.8% (R^2=0.728) of variation in mathematics achievement can be predicted by the combination of these three variables. The regression model was also statistically significant.

The next question examined was "Which cluster of the attitude had the greatest impact on achievement?" Modified Fennema- Sherman Math Attitude Scale asks twelve questions, each related to a certain trait. These traits include "pupils' confidence", "math usefulness" and "attitude about math teachers". These four traits serve as predictors of mathematics achievement. The

appropriate statistical analysis, multiple regressions, was conducted and summarized in Table 4.5.

Table 4.5: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.261	1.979		4.679	.000
	Pupils' confidence	1.903	.135	.889	14.136	.000
	Math usefulness	.108	.175	.036	.618	.538
	Attitude about math teacher	-.399	.191	-.120	-2.096	.038

a. Dependent Variable: Achievement

Two cluster was statistically significant. "Pupils' confidence" with a 0.889 correlation coefficient, had a large, positive effect on achievement and is statistically significant while "attitude about math usefulness," with a 0.036 correlation coefficient, had a moderately positive impact on achievement though not statistically significant. "Attitude about math teachers" had negative correlations coefficient -0.120 with math achievement but statistically significant. The regression equation developed for total sample (N=119) to predict achievement in mathematics of grade IX students on the basis of attitude towards mathematics is:

$$AIM= 9.261 +1.903*PC+0.108*MU-0.399*AMT$$

Where,

AIM = Achievement in mathematics,

PC   = pupils' confidence and

AMT = attitude about math teacher

The next question studied was "Does gender affect attitude or achievement?" There was one categorical predictor, gender, with two exclusive levels, male and female. The appropriate statistical analysis a two independent sample t-test was conducted. Table 4.6 summarizes the descriptive statistics while Table 4.7 displays results of the Independent Samples T-Test.

Table 4.6: Group statistics

	N	Mean	Std. deviation	Std. error of mean
Math achievement	119	24.67	7.851	.720
Pupils' Confidence	119	9.45	3.666	.336
Math usefulness	119	11.19	2.614	.240
Math teachers	119	9.50	2.354	.216
Overall attitude	119	32.26	7.784	.714

Table 4.7: Independent sample T-test

		N	Mean	Std. deviation	Std. error of mean	t	df	Sig.
Math achievement	M	60	26.90	8.223	1.062	3.245	117	0.002
	F	59	22.41	6.803	0.886			
Pupils' Confidence	M	60	10.57	4.248	0.548	3.509	96.443	0.001
	F	59	8.32	2.252	0.329			
Math usefulness	M	60	12.02	2.926	0.378	0.3652	102.841	0.000
	F	59	10.36	1.945	0.253			
Math teachers	M	60	10.05	2.281	0.294	2.656	117	0.009
	F	59	8.93	2.311	0.301			
Overall attitude	M	60	32.63	8.105	1.046	0.525	117	0.600
	F	59	31.88	7.493	0.975			

Because the significance value for Levene's Test was greater than .05 for math achievement, and overall attitude as well as for a cluster of attitude i.e. "attitude towards math teacher", equal variances were assumed while for two cluster of attitude i.e. "pupils' confidence" and "math usefulness", the significance value for Levene's Test was less than .05, so equal variance were not assumed. The above tables show that gender does have a significant impact

on achievement, but not on overall attitude. However gender does have significant impact on each of the cluster of attitude when considered separately. On average, males (M=26.90) had slightly higher scores for math achievement than females (M=22.41). This difference was significant t(117) = 3.245.

The attitude of male students are slightly positive in comparison to female students in all the three clusters of attitude and the difference is statistically significant for each cluster of attitude separately. Male students were found to be more confident of solving mathematical problem than the female students. Similarly, male students found mathematics more useful in their life than the female students. Male students viewed mathematics teacher as being important, motivated and encouraging them slightly more than the female students.

However the difference in overall attitude was not significant $t(117)=0.525$, p=0.600. The result reveals that the mean score of overall attitude is around 32.26 (Table 4.5) which is halfway between minimum and maximum attitude score of 12 to 60 respectively showing that the attitude was not more effectively positive towards mathematics. Analysing the data individually on each cluster of attitude, the mean attitude score for each cluster was below the average (M=12) or equal to average showing a negative attitude towards different dimension of math learning and performing process. More specifically the students were less confident when it comes to deal with mathematical problem. They didn't understand the usefulness of mathematics in their real life and in future and the mathematics teachers were not found to be more supportive or motivating in teaching and learning process.

Problems Associated with Attitudes Affecting Learning and Performance in Mathematics

The respondents were asked to identify some of the problems they experienced that affected their learning of mathematics and eventually affecting their performance in the subject. Their views are summarized in the Figure 4.1.
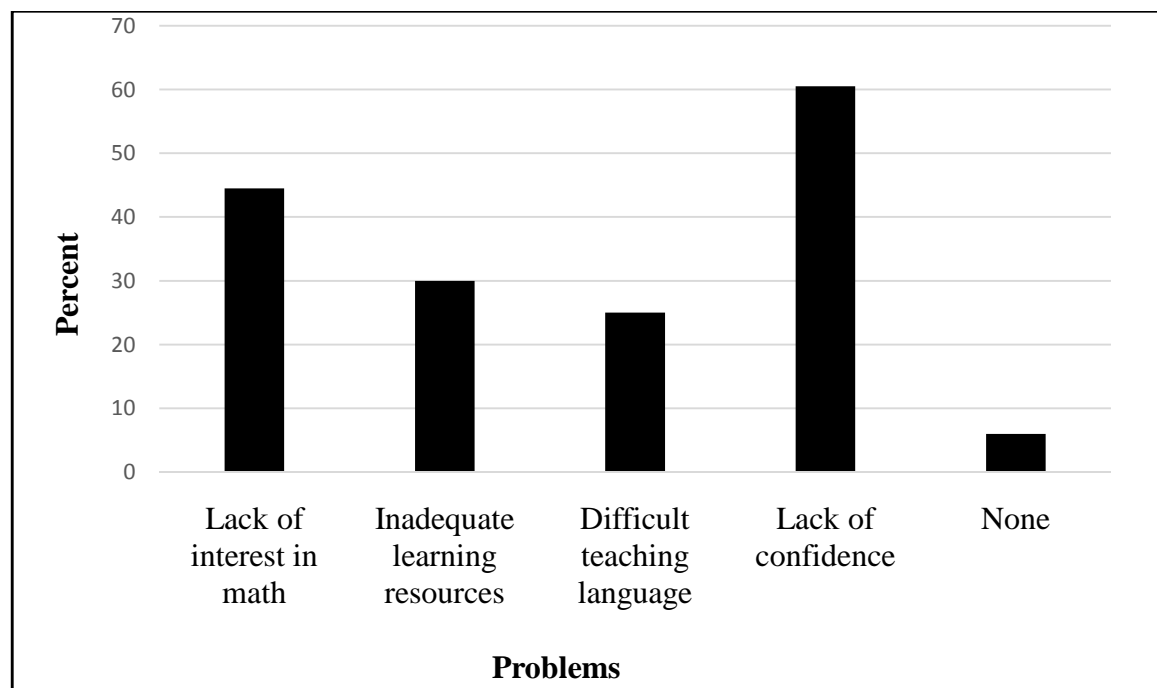

Figure 4.1: Problems associated with attitudes affecting learning and performance in mathematics

The major problems in the learning and performance in mathematics in the secondary schools included lack of confidence in the ability to learn and perform well in mathematics as reported by more than half (60.5%) of the respondents. Lack of interest in mathematics was mentioned by 44.5% of the respondents while lack of teaching facilities such as textbooks and learning resources was mentioned by 30% of the respondents. Difficult language used by the teacher was cited by 25% of the respondents while only 6% of the respondents reported that they experienced no problems learning mathematics.

31

Ryan et al. (1997) showed that students who perceived themselves as cognitively competent were less likely to avoid seeking help, whereas, students who were unsure of themselves were more likely to feel threatened when asking their peers for help and more likely to avoid seeking help. Students with high confidence in mathematics do not attribute their need for help to lack of ability and thus are more likely to seek help when they need it.

Chapter - V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

After analysing and interpreting the data, the researcher has presented the summary of the study, findings, deriving conclusion and provide some recommendations for pedagogical purpose.

Summary

The main aim of the study was to find the relationship between attitude and achievement in mathematics of students of secondary level. For the study, nine community secondary level school from Dhanusha district were selected purposively and the 119 students from the respective schools were selected by stratified random sampling technique. The specific objectives of the study were:

- To determine the attitudes of students towards learning mathematics.
- To find out correlation between attitude and achievement in mathematics.
- To explore the effect of gender on attitude and achievement in mathematics.
- To find out problems associated with attitudes affecting learning and performance in mathematics.

To fulfil these objectives the researcher used modified mathematics attitude scale adopted from Fennema-Sherman (1970) Mathematics Attitude Scale. It consisted of 12 statements divided on three cluster each having four statement with two positive and two negative statements. The answers range from "Strongly Agree" to "Strongly Disagree." The Likert scale is summarized as follows: 5= Strongly Agree, 4= Agree, 3= Undecided, 2= Disagree, 1= Strongly Disagree, however this coding was reversed for negative statements. And finally the mathematics achievement of the selected student achieved on

middle term examination was obtained from school to find correlation between attitude score and mathematics achievement.

The obtained data were analysed with the help of percentage, standard deviation, Pearson's correlation coefficient and independent sample T-test to compare the significant difference of mean scores of attitude and achievement of students taking 0.05 level of significance.

Summary of the Findings

Statistical analysis of the data gives the following results as the findings of the study.

- The findings of the study indicate that the students have a negative attitude towards mathematics based on the fact that the overall attitude score of students was found to be 32.26 which is lower than even the maximum score of undecided response (36). The findings showed that the students lacked confidence in solving mathematical problems as majority of the respondents either agreed or strongly agreed that math is difficult and they can't to do well in mathematics.

- The respondents were not able to realize the beauty and usefulness of mathematics in the real life problem. Majority of them think that mathematics is of no use in future and view learning mathematics as a waste of time.

- The attitude of students towards mathematics teacher is very negative. Most of them didn't find their teacher encouraging them for learning more advanced mathematics, nor do the teachers show any interest in the progress of students in math.

- The attitudes of male (32.63) were slightly positive than the female attitude (31.88), however the difference was not statistically significant.

- The average achievement in mathematics was 24.67 which is less than 50% (25) marks, clearly showing below average performance.

- The mathematics achievement of male students (26.90) was slightly higher than the girls (22.41) and this difference in achievement was statistically significant.

- All the three cluster of attitude along with the overall attitude (r=0.548) established significant positive correlation with achievement in mathematics. And about 72.8% variation in the achievement was found to be predicted by the combination of the three cluster of attitudes.

- Lack of confidence (60.5%) followed by lack of interest (44.5%) were the major problems associated with attitude affecting learning and performance in mathematics.

Conclusions

- The study concludes that the attitude of students towards mathematics is negative.

- Most of the students lack self-confidence and are ambiguous of the usefulness of mathematics due to its abstract nature.

- Mathematics have been portrayed as a complex subject. Thus self-confidence is a major problem associated with attitude contributing poor learning and performance in mathematics.

- There is a significant positive correlation between attitude and achievement in mathematics.

- Gender has significant impact on achievement but not on the attitude towards mathematics.

Recommendations

The study makes the following recommendations:

- The recommendations from this research study are mostly targeted to improve the academic achievement of pupils at basic level mathematics in national examinations by addressing some of the attitudinal problems which emerged from this study.

- Since most pupils generally regard mathematics as a complex and abstract subject, mathematics teachers must teach the subject at slower pace and show a lot of positive attitudes in form of patience.

- Teachers should ensure that all the problems which pupils forward to them are solved in a way which does not offend those who have asked them. Teachers must ensure that they treat all the pupils equally, without showing a lot of positive attitudes towards fast learners.

- The curriculum designers and the teachers should articulate well on the usefulness and applicability of mathematics in general so that students create positive minds towards the subject and subsequently strive to improve in the subject.

References

Ashby, B. (2009). Exploring children's attitude towards mathematics. In: M. Joubert (ed.), proceedings of the British Society for Research into learning mathematics, 29(1): 7-12.

Bohner, G., & Wänke, M. (2002). *Attitudes and attitude change*. Psychology Press.

Burstein, L. (1992). The analysis of multilevel data in education research and evaluation. *A review of research in education journal, 8:* 158-223.

Cater, G. S., & Norwood, K. S. (1997). The relationship between teacher and student's belief about mathematics. *School science and mathematics, 97*(2): 62-67.

Cockcroft, W. H (1982). *Mathematics Counts*. London: H.M. Stationery Office.

Costello, J. (1991). *Teaching and learning mathematics 11-16*. London: Routledge. Callahan, W. J. (1981). Adolescent attitudes towards mathematics. *Mathematics Teacher,* 66 (4): 751-755.

Daneshamooz, S., & Alamolhodaei, H. (2012). Cooperative learning and academic hardiness on students' mathematical performance with different levels of mathematics anxiety. *Educational Research, 3*(3): 270-276.

Daskalogianni, K. & Simpson, A. (2000). Towards a definition of attitude: the relationship between the affective and the cognitive in pre university students. Proceedings of PME 24, vol. 2, 217-224, Hiroshima, Japan.

Eagly and Chaiken, (1993). *The psychology of attitudes*, Fort Worth, NY: Harcourt Brace Jovanovich

Engle, P., Grantham-McGregor, S., Black, M., Walker, S., & Wachs, T. (2007). How to avoid the loss of potential in over 200 million young children in the developing world. *Child health and education, 1* (2): 67-87.

Ernest, P. (2004). Images of mathematics, values and gender. In S. Johnston-Wilder & B. Allen (Eds.), *Mathematics education: Exploring the culture of learning*. Routledge.

Eshun, B. (2004). Sex-differences in attitude of students towards Mathematics in secondary schools. *Mathematics Connection*, 4: 1-13.

Evans, K. M (1965). *Attitudes and interest in education.* London: Routledge and Keg and Paul.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison – Wesley.

Flanders, N. A. (1965). The influence pupils attitudes and achievement. *Co-operative Research Monograph No. 128.* Washington D.C.

Ford, M. I. (1994). Teachers' beliefs about mathematical problem solving in the elementary school. *School Science and Mathematics, 94*(6): 314-322.

Georgiou, S. Stavrinides, P. & Kalavana, T. (2007). Is Victor better than Victoria at maths? *Educational Psychology in Practice,* 23(4): 329–342.

Goldin, G. (2002). Affect, meta-affect, and mathematical belief structures. In: G. Leder, E. Pehkonen & G. Törner (Eds.). Beliefs: A hidden variable in mathematics education? Dordrecht: Kluwer.

Hamachek, D. E. (1971). *Encounters with the Self.* Holt, Rinehart and Winston, New York.

Hart, L. (1989). Classroom processes, sex of students and confidence in learning Mathematics. *Journal of Research in Mathematics Education*, 20(3): 242-260.

Heider, F (1946). Attitude and cognitive organizations. *Journal of Psychology* 21:107 - 112

Kaino, L. M. (1998): Some Swaziland high school student's attitudes towards the study of mathematics. *Journal of the Southern African Association for Research in Mathematics and Science Education,* 2(1):*33-38.*

Karp, K. (1991). Elementary school teacher's attitude toward mathematics: The impact on student's autonomous learning skills. *School Science and mathematics, 9*(16): 265-270.

Klein, M. (2004). The premise and promise of inquiry based mathematics in pre-service teacher education: A poststructuralist analysis. *Asia-Pacific Journal of Teacher Education, 32*(1): 35-47.

Kö ce, D., Yıldız, C., Aydın, M., & Altında , R., (2009). Examining elementary school student's attitudes towards mathematics in terms of some variables, *Procedia Social and Behavioral Sciences, 1*(1): 291-295.

Lianghuo, F. Seng, Q, K. Yan, Z. Me1 Y, S. & Yee, L.P. (2005). *Assessing Singapore Students Attitudes towards Mathematics and Mathematics learning*. Retrieved from http:math.ecnu.edu.cn/earcome3/TSG6/4-Fan%20L ().doc.

Ma, X. & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: a meta-analysi. *Journal for Research in Mathematics Education*, 28(1): 26–47.

Mac nab, D. S., & Cummine, J. A. (1986). *Teaching mathematics 11-16: A difficult-centered approach*. London: Basil Blackwell Ltd.

Maio, G., Maio, G. R., & Haddock, G. (2010). *The psychology of attitudes and attitude change*. SAGE Publications Ltd.

Maria de Lourdes mata et al, (2012). Attitudes towards Mathematics: effect of individual, motivational and social support factors. *Journal of Educational Research*. Hindaw publishing corporation Lisbon, Portugal.

Maritim, E. K. (1979). The academic self-concept and the teachers' perception: Their relationship to pupils' grade attainment in rural Kenya. Unpublished Ph.D. Thesis, Harvard University, London.

McLeod, D.B. (1992). Research on affect in Mathematics Education: A reconceptualization. In: D.A. Grouws (Ed.). Handbook of research on mathematics learning and teaching, (pp. 575-596). New York: Macmillan Publishing Company.

Nicolaidou, M. & Philippou, G. (2003).Attitudes towards mathematics, self-efficacy and achievement in problem solving. *European Research in Mathematics Education III*, M. A. Mariotti, Ed., pp. 1–11, University of Pisa, Italy.

Olatunde, Y.P. (2009). Students Attitude towards Mathematics and Academic Achievement in Some Selected Secondary Schools in Southwestern Nigeria. *European Journal of Scientific Research,* 3:336-341.

Orton, A. & Wain, G. (1994). *Issues in teaching mathematics.* London: Cassel Wellingon House.

Orton, A. (1987). *Learning mathematics issues theory and classroom practice.* London: Cassel Education Ltd.

Papanastasiou, C. (2000). Effects of attitudes and beliefs on mathematics achievement. *Studies in Educational Evaluation, 26:* 27-42.

Reitzes, D. C., & E. Mutran, (1980). Significant others and self-conceptions: Factors influencing educational expectations and academic performance. *Sociol Edu, 53*(1): 21-32.

Richardson, F. C., & Suinn, R. M. (1972). The mathematics anxiety rating scale: Psychometric data. *Journal of Counseling Psychology*, *19*(6): 551-554. http://dx.doi.org/10.1037/h0033456

Rubinstein, M. F. (1986). *Tools for thinking and problem solving*. New Jersey: Prentice Hall

Ryan, A., & Pintrich, P.R. (1997). Should I ask for help? The role of motivation and attitudes in adolescents" help seeking in math class. *Journal of Educational Psychology*, 89(2): 329 341.

Stanic, G. M. A & Hart, L. E. (1995). Attitudes, persistence and mathematics achievement: qualifying race and sex difference in Secada, W.G, Fennema, E and Adajiana, L.B (Eds.). *New Directions for Equity in Mathematics Educations.* (pp 258-276). New York: Cambridge University Press.

Suan, J. S. (4-5 March, 2014). *Factors affecting underachievement in mathematics*. Proceeding of the global summit on education GSE 2014. Kuala Lumpur, Malaysia.

Tahar, N. F., Ismail, Z., Zamani, N. D., & Adnan, N. (2010). Student's attitude toward mathematics: The use of factor analysis in determining the criteria. *Procedia-Social and Behavioral Sciences*, *8:* 476–481.

Tobias, S. (1993). *Overcoming math anxiety: Revised and expanded*. New York: W. W. Norton.

Twoli, N.W. (1986). Sex difference in science achievement among secondary school students in Kenya. Unpublished PhD Thesis. Flinders University of South Australia

Wang, M. C., Haertel, G. D., & Walberg, H. J. (1993). Toward a knowledge base for school learning. *Review of Educational Research, 6*: 249-294.

Wasiche, J. L (2006). Teaching techniques that enhance students' performance in mathematics in selected public secondary schools in Butere-Mumias District. Kenya. Unpublished M.Ed Thesis. Kenyatta University.

Williams, W. V. (1988). Answers to questions about mathematics anxiety. *School Science and Mathematics, 88*: 95-104. http://dx.doi.org/10.1111/j.1949-8594.1988.tb11786.x

Yilmaz, C., Altun, S. A., & Ollkun, S. (2010). Factors affecting students" attitude towards math: ABC theory and its reflection on practice. *Procedia Social Science and Behavioural Sciences, 2:* 4502-4506.

Ying, W. N & Ching, C. S. (1991). Attitudes towards learning mathematics among secondary school students in Hong Kong. *Educational Journal 19*(1): 13-18.

Zan, R. & Martino, P. (2007). *Attitude toward mathematics: overcoming the positive/negative dichotomy, in Beliefs and Mathematics,* B. Sriraman, Ed., The Montana Mathematics Enthusiast: Monograph Series in Mathematics Education, pp. 197–214, Age Publishing & the Montana Council of Teachers of Mathematics, Charlotte, NC, USA.

Appendix - A

Mathematics Attitude Scale

School's Name:

Participant Roll No.:   Gender:

We are about to begin the questionnaire. It will not affect your grade and participation is voluntary. There are12 statements and each one has five choices.

SA=Strongly Agree, A=Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

Please tick (ð) only one answer of your choice

Item No.	Statement	SA	A	U	D	SD
C1	I think I could handle more difficult math					
C2	I can get good grades in math					
C3	Math is difficult for me					
C4	I am not the type to do well in math					
U1	Knowing mathematics will help me earn a living					
U2	Mathematics helps me to develop good reasoning abilities					
U3	Learning math is a waste of time					
U4	Math is not important for my life					
T1	My teachers have been interested in my progress in math					
T2	My teachers have encouraged me to study more math					
T3	My teachers think advanced math will be a waste of time for me					
T4	Getting a teacher to talk seriously with me about math is a problem					

Q. Which of the following problems do you think affect you most when learning Mathematics?
  i.)   Lack of interest in mathematics [ ]
 ii.)   Inadequate mathematics textbooks and learning resources [ ]
iii.)   Language used by the teacher is difficult to understand [ ]
 iv.)   Lack of confidence [ ]
  v.)   None [ ]
Any other (please specify)………………………………………………………………….
…….

Appendix - B

List of Sampled School

Sampled Schools	Girls	Boys	Total
1) Ma. V. sohani, Mujeliya, ward No.-4	50	44	94
2) Ma. V. Kuwa Rampur, ward No.-12	44	48	92
3) Ma. V. Aurahi, ward No.-4	48	46	94
4) Sarasawati Ma. V. Bafai, ward No.-9	48	36	84
5) Yadav Ma. V., Baghchaur, ward No.-9	40	76	116
6) Janta Ma. V., Shivapur, ward No.-2	23	40	63
7) Janta Ma. V., Hariharpur, ward No.-5	41	29	70
8) Nanda Kumari Karki Ma. V., Jhatiyahi, ward No.-4	29	34	63
9) BP Koirala Ma. V., Sapahi, ward No.-7	69	51	120
Total	**392**	**404**	**796**