

ST. JOHN'S UNIVERSITY OF TANZANIA



**FACTORS INFLUENCING STUDENTS' ATTITUDE TOWARDS SCIENCE
SUBJECTS IN SECONDARY SCHOOLS. THE CASE OF MVOMERO DISTRICT,
TANZANIA**

By

JAPHET DAMAS

**A Dissertation Submitted in Partial Fulfilment of the Requirements for the
Award of Degree of Master of Arts (Education) of St. John's University of
Tanzania**

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CERTIFICATION

I, the undersigned, certify that I have read and hereby recommend for acceptance by St. John's University of Tanzania a dissertation entitled **Factors Influencing Students ' Attitude towards Science Subjects in Secondary Schools: The Case of Mvomero District, Tanzania** in fulfilment of the requirements for the degree of Master of Arts in Education of St. John's University of Tanzania.

PROF. MARTHA J NHEMBO

.....

(Supervisor)

Date

DECLARATION

I, **Japhet Damas** declare that this dissertation is my own original work. It has not been and will not be presented for any other course of study. I confirm that, appropriate credit has been given where reference has been made to the work of others.

Signature

DEDICATION

For my parents and my family

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ABSTRACT

The main purpose of the study was to explore the factors influencing student's attitudes towards science subjects in secondary schools. The study employed a qualitative research approach, particularly the case study design. The findings were obtained from two DEOs, 10 science teachers, and 24 science stream students, making a total of 36 informants. Participants were selected using purposive sampling. Data were collected through interview, focus group discussion (FGD) and documentary review. Thematic analysis was used to analyse data.

The study revealed that most students in Mvomero District had negative attitude towards science subjects in secondary schools. Also, it was found that previous science experiences, anxiety over career opportunities and inadequate teaching and learning materials influenced students' attitudes towards science subjects. The study revealed factors like providing enough teaching and learning materials and increasing the number of science teachers in secondary schools as some of the solutions to the problem of students' negative attitude towards science subjects. This study recommends, among other things, that there was a need to equip schools with all necessary teaching and learning resources; capacity be improved for teachers to be able to understand the need for improvisation of teaching and learning materials; in service training be carried out in schools to help teachers use learner centred approach to present the content.

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LIST OF ABBREVIATIONS AND ACRONYMS

BI	Behavioural Intention
CSEE	Certificate of Secondary Education Examination
DEOs	District Education Officers
FGD	Focus Group Discussion
ROSE	Relevance of Science Education
S1	School One
S2	School Two
SAH	Science and Allied Health
SMP	School Mathematics Project
SN	Subjective Norms
SSCE	Senior Secondary Certificate Examination
SSP	School Science Project
TLRP	Teaching and Learning Research Programme
TRA	Theory of Reasoned Action
UK	United Kingdom

CHAPTER ONE

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 Introduction

Chapter One addresses various aspects that clarify the problem. These aspects include background information to the research problem, statement of the problem, objectives, research questions, purpose and significance of the study, scope and delimitation of the study, definitions of key terms and the chapter summary.

1.2 Background to the Research Problem

Research on students' attitude in science subjects has been a substantive feature of the work of the science education research community for the past five decades (Osborne et al., 2003). As a result, development of positive attitudes towards science subjects and learning science, which has always been a constituent of science education, is increasingly a subject of concern for all education stakeholders all over the world (Trumper, 2006).

According to Najafi, Ebrahimitabass, Dehghani and Rezaei (2012), science education is important especially in this era of globalization because it improves science and the use of technology and increases the scientific development in higher education and other related fields. Its current importance is emphasized by the now mounting evidence of students' increasing reluctance to choose science courses in their final years of secondary education (Najafi et al., 2012). The importance of science education is based on its implications, not only for the continuity of scientific endeavour but also, for the scientific literacy of future generations in the world (Trumper, 2006).

Craker (2006) argues that many factors can affect students' attitude towards science subjects, including previous experiences, social influences, type of science courses taken, previous science experiences and science teachers. The study conducted by Weinburgh (1998) reveals that nearly fifty percent of students may lose interest in science by the third grade. Weinburgh add that participation in science is also being affected, as the number of students preparing for a science-related career is on the decline.

In UK, a commentary by the Teaching and Learning Research Programme [TLRP] (2006) report that very few students opt for science subjects at school once science subjects ceased to be compulsory. This situation leads to fewer applications for science degrees and reduces the supply of science graduates (TLRP, 2006). Furthermore, the number of young students entering non-graduate occupations involving science or technology is reduced, the situation which leads to skills shortages in many sectors (TLRP, 2006).

Another study by Craker (2006) on the attitudes toward science of students enrolled in introductory level science courses at the University of Wisconsin-La Crosse in the areas of personal confidence, usefulness of the subject, perception of the subject as a male domain, and perception of the teacher's attitude indicates that male students have more confidence than female students, and female students perceive science as a male domain more than male students. Similarly, another study conducted in Iran by Najafi et al. (2012) on students' attitude towards science and technology reveals that there is a meaningful difference between male students' and female students' points of views in attitude towards sciences and technology. The result shows that male students have higher averages than the female students.

In Nigeria, a study by Jebson and Hena (2015) on students' attitude towards science subjects in senior secondary schools in Adamawa state reveals that students in Adamawa state have positive attitude towards science subjects and gender has significant effect on their attitude where male students have more positive attitude toward science subjects than their female' counterpart.

Erinosho (as cited in Olasehinde & Olatoye, 2014) noted that Nigerian data indicates that female students formed 32% of arts students, 28% social sciences students, and a mere 17% of the natural sciences in the CSEE in 1999-2004. Moreover, female students participation in higher education show the disparity across disciplines; for every female that is enrolled for University courses in 2000 to 2004, eight males are in engineering science, three in environmental sciences, and two in the natural sciences. To make things even worse, females constitute a paltry 10.2% at the level of academic staff. For every female academic staff in different disciplines, there are twenty-six males in engineering, fourteen in environmental sciences, and seven in the basic sciences (Erinosho as cited in Olasehinde & Olatoye, 2014).

In Tanzania, a serious decline in interest of students in science subjects and poor quality of science classroom teaching has been witnessed (Mabula, 2012). The science courses seem more relevant to those students with science career aspirations and not to the majority for whom secondary science is terminal (Mabula, 2012). According to Mabula (2012), there is a high rate of students dropping science subjects which are not compulsory. In 2010 for instance, out of 350,904 candidates who sat for Form Four national examination 60.4% dropped Chemistry course and 74% dropped physics course. The drop out ratio in optional science subjects is extraordinary high (Nyamba & Mwajombe, 2012).

In an effort to improve science teaching and learning in secondary schools, the government of Tanzania introduced several projects including School Science Project (SSP) and School Mathematics Project (SMP) (Osaki, 2007). The focus of these projects is to improve the teaching strategies and adequate use of available teaching materials in the school and students' learning environment. The teaching materials and strategies for these projects focused on experimental approach for teaching and learning. These programmes are also focused on laboratory activities and a great deal of outdoor activities (Osaki, 2007).

Despite of the projects above which have introduced by the government of Tanzania to help secondary school students to develop positive attitudes towards science subjects, less emphasis has been made to improve teaching of science in secondary schools (Kihwele, 2014). This has led to not only poor performance in final examinations, but also fewer students who are studying science subjects (Kihwele, 2014). This learning gap in science subjects appears to widen throughout early secondary school and persists throughout their schooling (Kihwele, 2014).

1.3 Statement of the Problem

Previous studies conducted by Mabula (2012), Nyamba and Mwajombe, 2012) and Kihwele (2014) indicate that there are serious decline in interest of students in science subjects as too few students opt for science subjects at school. More specifically, studies related to students' attitudes towards science subjects have shown that participation in science is also being affected, as the number of students preparing for a science-related career is on the decline (Kihwele, 2014). While this is the state of affairs, there is little concern about decline of secondary school students who opt for science subjects.

Despite the fact that researches on students' attitude in science subjects has been a substantive feature of the work of the science education research community for the past 40 years (Osborne et al., 2003), negative attitudes towards science subjects among secondary school students has been increasing day after day (Mabula, 2012). Therefore, there is a need for more research to be done on the phenomena to investigate the extent of this problem. This study, therefore, will contribute to the growing knowledge in this identified gap in the literature.

1.4 Research Objective

1.4.1 General objective

The general objective of this study is to explore the factors influencing student's attitudes towards science subjects in secondary schools.

1.4.2 Specific objectives

In particular, this study was guided by the following specific objectives;

- i. To assess students' attitudes towards science subjects.
- ii. To identify the factors for students' attitude towards science subjects.
- iii. To determine possible recommendable solutions to the students' negative attitude towards science subjects.

1.5 Research Questions

In line with specific areas of investigation, three research questions have developed to guide this study. These are:

- i. What are the student's attitudes towards science subject?
- ii. What are the factors for students' attitude towards science subjects?
- iv. What are the possible recommendable solutions to the students' negative attitude towards science subjects?

1.6 Significance of the Study

The intent of this study was to help in generating the much needed information that would be used by various stakeholders in education sector to develop positive attitudes towards science subjects among secondary school students. Through this study, the assessment results would help students to identify their areas of strength and weaknesses and make necessary adjustments to fill the gaps in the future. The

results would also help students to think of their own learning and redirect their efforts where necessary and in appropriate direction of needs. The study would also help other efforts in identifying the root cause of high rate of dropping science subjects. This understanding would give teachers, educators and other stakeholders the clues of how to motivate and encourage students to choose science subjects than to drop them. The study would also furnish policy makers, Ministry of Education and Vocational Training and politicians with information on the factors influencing students' attitudes towards science subjects; hence giving them a leeway to formulation of better policies regarding science education, based on researched information. Lastly, the study would add to the existing body of knowledge and act as a stepping-stone for later researchers in similar studies.

1.7 Scope and Delimitation of the Study

The study was conducted within the jurisdiction of Mvomero District where two (2) secondary schools was involved to explore the factors influencing student's attitudes towards science subject in secondary schools.

1.8 Operational Definitions of Key Terms

Students: A group of people formally engaged in learning, especially those enrolled in an accredited educational institution and are expected to spend a minimum aggregate of given hours per week in a classroom or similar instructional setting during most of the term of enrolment (Kalanda, 2005). In this study, the term student will be used to address students' attitude towards science subject in secondary schools.

Attitudes: Attitudes are psychological constructs theorized to be composed of emotional, cognitive and behavioural components. Attitudes serve as functions including value expressive, social expression, defensive functions and utilitarian, for the people who hold them (Newbill, 2005). In this study, the term attitudes will be used to address students' emotional, cognitive and behavioural components towards science subjects in secondary schools.

1.10 Chapter Summary

This chapter builds the foundation for exacting students' attitude towards science subjects in secondary schools in Mvomero District; it focuses on the background of the study, statement of the problem, objectives, research questions, significance, scope and delimitation of the study and definition of key terms.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 Introduction

Chapter two provides the theoretical framework, conceptual framework and review of empirical literature related to the study. Review of literature was arranged under headings and subheadings.

2.2 Theoretical Framework

In this study, Theory of Reasoned Action (TRA) postulated by Azjen and Fishbein was employed to enlighten the phenomena of students' attitude, beliefs and behaviour towards science subjects in secondary schools. The theory emphasizes that behaviour is predicted by an individual's intention to engage in a given behaviour (Azjen & Fishbein, 1975). Intention, in turn, is predicted by two factors, the individual's attitude towards the outcome of the behaviour and by the opinions of the person's social environment, which is called the subjective norm (Azjen & Fishbein, 1975). The person's social environment and school environments as social settings include the perspective of TRA in the present study. According to Azjen and Fishbein (1975), students' attitudes and behaviour are intimately related to the opinions of the students' social environment and other adjoining social events as the student interacts with people in the environment.

Jebson and Hena (2015) assert that, there are three general construct of the components of TRA namely: Behavioural Intention (BI); Attitude (A); and Subjective Norms (SN). Behavioural intention depends on the person's attitude about the behaviour and subjective norms ($BI=A+SN$). This means that a person in a community with intention of doing certain behaviour then it is likely that he/she will do it (Jebson & Hena, 2015). Jebson and Hena (2015) add that the person's attitude towards the behaviour and the subjective norms guide a person's intentions. Attitude concerns with beliefs about the consequences of performing the behaviour and person's valuation of these consequences (Jebson & Hena, 2015). Subjective Norm is a combination of expectations from individuals or social groups supported by intentions to comply with these expectations (Jebson & Hena, 2015).

TRA presupposes that attitude towards science denote interest or feeling towards studying science where a number of factors can influence a person's attitude,

including previous experiences and social influences, type of science courses taken, previous science experiences, science teachers, and various other factors can influence these attitudes toward science (Morrell & Lederman, 1998). According to Jebson and Hena (2015) attitude in science means favourable or unfavourable feelings about science as a school subject. Jebson and Hena add that students' favourable attitude towards science subject influences their success in that areas while constant failure in science subjects makes a student to believe that he/she can never do well on the subject thus accepting defeat. To change attitudes, new attitudes must serve the same function as the old one (Jebson & Hena, 2015).

In this study, TRA implies that, students' attitudes and behaviour are intimately related to the opinions of the students' social environment and other adjoining social events as the student interacts with people in the environment. Thus, teachers can create favourable attitude towards science subject in order to influence students to build positive attitude towards science subjects. In this case, new attitudes must be created to serve the same function as the old one in order to change students' attitudes. Similarly, in this study TRA was used to explore the factors influencing student's attitudes towards science subjects in secondary schools.

2.3 Review of Theoretical Literature

2.3.1 Meaning of attitudes

Smith, Walker and Hamidova (2012) explain that an attitude is a complex of feelings, fears, convictions, desires, prejudices, or other tendencies. It is a disposition to respond favourably or unfavourably to an object. Attitudes may also contain feelings and emotions associated with the object and are assumed to result from one's prior experience with the object (Smith, Walker & Hamidova, 2012). Furthermore, Koballa and Glyn (2007), in their review of the literature, explain that the term attitude is used interchangeably with terms such as interest, beliefs, curiosity and opinions. Hofstein & Mamlok-Naaman (2011) assert that students who are interested in science and understand the scientific concepts, will have more positive attitudes towards science and science studies compared to students who have negative attitudes towards science subjects.

2.3.2 Attitudes towards Science Subjects

There is a widespread concern about the outcomes of science education because of the demand for more high-grade scientists, technicians, and engineers while the numbers of students who are interested in science subjects are declining (TLRP, 2006). The decline of science graduates at secondary schools leads to fewer applications for science degrees and reduces the supply of science graduates. This situation is the same for students who entering non-graduate occupations involving science (TLRP, 2006). Smith, Walker and Hamidova (2012) assert that Students' attitudes represent an important dimension which affects students towards particular subject domains in school. Smith, Walker and Hamidova add that Students' attitudes motivate them to attain subject matter mastery. In the classroom, students' attitudes reflect how they manage their perceptions regarding academic content and their behaviours. According to Simpson, Koballa, Oliver, and Crawley (1994) the examination of students' attitudes toward science subjects in secondary schools provides information about the status of science subjects and enables educational researchers to predict and regulate students' classroom behaviours.

2.3.3 Factors Affecting Students' Attitudes towards Science Subjects

Haase (2009) asserts that young children commonly have a positive attitude toward all school subjects, a natural curiosity about quantitative events and some problem-solving skills when starting school. Gradually, this positive attitude change into negative attitude as both male and female students begins to lose interest in science subjects (Haase, 2009). Furthermore, a gender gap appears soon after, with more girls than boys disliking science subjects like Chemistry, Physics and Mathematics (Watt, 2005).

According to Mabula (2012), the reasons for the decrease in the number of students taking science subjects in developed countries vary from the reasons for students in developing countries. The reason as to why youth in schools in Europe are currently not interested in taking science subjects are caused by the connection between attitudes towards science subjects and the way in which science subjects are taught (Mabula, 2012). Similarly, Lyons (2005) acknowledges that the decline of interest among students in science subjects in Tanzania is a result of how science is taught and learnt in secondary schools.

Osborne et al. (2003) highlight a number of factors influencing attitudes towards science in secondary schools. These are gender, personality, structural variables and curriculum variables. However, Osborne et al. mention gender as the most significant variable related to pupils' attitude towards science. This view is supported by Weinburgh's (1995) extensive review of the literature which shows that boys have a consistently more positive attitude to school science than girls.

2.4 Review of Empirical Studies

2.4.1 Global Empirical Studies on Students' Attitudes towards Science

Subjects

The study conducted by Craker (2006) on the attitudes toward science of students enrolled in introductory level science courses at the University of Wisconsin-La Crosse in the areas of personal confidence, usefulness of the subject, perception of the subject as a male domain, and perception of the teacher's attitude indicates that nearly fifty percent of students may lose interest in science by the third grade which in turn leads to decline the number of students preparing for a science-related career. Craker explains that several factors, including gender, expected achievement and previous science experiences could influence a student's attitude toward science. The study reveals that male students were found to have more confidence than female students, and female students perceive science as male domain more than male students.

Moreover, Craker (2006) reveals that results from students enrolled in majors falling under the College of Science and Allied Health (SAH) indicates that all students has higher attitudes in the areas of confidence, usefulness, and perception of teacher's attitudes. Also, the findings show that experience will affect students' attitudes toward science. It seems that students in SAH have more science courses that have helped them to develop a better attitude than students in other colleges (Craker, 2006).

Also, a survey of 250 students conducted in Iran by Najafi et al. (2012) on students' attitude towards science and technology reveals that there is a meaningful difference between male students' and female students' points of views in attitude towards sciences and technology. The result shows that male students have higher averages than the female students. Similarly, the survey of 250 students conducted in Iran by Sarjou, Soltani, Kalbasi and Mahmoudi (2012) on students' attitude

towards science and technology, school science and environment, based on the ROSE project indicates that male students have higher averages than the female ones.

2.4.2 Regional (African) Studies on Students' Attitudes towards Science Subjects

In Nigeria, a study which comprised 250 science students conducted by Jebson and Hena (2015) on students' attitude towards science subjects in senior secondary schools in Adamawa state, reveals that students in Adamawa state have positive attitude towards science subjects and gender has significant effect ($p < 0.05$) on their attitude where male students have more positive attitude toward science subjects than their female' counterpart. Jebson and Hena argue that the reasons for girls developing negative attitude toward science subjects can be influenced by cultural barriers, social norms, parental influence, lack of role models and personal influence. However, a survey of 204 senior secondary school students from the three geopolitical zones of the state conducted in Nigeria by Olasehinde and Olatoye (2014) on scientific attitude, attitude to science and science achievement of senior secondary school students in Katsina State, indicates that there is no significant difference between male and female students in scientific attitude, attitude to science and science achievement ($t = -0.375, 0.597$ and $-0.678, p > 0.05$ respectively).

In Kenya, the study by Chepkorir (2013) on the impact of students' attitudes on the teaching and learning of chemistry in secondary schools in Bureti district shows that there are some factors such as anxiety over career opportunities and peer influence which influence students' attitudes. Another study by Mbugua, Kibet, Muthaa and Nkonke (2012) on the factors contributing to students' poor performance in mathematics at Kenya certificate of secondary education identifies some factors contributing to poor performance in secondary schools including inadequate teaching and learning materials, retrogressive practices, lack of motivation and poor attitudes by both teachers and students and under staffing. Mbugue et. Al (2012) argue that improving on these factors and sensitization of the local community to discard practices which prohibit student's effective participation in learning mathematics can improve students' performance in Mathematics.

In Sudan, the study by Lado (2011) on the attitudes of first year senior secondary school students toward their science classes in the Sudan reveals that peer influence and attitude is positively associated with students' reported choice to major in a science discipline, and that gender is negatively associated with their reported choice. On the other hand a survey of 375 high school agricultural science students in KwaZulu-Natal province in South Africa conducted by Kidane and (2013) on the attitude of students in the formal educational sector towards agricultural education and training indicates that over 90% of students had a positive perception towards farming, agricultural education, high school agricultural knowledge impartation and the importance of practical lessons.

2.4.3 Tanzanian Studies on Students' Attitudes towards Science Subjects

In the Tanzania context, several studies have conducted on this issue. The study by Mabula (2012) with a sample size of 471 students and 66 teachers on challenges and opportunities in promoting science subjects choices for secondary school students in Tanzania reveals that there is poor quality of science classroom teaching and a serious decline in interest of students in science subjects. The science courses seem more relevant to those students with science career aspirations and not to the majority for whom secondary science is terminal (Mabula, 2012). According to Mabula (2012), there is a high rate of students dropping science subjects which are not compulsory.

In another study conducted in two secondary schools in Kilombero District by Kihwere (2014) on students' perception of science subjects and their attitude in Tanzanian secondary schools, the study find out that allowing students to opt subjects has developed a mentality that those subjects are difficult and for few intelligent students. This has led to poor performance in final examinations and fewer students who are willing to opt for science subjects (Kihwele, 2014). Unfortunately the learning gap in science subjects appears to widen throughout early secondary school and persists throughout their schooling (Kihwele, 2014). Similarly, the study comprised 101 students, 13 science teachers, 4 heads of schools and (1) District Educational Officer (DEO) conducted by Kinyota (2013) on students' perceptions of the factors influencing their decision to choose between the science and arts streams for ordinary level secondary schools in Morogoro Region find out that factors such as knowledge of available careers, gender, students'

examination scores, self-efficacy in science, and school resource contexts affect students' choice of science streams.

Furthermore, the study by Ndalichako and Komba (2014) which involves a sample of 18 secondary schools on students' subject choice in secondary schools in Tanzania with the aim of providing answers to two key questions: (1) which subjects are most preferred by students in secondary schools? and (2) what are the reasons behind the students' interest, or lack of interest, in particular subjects? The results show that the challenges that students experience in learning science is the reason for the majority of students in secondary schools to prefer arts subjects. Other reasons are commitment and support provided by the subject teachers, inspiration from significant others, the availability of teachers and their teaching approaches and relevance of the subject to their daily life experiences.

2.5 Synthesis of Key Issues and Knowledge Gap in the Reviewed Literature

Various studies have been done in Tanzania on students' attitude towards science subjects in secondary schools. For example, researchers such as Mabula (2012) who conducted research on challenges and opportunities in promoting science subjects choices for secondary school students in Tanzania who; Kihwere (2014) on students' perception of science subjects and their attitude in Tanzanian secondary schools. Other study was focused on students' perceptions of the factors influencing their decision to choose between the science and arts streams for ordinary level secondary schools (Kinyota, 2013) and students' subject choice in secondary schools in Tanzania (Ndalichako & Komba, 2014). These studies reveal that there is a serious decline in interest of students in science subjects.

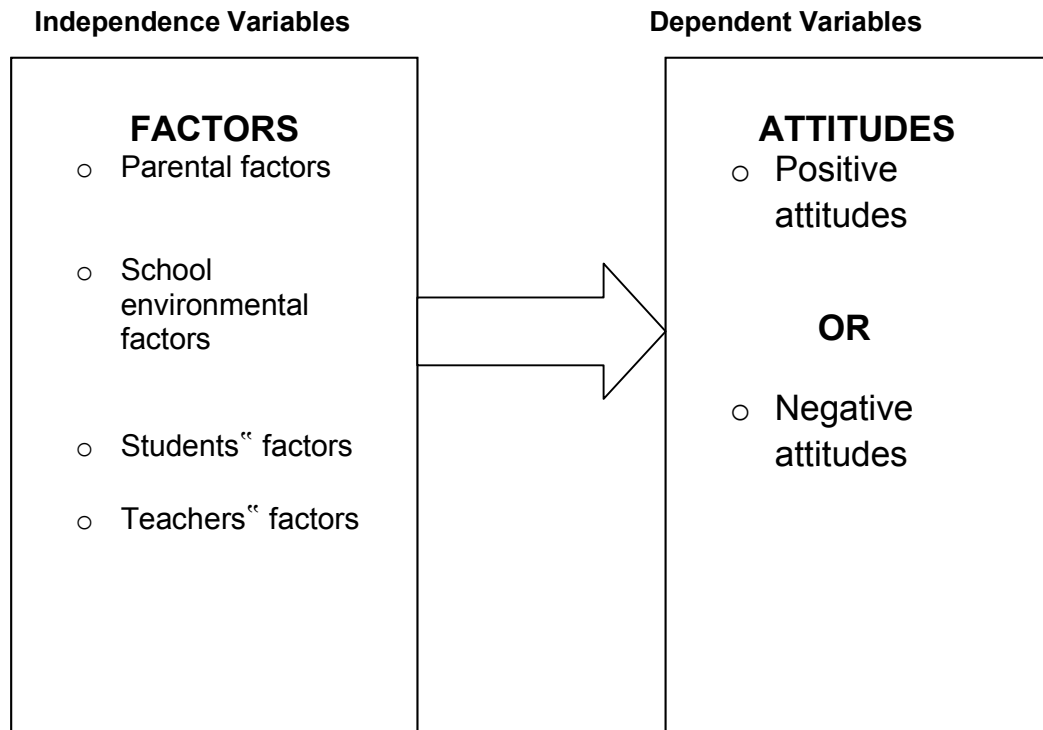
All mentioned studies contained one or more element of the current study. However, little studies is focused on factors influencing students' attitudes towards science subjects in secondary schools. Therefore, this study will explore the factors influencing students' attitude towards science subjects in Mvomero District.

2.6 The conceptual framework of the Study

A conceptual framework is used in research to outline possible courses of action or to present a preferred approach to an idea or thought. The conceptual framework is a description outline of variables. The types of variables shown in the conceptual

framework are independent and dependent variables. The variable of primary interest to this study is the dependent variables which is students' attitude in secondary schools. Some of the variables to be studied in an attempt to explain the dependent variable are indicated in Figure 1 which explains the relationship between the dependent variable and independent variables in a clear and simple way.

FIGURE 2.1: CONCEPTUAL FRAMEWORK OF THE STUDY



Source: Adapted from Mabula (2013) and modified by the researcher

2.7 Chapter Summary

The chapter analysed briefly theoretical framework, conceptual framework and related literatures on the factors influencing students' attitude towards science subject in secondary schools.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter Three presents research methodology that was employed in the study. It addresses research design and approach, location of the study, population, sample size, sampling technique, validity and reliability, ethical issues, data collection methods and data analysis.

3.2 Research Design and Approach

3.2.1 Research design

Research design provides a framework for the collection and analysis of data. According to Kombo and Tromp (2006), a research design holds together all the elements used to structure the research. Since the study was focused on exploring the factors that influence students' attitudes towards science subjects, it used case study design in gathering information because the case study is a qualitative study, which involves a careful and complete observation of social unit, be that unit a person, a family, an institution, a cultural group or even the entire community (Kothari, 2004).

3.2.2 Research Approach

Both quantitative and qualitative research approach was adopted as the research approach. Qualitative research approach allows the researcher to get in-depth data from informants through their personal knowledge, experience and opinions (Omari, 2011). Qualitative studies are highly exhaustive and reliable because they make a deep exploration of respondents to obtain purposively information. In this way, the researcher was able to collect information from respondents in an interactive manner.

3.3 Location of the Study

The study was conducted in Mvomero District in Morogoro Region, Tanzania. The district covers an area of approximately 6,632.9 sq. km. The selection of the district has not only considered coverage advantage of both urban and rural primary schools but also the nature of the communities within the district which are similar to other communities in the country (peasant and pastoralists). Currently, the district is

estimated to have the population of 312,109. This study will be conducted in two secondary schools in Mvomero District which are located in rural areas.

3.4 Target Population of the Study

Population refers to a group of individuals, objects or items from which samples are taken for analysis (Kombo and Tromp, 2006). Furthermore, Punch (2006) argues that population means everyone who can be potential to be included in the study. The targeted population of this study was all students, teachers and DEOs in Mvomero District.

3.5 Sample and Sampling Techniques

Purposive random sampling was employed in this study to get participants who are rich in information depending on the nature and purpose of the study (Patton (1990). It is used because it is a type of non-probability sampling which allows deliberate selection of sample units that conform to some pre-determined criteria that the researcher judged as the most appropriate for the study (Krishnaswamy, 1993). The sample size was determined by the level of saturation. However, after collection of data the researcher may ignore some of irrelevant responses from informants.

3.5.1 Sample size

The sample size determination was made by focusing on the following criteria such as required level of precision in the result, the level of detail in the proposed analysis techniques, the available budget and time for study completion. The study had total number of 36 respondents where there were 2 DEOs 10 Teachers and 24 Students

TABLE 3.1 SAMPLE SIZE AND COMPOSITION

Category of respondents	Number of respondents
Students	24
Teachers	10
DEOs	2
TOTAL	36

3.6 Data Collection Methods

Data collection methods are tools used by the researcher to collect data from the respondents (Kothari, 2004). Cresswell (2007) argues that, there is no single instrument that may be considered to be adequate in itself in collecting valid and

reliable data. In this study, the researcher applied the following three types of data collection instruments: interviews, Focus Group Discussion (FGD) and documentary reviews.

3.6.1 Interviews

An interview is a two people conversation initiated by the interviewer with a clear list of issues to be addressed and questions to be answered (Descombe, 1998). Therefore, interview was used to collect primary data from teachers and DEOs. All interviews were conducted in ventilated rooms for the purpose of comfort and confidentiality. With the consent of informants, the interviews were recorded.

3.6.2 Focus Group Discussion (FGD)

FGD was used to collect primary data from students. The discussion involved twelve students from each school. The discussion took place after normal class hours to avoid disrupting normal classroom teaching. For enhancing the validity of information, the focused group discussions were conducted in a classroom. With the participants' consent, the discussions were recorded.

3.6.3 Documentary reviews

Documentary review entailed reviewing different documents so as to get useful information for the study (Rwehazura, 2005). This method is preferred by the researcher because documents would supplement information collected through other methods such as interviews and questionnaires. Documentary review was used to collect secondary data from two (2) secondary schools where the result of science subjects was obtained.

3.7 Validity and Reliability

Validity is defined as the extent to which the instrument measures what it supports to measure. The validity of the study was determined by students and teachers through piloting test on study area so as to find out if the research instruments would yield the desired results based on this study. In this study, validity and reliability was assured through the use of multiple methods of data collection such as triangulation, thick description of the findings and back translation.

3.8 Ethical Considerations

In consideration of the importance of being ethical, the researcher adhered to the following:

- The researcher sought clearance for this study from St. John's University of Tanzania. The respondents were assured that, the information provided by them was used for the sole purpose of research.
- Before collecting data for this study, the researcher carried out a pilot study in one randomly selected school that was not be included in this study. Students and teachers of those schools was involved in the interview.
- In the schools, the researcher sought permission from the heads of institutions before conducting the study in their respective institutions.
- Neither real names of the participants nor of the institutions was included in the report so as to ensure confidentiality; instead, pseudonyms was used in order to observe anonymity in the entire process of writing the report and dissemination of results of the study.
- The researcher informed the participants of their freedom to withdraw from the study once they feel like to do so.

3.9 Data Analysis Plan

The qualitative data collected through interviews and focused group discussion is subjected to thematic content analysis. The process of content analysis involved categorizing data, grouping them into themes and units (Kothari, 2004). First, the researcher prepared collected data for analysis. Second, the researcher organized the material into segments of texts and generated themes for analysis. Third, the researcher analyzed the findings and makes an interpretation of the data.

3.10 Chapter summary

Chapter three has presented research design, study area and its characteristics, study population, sampling techniques and sample size, research instruments, validity and reliability, study instruments, data analysis procedures s well as ethical consideration.

CHAPTER FOUR

PRESENTATION OF FINDINGS AND DISCUSSION

4.1 Introduction

Chapter Four presents and discusses the findings of the study on the factors influencing student's attitudes towards science subjects in secondary schools. This chapter includes part one, part two, part three and part four. Part one is about characteristics of respondents, part two is to assess students' attitude towards science subject, part three is all about the factors for students attitude towards science subject and part four is to determine possible solutions to students attitude towards science subject. The data presented are organised into categories and subcategories. Three main categories, based on the study objectives, and their related subcategories feature the headings in this chapter.

4.2 Socio-demographic Characteristics of respondents

This section presents characteristics of respondents such as age, sex and education of respondents.

4.2.1 Age of respondents

Table 4.1: Distribution of respondents by Age

Age of Informants	Frequency (n=36)	Percentage (%)
13 – 20	24	66.7
21 – 30	5	13.9
31 – 40	4	11.1
41 – 50	2	5.6
51+	1	2.8
Total	36	100

Table 4.1 illustrates that the highest percentage of informants (about 66.7%) were aged between 13 and 20 years; 13.9% were aged between 21 and 30 years; 11.1% were aged between 31 and 40 years; 5.6% were aged between 41 and 50 years; and 2.8% of all informants were aged between 50 years and above.

4.2.2 Respondents' Sex

Table 4.2: Distribution of respondents by Sex

Informants	Gender of Respondents				Total
	Male		Female		
	Frequency	Percentage	Frequency	Percentage	
DEOs	2	100%	0	0%	2
Teachers	5	50%	5	50%	10
Students	11	46%	13	54%	24
Total	18	50%	18	50%	36

Table 4.2 illustrates that males had the total representation of 18 (50%) informants comprised of two (2) DEOs, five (5) teachers and 11 students whereas female comprised of five (5) teachers and 13 students making a total of 18 (50%) informants.

4.2.3 Education Level of Respondents

Table 4.3: Distribution of Respondents by Education Level

Education Level of Respondents	Frequency (n=36)	Percentage (%)
Secondary	24	67
Diploma	4	11
Degree	8	22
Total	36	100

Table 4.3 illustrates that the highest percentage of respondents (about 67%) were Form III and Form IV students, 11% were secondary schools teachers with diploma qualification and 22% out of 36 respondents were secondary schools teachers with bachelor degree qualification.

4.2.4 Students' attitude towards science subjects

The first research objective sought to assess students' attitude towards science subjects in secondary schools in Mvomero. Interview and FGD sessions were administered to teachers and students respectively to get their perceptions about the issue. Both positive and negative perceptions from S1 and S2 on the attitude of

students towards science subject were given. The findings are presented in Table 4.4 and 4.5.

Table 4.4: Science Teachers on Students' Attitudes towards Science Subjects

ATTITUDES	S1		S2	
	Frequency (N=5)	Percent (%)	Frequency (N=5)	Percent (%)
Negative	4	80%	3	60%
Positive	1	20%	2	40%
Total	5	100%	5	100%

Table 4.4 shows the results obtained from interviews with science teachers on students' attitude towards science subjects from both S1 and S2. The results indicated that 4 (80%) out of 5 teachers from S1 and 3 (60%) out of 5 teachers from S2 agreed the idea that majority of the students in secondary schools had negative attitude towards science subjects whereas 1 (20%) out of 5 science teachers from S1 and 2 (40%) out of 5 teachers from S2 pointed out that students had positive attitudes towards science subjects in secondary schools in Mvomero.

Table 4.5: Students Attitudes towards Science Subject

Attitudes	S1		S2	
	Frequency (N=12)	Percent (%)	Frequency (N=12)	Percent (%)
Negative	9	75%	7	60%
Positive	3	25%	5	40%
Total	12	100%	12	100%

Table 4.5 shows the results obtained from FGDs with students on their attitude towards science subjects from both S1 and S2. The results indicated that 9 (75%) out of 12 students from S1 and 7 (60%) out of 12 students from S2 agreed the idea that majority of the students in secondary schools had negative attitude towards science subjects. Contrary, 3 (25%) out of 12 students from S1 and 5 (40%) out of 12 students from S2 revealed that students had positive attitudes towards science subjects in secondary schools in Mvomero.

4.4.1 Students and Science Teachers' Views on Students' Negative Attitude towards Science Subjects

Science Teachers were asked in the interview to give out their views on students' attitude towards science subjects. The findings from Table 4.4 indicated that most students' from S1 had more negative attitude towards science subject than students from S2. Four (80%) out of 5 teachers from S1 and 3 (60%) out of 5 teachers from S2 pointed out that majority of the students in secondary schools had negative attitude towards science subjects in secondary schools in Mvomero. It was found out that Science Streams in S1 had fewer students compared to Art Streams because students had developed negative attitudes towards science subjects due to shortage of science teachers, inadequate teaching and learning materials and lack of teaching and learning resources. On the other hand, in S2 the number of students in Science Streams was slightly higher than that of students in Art Streams because the school had more science teachers compared to S1, enough teaching and learning materials and availability of teaching and learning resources. However, the number of female students in Science streams in both S1 and S2 were fewer compared to male students. Asked a question, *What would you consider to be students' attitude towards science subject in secondary schools?*, one teacher from S1 in an interview had this to say:

“Students in this school preferred Arts subject to Science subjects. Most of them don't like science subjects because they think that science subjects are more difficult compared to arts subjects... in Form Three for instance, 62 percent out of 112 students opted for Arts Streams while only 38 percent opted for Science Stream (Teacher S1, February 2016).”

Another teacher from S1 had the same views about students' negative attitudes towards science subjects. When asked the same question in the interview, the teacher replied:

“In our school, most students have negative attitude towards science subjects due to the shortage of science teachers, inadequate teaching and learning materials and poor science infrastructures such as laboratory and library (Teacher S1, February 2016).”

Based on the responses in table 4.4 above, it is apparent that a large number of secondary school students had negative attitudes towards science subject as we have noted in the findings. Shortage of teachers and poor infrastructure such as

laboratory and its facilities are among the factors for students' negative attitudes towards science subjects.

Also, the result obtained from the FGD session with students indicated that 9 (75%) out of 12 students from S1 and 7 (60%) out of 12 students from S2 agreed the idea that majority of the students in secondary schools had negative attitude towards science subjects. Students from S1 explained that they had negative attitudes towards science subject because it was difficult to get high grades in examinations compared to arts subjects, while this was the case in S1, only 40% of students from S2 said that they view learning of science subjects negatively while 60% claimed that they were enjoying learning science subjects. One Form Four student participating in the FGD session from S1 had this to say:

“I have negative attitudes towards science subjects because they are difficult and I am not sure if I will pass in CSEE at October this year. This is largely caused by lack of science teachers and facilities for learning science..... It is better to stick with art subjects because most students in Arts Streams perform well in CSEE and proceed for further studies (Student S1, February 2016).”

The responses from the findings in Table 4.4 and Table 4.5 show that students had negative attitude towards science subjects in Mvomero. The students in S1 opted for Arts Streams just because of the fear of failing in CSEE in the belief that science subjects are difficult and the number of science teachers whose would had been of great help to them were low. More negative statements were also provided by many other students in the FGD session. Responding to the same question, one female student from S1 had this to say:

“In our class, most of us have negative attitudes towards science subject because of the experience we have got from past CSEE results in our school, only two female students from Science Streams managed to pass and enter Form Five last year while the rest failed....Although science subjects are tough, I opted Science Stream because of my mother who is a nurse and she wants me to be a doctor (Student S1, February 2016).”

From the excerpts, it is apparent that students' negative attitude towards science subjects affect their confidence in their studies and make them lost interest in science subject. Nneji (1997) argues that the root of the problem could probably be caused by poor teaching and learning of science subjects at the foundational primary school level. The most widely used in schools traditional talk and chalk

method was wasteful and unproductive, particularly with slow and average learners (Olasehinde & Olatoye, 2014). Stofflet and Stoddart as cited by Olasehinde and Olatoye (2014) claim that traditional talk and chalk method had also been shown to be ineffective in engaging learner's positive attitude, in developing the conceptual understanding of the subject matter and critical reasoning. This was probably why the problem of students' negative attitude towards science subjects among secondary school students is still persists.

Also, the findings of this study are in line with the study conducted by Craker (2006) that indicated that female students perceive science as male domain more than male students. The findings of this study showed that there is a meaningful difference between male students' and female students' points of views in attitude towards science subject.

4.4.2 Students and Science Teachers' Views on Students' Positive Attitude towards Science Subjects

The research findings revealed that there were few students who had positive attitude towards science subjects in both S1 and S2. Through interviews with Science Teachers, 1 (20%) out of 5 from S1 and 2 (40%) out of 5 exposed that few students in their schools had positive attitude towards science subjects. However, the study revealed that students' from S2 were likely to enjoy studying science subjects compared to students from S1. This was evident during the interview session with one teacher from S2, who shared her concern that:

"Students especially Form Three and Form Four have positive attitudes towards science subjects and their results in CSEE are very good (Teacher S2, February 2016)."

Similar findings were observed from the FGD with students from S1 and S2 as well where the study indicated that few students had positive attitude towards science subjects (Observe Table 4.5). 3 (25%) students out of 12 from S1 and 5 (40%) out of 12 from S2 pointed out that they like and enjoying learning science subjects. It was found that students from S2 had more positive attitude towards science subjects due to good teaching and learning environment compared to S1. Discussing this in the FGD, one Form Three student from S2 had this to say:

"We are enjoying very much studying science subjects in this school because the school have good science infrastructures and facilities such as laboratory, enough apparatus and a convincing

library.... Also we have good science teachers and we have practical sessions every Friday (Student S2, February 2016).

Similar opinions were given by Form Four student in the FGD, where one student remarked:

On my side, I like science subjects because the methods which our teachers use to teach us are good and easy to understand..... I really enjoy this and I am confident I will perform well in the coming national examination (Student S2, February 2016).

From the responses in Table 4.5 above, it is likely that, students in S2 had more positive attitudes towards science subjects than students from S1 due to good teaching and learning environment, appropriate teaching methods and enjoyment of science and science lessons. This implies that if science teachers will use participatory methods questions and answers, debate, experimentation and role play in the whole process of teaching and learning in secondary schools students will understand well the subject matter and build positive attitude towards science and science subjects. This point falls with Md-Zain, Samsudin, Rohand, and Jusoh (2010) who comment that instructional congruence in science education promotes students' positive attitudes toward science, especially in the constructs of the practical work of science and future participation in science. Contrary, poor quality of science classroom teaching and a serious decline in teacher-students interaction and relationship in classroom teaching and learning may influence students' negative attitudes towards science subjects (Mabula, 2012).

Similar findings emanated from the study by Najafi et.al (2012) who indicate that there is a positive attitude towards science and technology among students in Iran. Also, this study is similar to the study conducted by Chang et al. (2009) on 942 Taiwanese students which examined their attitudes about science and technology, learning interests and life experiences. The results indicated that boys showed higher learning interests in sustainability issues and scientific topics than girls while girls on the other hand recalled more life experiences about science and technology in life than boys.

The finding of this study support Anderson as cited in Najafi et.al (2012) who shows that the majority of students had positive attitude on science and had a belief that science and technology were useful for society and can help to reduce poverty and famine in the world. Most students did not agree that school science is a difficult subject and disagreed that school science has made them more critical and

sceptical, opened their eyes to new and exciting jobs or increased their appreciation of nature (Najafi et.all, 2012).

4.4 Factors for Students' Attitude towards Science Subjects

The second research objective sought to identify the causes of students' attitudes towards science subjects in secondary schools. Interviews were administered to teachers and DEOs whereas FGDs were administered to students to get their perceptions about the issue. Various factors for students' attitudes towards science subjects in secondary schools were given. The findings are presented in Table 4.6 and Table 4.7 below.

Table 4.6: Science Teachers and DEOs on the Factors for Students' Attitude towards Science Subjects

	Factors for Students' Attitude towards Science Subjects	DEOs		Science Teachers	
		Frequency (N=2)	Percent (%)	Frequency (N=10)	Percent (%)
1.	Shortage of Science Teachers	-	-	9	90%
2.	Inadequate Teaching and learning	-	-	8	80%
3.	Teaching Approaches	-	-	7	70%
4.	Gender	2	100%	7	70%
5.	Perceived Difficult of Science	1	50%	6	60%
6.	Commitment and Support Provided by the Subject Teachers	-	-	4	40%

Table 4.6 illustrates interviews results obtained from DEOs and Science Teachers on the factors for students attitude towards science subjects. The most mentioned factors were; shortage of science teachers; teaching approaches; gender; inadequate teaching and learning; perceived difficult of science; and the least mentioned variable was commitment and support provided by subject teachers.

Table 4.7: Students on the Factors for Students' Attitude towards Science Subjects

S/N	Factors for Students' Attitude towards Science Subjects	Frequency (N=24)	Percent (%)
1.	Inspiration from Significant People	21	88%
2.	Gender	18	75%
3.	Anxiety over Career Opportunities	18	75%
4.	Shortage of Science Teachers	18	75%
5.	Students Abilities and Self Efficacy	15	63%
6.	Perceived Difficult of Science	12	50%
7.	Previous Science Experiences	11	46%
8.	Teaching Approaches	11	46%
9.	Commitment and Support Provided by the Subject Teachers	10	42%
10.	Inadequate Teaching and Learning Materials	08%	33%

Table 4.7 shows results obtained from the FGDs with students on the factors influencing students' attitude towards science subjects. The most mentioned factors were; inspiration from significant people (88%); gender (75%); anxiety over career opportunities (75%); shortage of science teachers (75%); students abilities and self efficacy (63%); perceived difficult of science (50%); previous science experiences (46%); teaching approaches (46%); commitment and support provided by the subject teachers (42%); and the least mentioned factor was inadequate teaching and learning materials (33%).

4.5.1 Gender

The study findings from Table 4.6 indicated that 2 (100%) DEOs and 7 (70%) out of 10 Science teachers who participated in the interviews pointed out that female students had negative attitude towards science subjects and gender had significant effect on their attitude. It was found that female students had more negative attitude toward science subjects than their male students' counterpart. In both schools selection of students into science streams was based on students' performance in Form Two National Examinations. Since female students performed more poorly in the national exam than male students, they were allowed to join science streams with lower average scores compared to that of male ones. This made female students to loose confidence in science subjects in the belief that they were difficult compared to arts subjects. This in turn built a negative attitude on their mind towards science subject. Responding on the question, *What could be the factors influencing students' attitudes towards science subjects?* one DEO in the interview had this to say:

“In our district, one of the criteria for students to join Science Streams is their performance in science subject in Form Two national examinations..... Although girls perform poorly in Form II national examinations compared to boys they usually allowed joining science streams despite of their low scores in order to balance gender in the class. This in turn makes them to feel that they can not compete with boys in science subject and build negative attitude towards science subjects (DEO, February 2016).”

In the FGD with secondary school students, it was also revealed that female students had negative attitude towards science subjects and gender has significant effect on their attitude. 18 (75%) out of 24 of explained that gender was one of the factors influencing students' attitudes towards science subjects. Contributing her view, one student from S1 shared her concern that:

“It is difficult for us (female students) to perform well science subjects because of our gender, we don't have enough time for private studies like boys because of domestic works at home.... Also, parents don't allow us to go to the tuition centres for extra studies because the tuition usually end at late evening, the time for dinner preparation (Student S1, February 2016).”

The argument above shows how gender has significant effect on students' attitude towards science subjects in secondary schools. The result imply that a large number of female students perceive science subjects negatively and this will in turn continue to affect them in their life after completion of studies as most of them perform poorly in science subjects leaving them with few option for career opportunities.

A similar study by Jebson and Hena (2015) on students` attitude towards science subjects in senior secondary schools revealed that male students had more positive attitude toward science subjects compared to female ones. Females' constant failure in science subjects have made them believe that they never do well in science streams compared to male students, thus accepting defeat.

Similarly, the study by Craker (2006) on the attitudes toward science of students enrolled in entry-level general education courses at the University of Wisconsin-La Crosse in the areas of personal confidence, usefulness of the subject reveals that males had more confidence than females and that females perceived science as a male domain more than males do. Research on the differences in attitudes toward science of men and women indicated that men have better attitudes toward science than women, and that men are more apt to continue studying science (Weinburgh as cited by Craker, 2006)).

These findings contradict a survey of 200 secondary school students conducted by Mohamed and Waheed (2011) on secondary students' attitude towards science and mathematics in a selected school of Maldives which indicates that there was no gender difference in their attitudes. It was found out that there was no statistically significant difference between the students' attitude towards science and mathematics between male ($M=3.4302$, $SD = 0.5596$) and female ($M= 3.5512$, $SD = 0.6316$), where $t(198) = 1.438$, $p = .152$, $\alpha = .05$. Hence the attitude towards science and mathematics among male and female student were equal (Mohamed & Waheed, 2011).

4.5.2 Students' Abilities and Self-efficacy

The study findings showed that 15 (63%) out of 24 students' explained that self-efficacy and abilities was another factor which influences their attitude towards science subjects (see Table 4.7). During the FGD session with Form Four students from S1, some students claimed that they can perform well science subjects despite the challenges which are facing them like absence of teachers in science streams. One student in the interview had this to say:

"I am sure I will perform well science subjects even in the absence of enough science teachers.... for example I got Division One in Mock Examinations last year..... I believe if God will be on my side I will get Division One too in national examinations (Student S1, February 2016)."

Another student in the same FGD had different views about their attitudes towards science subjects. He shared his concern that:

"In fact, although I am in science Stream but my ability in science subjects is very low.... I am in science stream because teachers forced me into this stream (Student S1, February 2016)."

From these views, it can be argued that, abilities of students and self-efficacy influenced students' attitude towards science subjects in secondary schools. The fact that some students had high self-efficacy in science may mean that self-efficacy helped them to have positive attitude towards science subjects whereas low self-efficacy among students led them to have negative attitudes towards science subjects. This implies that poor abilities and low self-efficacy of secondary school students on science subjects could be a result of poor science background obtained from primary school. This suggests that a number of measures should be taken to strengthen the teaching of science subjects in primary schools

This finding support Bandura, Freeman and Lightsey (1999) who argue that people with high self-efficacy believe that control over something is possible. They usually set goals to be met and maintain strong commitments in order to achieve those goals. Bandura et al. (1999) add that students with high self-efficacy can accomplish difficult tasks and improve performance which in turn raises self-efficacy in that task to higher levels. On the other hand, low self-efficacy creates environments of stress and anxiety that lead to avoidance of a tasks and/or poor performance which in turn leads to a vicious circle of low self-efficacy (Bandura et al., 1999).

4.5.3 Inspiration from Significant People

The research findings revealed that inspiration from significant people play a significant role in influencing students' attitudes towards science subjects. This was evident in the FGD session conducted in both S1 and S2 where 21 (88%) out of 24 students discussed and explained that inspiration from significant people was highly influenced them to choose science subject. This was the view expressed by one Form Four student.

“I like physics and biology because of the inspiration from my father and my aunt who are engineer and doctor respectively.....
To be honest I would like to become an engineer or a doctor
(Student S2, February 2016).”

This argument was similar to the one given out by another student from S1 who commented that:

“I always have a dream of studying laboratory engineering because I have a lot of inspiration from my brother who is a laboratory technician (Student S1, February 2016).”

The above explanations show that inspiration from significant people is one of the factors influencing students' attitude towards science subjects. Parents and other people in the family can inspire their children to choose science subjects in secondary schools. This implies that parents and other people in the family whose career benefit the family can influence their children's to choice science subjects in secondary schools. This suggests that parents should be good role models by showing their love for science subjects and inspire their children to choose science subjects in secondary schools. This finding corroborated that of Ndalichako and Komba (2014) who observed that inspiration from people who matters to the students play a significant role in influencing their interest for certain subjects.

This finding is also in line with the study by Akintade (2012) who observed that students' attitudes toward particular subjects are significantly determined by their parents' influence. Akintade argued that the job prospect of science subjects' related professions was closely related to the reason as to why parents influenced their students' choice of subjects in secondary schools.

4.5.4 Previous science experiences

Findings of the study from Table 4.7 obtained from the FGD with students indicated that 11 (46%) out of 24 students pointed out previous science experiences as another factor which influence their attitudes towards science subjects. It was found that students who were good in science subjects in the past especially primary school and early years of secondary school were likely to had positive attitude towards science subjects while students with poor science background in the past were likely to had negative attitude towards science subjects. This was evident in the FGD discussions with students from S2 who remarked that:

“I like science subjects because I am good at mathematics since I was in Standard VI..... this helped me to perform well in Mathematics and Physics in secondary school (Student S2, February 2016).”

This argument was similar to the one given by one student from S1 in the FGD who shared his concern that:

“I thank God I had good science background since I was in primary school.... this gave me confidence and positive attitude towards science subject in secondary school (Student S1, February 2016).”

From this view, it is likely that students' attitudes towards science subjects in secondary schools were influenced by previous science experiences in the past. This means that if students had been taught well science subjects in primary schools, they would had positive attitude towards science subjects in secondary schools.

In an attempt to further find out the how previous science experiences influence students' attitudes towards science subjects, the study indicated that students' failure in science subject in the previous CSEE led students to hate science subjects. One female student from S1 had this to say:

“I hate science subjects because it is difficult to pass science subjects in CSEE, for example, only two female students managed to be selected into advanced level previous year.... In fact I am in science Stream because teachers forced me into this stream (Student S1, February 2016).”

This finding implies that, if students will get the best grades in science subjects in CSEE each year, the results will inspire other students to opt for science subjects in secondary schools. This finding corroborated the study by Craker (2006) which found that students enrolled in majors falling under the College of Science and Allied Health (SAH) had higher attitudes in the areas of confidence, usefulness, and perception of teacher's attitudes. Also, the findings showed that experience affected students' attitudes toward science. It seemed that students in SAH have more science courses that have helped them to develop a better attitude than students in other colleges.

4.5.5 Perceived Difficulty of Science

The study revealed that perceived difficulty of science influenced students' attitude towards science subjects. It was found that 1 (50%) out of 2 DEOs and 6 (60%) out of 10 Science Teachers explained that, the nature of science subjects made them be more difficult to learn as they need practical work compared to science subjects. Asked a question on the factors influencing students attitude towards science subjects, one DEO from District Council in the interview replied:

“Science subjects are difficult to teach and learn compared to arts subjects.....this is due to the fact that science subjects need more practical work to be understood..... Unfortunately, most schools have no laboratories and apparatus, this make it more difficult to teach and learn science subjects. This in turn creates negative attitudes towards science subjects among students (DEO, February 2016).”

Also, through FGD with students, 12 (50%) out of 24 agreed the idea that teaching and learning science subjects was more difficult compared to arts subjects. Discussing this in the FGD session, one student from S2 had this to say:

“I normally get difficult to study science subject during my private study compared to arts subjects (Student S2, February 2016).”

The findings from both Table 4.6 and Table 4.7 above indicated that students fear and believe that it is more difficult to learn science subjects compared to arts subjects. This led students to develop negative attitudes towards science subjects in secondary schools in Mvomero. This finding is in line with the study by Osborne et al. (2003) who identified students' perception of science as a difficult subject and that studying science is perceived as a risk by students. Osborne et al. argue that student preferred to risk the choice that leads to the definite avoidance of loss rather than risk an opportunity that may have no loss whatsoever.

4.5.6 Anxiety over Career Opportunities

The findings in Table 4.7 show that anxiety over career opportunities influenced students' attitude towards science subjects in secondary schools. When discussing this in the FGD session, 18 (75%) students out of 24 mentioned anxiety over career opportunities in their explanations as one of the factors influencing positive attitude towards science subjects in secondary schools. They argued that students' positive attitude towards science subjects were influenced by availability of many jobs in the market for those who passed science subjects. This was the view expressed by one student from S1:

“It is easy for one to find a job when he/she takes science courses compared to arts courses... in fact many students who opt for arts subject end up by becoming teachers whereas those who opt for science courses have plenty of choices in various sectors such as aviation, agriculture, environment, manufacturing, mining and transportation to mention few (Student S1, February 2016).”

The above explanations show that anxiety over career opportunities is one of the common factors that influenced positive attitude towards science subjects among secondary school students in Mvomero. Despite of many challenges that are facing the teaching and learning process of science subject in secondary schools like shortage of science teachers, inadequate teaching methods, shortage of teaching resources and poor infrastructure such as laboratory, libraries and classrooms, still some students opted for science subjects due to the fear of not securing jobs after their graduation especially. This is similar to the observations made by Chepkorir (2013) on the impact of students' attitudes on the teaching and learning of chemistry in secondary schools in Bureti District, Kenya which mentioned anxiety over career opportunities to be one of the most important factors which influence students' attitudes towards science subjects in secondary schools.

4.5.7 Inadequate Teaching and Learning Materials

The study revealed that inadequate teaching and learning materials contributed to students' negative attitude towards science subjects in secondary schools. This was evident in interview session with secondary school teachers (see table 4.6), where 8 (80%) teachers out of 10 lamented that, it was difficult to teach science subject due to absence of teaching materials in their schools. The study revealed that teachers use low quality materials or not at all to teach science topics. Most schools in Mvomero don't have enough apparatus and chemicals for Chemistry experiments as well as pendulums and other materials for Physics experiments. To make things

worse, there was huge absence of science textbooks in many schools. This situation in turn influenced students' negative attitude towards science subjects in secondary schools. Expressing her view in the interview, one Science Teacher lamented that:

“In fact we are teaching students in very difficult conditions due to shortage and inadequate teaching materials such as science text books, science kits, charts and apparatus/chemicals for teaching Chemistry (Teacher S1, February 2016).”

Similar responses were given in the FGD with students (see Table 4.7), 8 (33%) out of 24 pointed out how inadequate teaching and learning materials contributed to students' negative attitude towards science subjects in secondary schools. This was the argument contributed by one student from S1.

“We have many problems here like shortage of teachers and inadequate learning materials such as books, apparatus and chemical... This makes some students to hate science subjects and opt for arts subjects.... however, for those who are in science streams are forced to go to Dar es Salaam or Morogoro town for practical experiments in various tuition centers in June and December (Student S1, February 2016).”

As a result, most of students in S1 joined into tuition system outside of their school especially in June and December when schools had closed. Most students went to Dar es Salaam or Morogoro town for practical experiments in various tuition centers. Conversely, in S2, the situation was different as teachers and students were enjoying the whole process of teaching and learning science respectively due to availability of teaching and learning materials in their school. This was evident in the interview session with teachers in S2 where one teacher shared his concern that:

“In fact, we don't have many problems in teaching science subjects because we have all necessary materials for teaching science subjects (Teacher S2, February 2016).”

Similarly, students in S2 had the same view during the FGD session, this was the view expressed by one students:

“I like science subjects because we have good science teachers and enough teaching and learning materials (Stusent S2, February 2016).”

From the excerpts above, it is apparent that inadequate teaching and learning materials influenced students' negative attitude towards science subjects where as availability of good teaching and learning materials influenced students' positive attitudes towards science subjects in secondary schools. The findings of this study imply that shortage of teaching materials such as textbooks, apparatus and chemicals in secondary schools will make some students to continue hating science

subjects and opt for arts subjects. This study is similar to the study by Mbugua, Kibet, Muthaa and Nkonke (2012) who assert that inadequate teaching and learning materials had an influence on students' poor performance in mathematics at Kenya certificate of secondary education. Furthermore, the study by Psacharopoulos and Woodhall (as cited in Mbugua et al., 2012) assert that textbooks and other learning materials are a major input for performance in examinations. Chepchieng (as cited in Mbugua et al., 2012) adds that availability of and quality of textbooks and other teaching and learning materials in a secondary school is strongly related to achievement in science subjects among children from lower income families.

4.5.8 Shortage of Science Teachers

Findings of the study also indicated that 9 (90%) out of 10 Science Teachers in the interview mentioned shortage of science teachers in their explanations as one of many factors contributing to students' negative attitude towards science subjects in secondary schools. It was found that shortage of science teachers in S1 increased the teaching load for those few teachers available. The school has only one Physics teacher, one Biology teachers, two Chemistry teachers and three Mathematics teachers. This situation left the school in dilemma as it was impossible for one Physics teacher to go around all classes and their streams. In the situation like this, most students built negative attitudes towards science subject. In order to solve this problem, the school hired few form six leavers to accommodate for the existing problem. Responding to the question in the interview, one science teacher from S1 remarked that:

“There are only seven teachers in this school..... one teacher is for Physics, two teachers for Chemistry, one teacher for Biology and three teachers for Mathematics (Teacher S1, February 2016).”

Likewise, results obtained from FGD with students revealed that students didn't learn well due to absence of science teachers especially Physics and Biology teachers. This is what was said by one student:

“Many science topics are usually left without being taught due to shortage of teachers..... For example, the school has only one Physics teacher who is responsible to teach all classes and streams from Form One to Form Four. This makes many students to opt for arts subjects (Student S1, February 2016).”

Conversely, schools which had enough number of science teachers, students seemed satisfied and had positive attitude towards science subjects. In S2 for instance, students claimed that they were hoping to pass their final examinations

because their school had convincing number of science teachers and that they were already covered some important topics. This was the view expressed by one student:

“I am happy because we have good number of science teachers in our school and we have already covered some necessary topics..... I believe most of us will perform well (Student S2, February 2016).”

Based on the responses above, it is apparent that availability of enough science teachers in secondary schools influenced students' positive attitude towards science subjects whereas shortage of science teachers in secondary schools influenced students' negative attitudes towards science subjects. This implies that if the number of science teachers will be increased in all secondary schools in mvomero, will help students to learn and understand well science subjects and build positive attitudes towards science.

Similar trends emanated from the study by Mbugua, Kibet, Muthaa and Nkonke (2012) who revealed that under staffing in secondary schools was contributing to students' poor performance in mathematics at kenya certificate of secondary education. Wamukuru (2016) asserts that teachers' shortages were frequently viewed as impacting negatively on quality of teaching and learning of science subjects. Wamukuru argues that teacher recruitment has been minimal despite the increase in supply of teachers graduating from universities and other teachers' training colleges.

4.5.9 Teaching Approaches

The finding of the study in Table 4.6 indicated that 7 (70%) out of 10 Science Teachers, discussed and explained that teaching approaches was one of the important factors that influenced students' attitude towards science subjects. Active learning was said to be crucial when teaching science subjects in secondary schools. Learning science subjects demands a student to be involved in classroom activities rather than merely passively listening to an instructor's lecture. These activities helped students to develop high order cognitive skills such as problem solving and critical thinking which in turn led to students' positive attitude towards science subjects. Responding to the question in the interview on the factors that were influencing students' attitude towards science subjects, one teacher from S2 had this to say:

“Some teaching approaches such as collaborative learning, inquiry, discussions, games/experiments/simulations, and experiential learning (learning by doing) improved secondary school students' cognitive abilities, retention of information and understanding and were very effective in developing higher order cognitive skills such as critical thinking and problem solving (Teacher S2, February 2016).”

This response implies that active learning will help students to develop positive attitude towards science subjects in the whole process of teaching and learning in secondary schools due to the fact that discussions, games, simulation, experiments and inquiry improved students' understanding and retention of information.

In the FGD with students, teaching approaches was also said to be among the factors influencing students' attitudes towards science subjects. 11 (46%) out of 24 students said that passive learning such as lecture method enabled students to develop negative attitude towards science subjects. This is what was said by one student in the FGD:

“I don't like the way our Physics teacher used to teach us..... he normally engage us in doing nothing in the class but merely passively listening to his lectures (Student S1, February 2016).”

From these perspectives, some insights can be drawn that most students in science classes liked to be involved in doing exercises, discussions and experiments and participating in games which enabled them to improve their understanding and retention of information. On the other hand, learning science subjects passively develop students' negative attitude towards science subjects because passive learning is less effective in developing higher order cognitive skills such as critical thinking and problem solving. These findings imply that if teachers will use participatory methods in the whole process of teaching and learning science subjects, students will understand easily the subject matter and build positive attitude towards science and science subjects.

These findings concur with that of Mabula (2012) in his study in promoting science subjects choices for secondary school students. He found that students' negative attitudes towards science subjects were caused by the connection between attitudes towards science subjects and the way in which science subjects were taught. Similarly, the study by Lyons (2005) who reports that the decline of interest among students in science subjects in secondary schools was a result of how science was taught and learnt in secondary schools where science subjects were taught theoretically instead of engaging students in practical work.

The findings of the study indicate that teaching approaches have strong impact on students' interest in the subject. This is consistent with Ndlichako and Komba (2014) who argue that what happened in the classroom has impact on students' performance. This means that effective teachers enhance opportunities for their students to participate in the whole process of learning while teachers who use non participatory methods of teaching and learning limit the opportunities for their students to learn science subjects.

4.5.10 Commitment and Support Provided by the Subject Teachers

The results obtained from the interviews sessions with Class Teachers revealed that, commitment and support provided by the subject teachers played the crucial role in influencing positive attitude towards science subjects in secondary schools. 4 (40%) out of 10 Class Teachers pointed out that teachers who were committed themselves in teaching their subjects, the performance of students in that subjects were high compared to subjects that were taught by teachers who were less committed to teach their subjects. These teachers were willing to teach their students even in weekend in order to ensure that all topics were covered on time. This boosted students' confidence and morale and develop positive attitude towards science subjects. Reflecting on this aspect, one of the science teachers from S2 had this to say:

“On the other hand, students' attitudes towards science subjects are influenced by subject teachers' commitment and support (Teacher S2, February).”

The finding above was similar to the findings obtained from the FGD with students.

This is the remarks given by one student from S1:

“Our school is doing well only in Biology subject due to the commitment and support from Biology teachers, though they are only two, but they teach us by heart to the extent that 29 students out of 71 managed to get a credit in the previous CSEE on the other hand, no one managed to get even a pass in Mathematics,... all students failed (Student S1, February 2016).”

Validating this information from documentary review through CSEE results, it was evident that commitment and support from subject teachers influenced students' performance in science subjects in CSEE. Table 4.1 below indicates these results.

Table 4.8: Subjects' Performances for S1 in Certificate of Secondary Education Examinations

CODE	SUBJECT NAME	REG	SAT	NO-CA	W/HD	CLEAN	PASS
031	PHYSICS	20	20	0	6	14	5
032	CHEMISTRY	24	24	0	7	17	9
033	BIOLOGY	71	71	0	35	36	29
041	BASIC MATHEMATICS	71	71	0	35	36	0

Source: Data from Documentary Review (2016)

Table 4.8 illustrates the subjects' performances for S1 in certificate of secondary education examinations. The table indicated that only five (5) out of 20 students who sat for Physics subject were passed; nine (9) out of 24 students who sat for Chemistry subject were passed; 29 out of 71 students who sat for Biology were passed; and none out of 71 students who sat for mathematics were passed. This means that despite the shortage of science teachers and inadequate teaching and learning materials in S1 still 29 students managed to get a credit in Biology subject due to teachers' commitment and support to their students.

This study is consistent with the study by the Ndalichako and Komba (2014) which indicated that teachers are able to influence the motivation of students via specific aspects of their teaching but mainly through their orientation to the student. Teachers have a great influence on students' interests on the subject and are key determinant factor in encouraging or discouraging students to engage in a subject (Samuelsson, 2010). Ndalichako and Komba (2014) explains attribute of teachers such as friendliness, punctuality, hardworking and effectiveness in teaching as some of the factors that make students like the subjects. The findings show teachers commitment on their work had strong impact on students' interest in the subject and that teachers who were not committed to their teaching professional eroded the motivation of students to pursue their subjects.

4.6 Possible Solutions to Students' Negative Attitude towards Science Subject

Research Objective three sought to determine possible recommendable solutions to students' attitude towards science subject. This section presents the analysis and discussion of the results regarding the suggested solutions obtained from science teachers, DEOs and students through interviews and FGDs. The aim was to find out their views on the possible solutions to students' negative attitude towards science subjects. The findings are presented in Table 4.9 and Table 4.10.

Table 4.9 Science Teachers on Possible Solutions to Students' Negative Attitude towards Science Subject

S/N	Possible Solutions to Students' Negative Attitude towards Science Subject	Frequency (N=10)	Percent (%)
1.	Using learner centred approach to present the content	9	90%
2.	Providing enough teaching and learning materials	8	80%
3.	Increasing the number of science teachers	8	80%
4.	Encouraging guidance and counselling programme in secondary schools	6	60%
5.	Raising teachers' morale	4	40%

Table 4.9 indicates possible solutions to students' negative attitude towards science subjects in public secondary schools. The most mentioned solutions included; using learner centred approach to present the content (90%); providing enough teaching and learning materials (80%); increasing the number of science teachers (80%); encouraging guidance and counselling programme in secondary schools (60%); and the least mentioned was raising teachers' morale (40%).

Table 4.10 Students on Possible Solutions to Students' Negative Attitude towards Science Subject

S/N	Possible Solutions to Students' Negative Attitude towards Science Subject	Frequency (N=10)	Percent (%)
1.	Providing enough teaching and learning materials	20	83%
2.	Using learner centred approach	15	63%
3.	Raising teachers' morale	09	38%

Table 4.9 indicates possible solutions to students' negative attitude towards science subjects in public secondary schools. The most mentioned solutions included; providing enough teaching and learning materials (83%); Using learner centred approach (63%); and Raising teachers' morale (38%).

4.6.1 Encouraging Guidance and Counselling Programmes in Secondary Schools.

The study findings in Table 4.9 indicated possible solutions to students' negative attitude towards science subject. With this regard, 6 (60%) Science Teachers in the interviews proposed that guidance and counselling programmes should be availed in schools to help students to develop positive attitudes towards science subjects. One teacher in the interview from S1 proposed:

“The school should establish guidance and counselling programmes to help students on issues like drug abuse, misbehaviour, negative attitudes towards science subjects and gender issues (Teacher S1, February 2016).”

Also, interview with teachers in S2 revealed that guidance and counselling programmes were important for students because these programmes would be used to change students' negative attitudes into positive ones by eliminating thoughts of failure and gender problems and encouraging them to study hard. In an individual interview, a teacher in S2 opined:

“Guidance and counselling programmes is very important because it will help students to reduce fear and a sense of failure and providing them with confidence, ambition and determination on science subjects (Teacher S2, February 2016).”

The finding of the study support Gatua (2014) who note that guidance and counselling services in secondary schools had high levels impact on students' social and emotional adjustments. It was also found that guidance and counselling services helps in enhancing positive social and emotional adjustments amongst secondary school students (Gatua, 2014). The findings show guidance and counselling programmes in secondary schools had positive impact on students' attitude towards science subjects. Stakeholders in education sector and other youth institutions could find these findings useful in addressing secondary schools students' social and emotional and psychological needs.

4.6.2 Providing Enough Teaching and Learning Materials

In finding the possible solutions to students' negative attitude towards science subject, 8 (80%) Science Teachers proposed that materials like books, charts, laboratory equipments and their chemicals should be availed to enhance the teaching and learning of science subjects. Responding to a question in an interview, a teacher in S1 proposed:

Materials for teaching and learning science subjects are a hindrance in active learning.... the school should purchase important materials like books and laboratory equipments such as apparatus and their chemicals to ease the teaching of science subjects and help students to develop positive attitudes towards science subjects (Teacher S1, February 2016).

In an attempt to find out further possible solutions to students' negative attitude towards science subject, 20 (83%) out of 24 students in the FGD (see Table 4.10) revealed that shortage of learning materials impeded the practicality of science subjects. This was due to the fact that shortage of learning materials forced teachers to teach students more theoretically. Students in S1 suggested that the laboratory should be well equipped in order for them to learn more practically than theoretically. In an FGD, a student in S1 had this to say:

"It is difficult to learn some science topics theoretically. Instead most topics like "Laboratory Rules" could best be taught practically so that it can be well understood..... so, the laboratory should be well equipped to enhance learning (Student S1, February)."

From the findings above, it is apparent that, in order for effective teaching and learning of science subjects to take place, there should be enough materials to facilitate learning. The laboratory should be equipped with all necessary equipments such as apparatus and chemical in order to enhance learning of science subjects.

The findings of the study indicated that schools were lacking adequate teaching and learning materials to facilitate the teaching of science subjects. With this regard, teachers in S1 proposed that materials like books, charts, laboratory equipments and their chemicals should be availed to enhance the teaching and learning of science subjects. The findings from this study corroborated the study by Mbugue et. Al (2012) who revealed that increasing the number of teachers and learning materials in secondary schools and sensitization of the local community to discard practices which prohibit student's effective participation in learning science subjects can improve students' performance in science subjects.

4.6.3 Increasing the Number of Science Teachers

The findings of the study in Table 4.9 indicated another solution to students' negative attitudes towards science subjects which is to increase the number of science teachers. 8 (80%) out of 10 Science Teachers claimed that shortage of teachers was one of the factors influencing students' negative attitudes towards science subjects. It was noted that both S1 and S2 had few number of science teachers which in turn affected students performance in science subjects. One teacher from S2 claimed that in order to develop students' positive attitude towards science subjects, the number of science teachers should be increased according to the number of students in the class. This is what he said:

“The number of science teachers should be increased in each secondary school in order to enhance learning and teaching of science subjects. This will help to develop positive attitudes among students towards science subjects (Teacher S2, February 2016).”

Another teacher from S1 shared her concern on the solutions to students' negative attitudes towards science subjects that:

“The government should hire many science teachers in order to accommodate for the existence problem of shortage of science teachers in secondary schools which in turn would help to develop students' positive attitudes towards science subjects (Teacher S1, February 2016).”

The above explanations show that increasing the number of science teachers in secondary schools would be one of the solutions to students' negative attitude towards science subjects. Availability of enough teachers would help students to learn all important topics in the syllabus and give them confidence that would help them to develop positive attitude towards science subjects.

4.6.4 Using Learner Centred Approaches to Present the Content

The study findings indicated that 9 (90%) out of 10 Science Teachers who participated in the interviews sessions explained that the use of learner centred approach might be used as the solution to students' positive attitudes towards science subjects (Table 4.9). Learner centred approach was said to be crucial when teaching science subjects because the approach demanded a student to be involved in classroom activities rather than merely passively listening to an instructor's lecture. Speaking on the importance of learner centred approaches, one teacher from S2 had this to say:

“Teaching methods like role play, class debate, group discussion, question and answers, dramatization and experimentation involve

students in classroom activities..... These activities helped students to develop high order cognitive skills such as problem solving and critical thinking which in turn led to students' positive attitude towards science subjects (Teacher S2, February 2016)."

In the FGD with students, 15 (63) out of 24 students comment that teachers should use learner centred approaches to present the content. This is what was said by one student from S1:

"I normally understood the lesson well when teachers use methods like group discussion, debate and experiments (Student S1, February 2016)."

The explanation above show that learner centred approach was crucial for effective teaching and learning of science subjects because the approach involved students classroom activities which enable students to develop cognitive skills like inquiry, reasoning, critical thinking and problem solving. These mental processes helped students to develop positive attitudes towards science subjects.

These findings are in line with the study conducted in Pakistan by Rahman et al. (2011) on the impact of discussion method on students' performance which revealed that discussion method was more effective than lecture method. Similarly, this study corroborated the study by Ghorbani, Sarukolae and Dast-Mard (2014) on the use of participatory learning method in training higher levels of learning in e-learning system which showed that the use of collaborative teaching methods were effective in improving the high levels of learning lessons in Iran. The findings show that using learner centred approaches to present the content had positive impact on students' performance which in turn led to students' positive attitude towards science subjects.

4.6.5 Raising Science Teachers' Morale

Through FGD with students 9 (38%) out of 24 students suggested that raising science teachers' morale was the key to development of positive attitude towards science subject among secondary school student. If teachers are motivated they would commit themselves to their subjects and support their students. One student from S2 in the FGD session had this to say:

"In fact teachers' morale is low.... Something should be done in order to raise teachers' morale (Student S2, February 2016)."

From the finding above, it is likely that raising teachers' morale would enable teachers to commit themselves to their teaching professional by teaching students

by heart and help students to get high grades in science subjects which in turn would develop students' attitudes towards science subjects.

Moreover, the findings obtained from the interviews with Science Teachers indicated that 4 (40%) out of 10 Science Teachers explained that raising teachers' morale was also among the possible solutions to students negative attitudes towards science subjects. Responding to the question in the interview about this issue, one teacher remarked:

“The government should motivate teachers and raise their morale by giving them reasonable salaries, house, working at safe place, annual leave and teaching allowances to mention few (Teacher S1, February 2016).”

The argument appeared that if teachers would be given all necessary needs to support their living such as good salaries which suit their needs, good working conditions and giving them teaching allowances to mention few, they would do their best to teach students regardless their numbers in each school. This is consistence with the study by Govindarajan, (2012) who contended that improving teachers' morale has many benefits in that it can help teachers to maintain a positive attitude and be happier at work. By treating teachers in ways that empower them, such as involving them in decisions about policies and practices and acknowledging their expertise, administrators can help sustain teacher morale and (Govindarajan, 2012).

The study findings above relate to both theoretical and conceptual frameworks which guided this study. The adopted theory, Theory of Reasoned Action (TRA), considers learning as involving three general construct namely: Behavioural Intention (BI); Attitude (A); and Subjective Norms (SN). Behavioural intention depends on the person's attitude about the behaviour and subjective norms ($BI=A+SN$). This means that a person in a community with intention of doing certain behaviour then it is likely that he/she will do it (Jebson & Hena, 2015). Jebson and Hena (2015) add that the person's attitude towards the behaviour and the subjective norms guide a person's intentions. Attitude concerns with beliefs about the consequences of performing the behaviour and person's valuation of these consequences (Jebson & Hena, 2015). Subjective Norm is a combination of expectations from individuals or social groups supported by intentions to comply with these expectations (Jebson & Hena, 2015). TRA presupposes that attitude towards science denote interest or feeling towards studying science where a number of factors can influence a person's attitude, including previous experiences

and social influences, type of science courses taken, previous science experiences, science teachers, and various other factors can influence these attitudes toward science (Morrell & Lederman, 1998). In this study, TRA implies that, students' attitudes and behaviour are intimately related to the opinions of the students' social environment and other adjoining social events as the student interacts with people in the environment. Thus, teachers can create favourable attitude towards science subject in order to influence students to build positive attitude towards science subjects.

As per the conceptual framework adapted in this study, Positive and negative attitudes as dependent variables were related to the independent variables, which are parental factors, school environmental factors, students' factors and teachers' factors. This means that factors like gender, teaching approaches, shortage of science teachers and school resources are associated with negative and positive attitudes towards science subjects.

4.7 Summary of the Chapter

This chapter has presented the findings of the study. The findings from Objective 1 revealed that majority of students from S1 and some students from S2 had negative attitude towards science subjects. The findings from Objective 2 revealed some factors which influence students' attitudes towards science subjects. Such factors are gender; expected achievements; previous science experiences; anxiety over career opportunities; inadequate teaching and learning materials; shortage of science teachers; teaching approaches; knowledge of available career; students examinations scores; school resources; commitment and support provided by the subject teachers; and relevancies of the subject to their daily life experiences. The findings from Objective 3 indicated some possible solutions to students' negative attitudes towards science subjects.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary, conclusions, and recommendations for practice and for further research related to the factors influencing student's attitudes towards science subjects in secondary schools.

5.2 Summary of the Study

The purpose of this study was to explore the factors influencing student's attitudes towards science subjects in secondary schools. The study was carried out in Mvomero District where two (2) secondary schools namely S1 and S2 were involved. The study involved a total of 36 informants including two (2) DEOs, 10 science teachers, and 24 science stream students. From the informants, data were collected through interview, focus group discussion (FGD) and documentary review.

To accomplish the purpose above, the study had three specific objectives which were (1) to assess students' attitude towards science subjects, (2) to identify the factors for students' attitude towards science subjects and (3) to determine possible recommendable solutions to students' attitude towards science subject.

The study employed a qualitative research approach and a case study design. Purposive sampling was mainly employed in this study. Triangulation, thick description and back translation were employed to ensure reliability and validity of the study. Data analysis were followed a system developed by Miles and Huberman (1994) which involves development of themes. The system allows new ideas to be brought up during the process of data collection. The researcher put into consideration the ethical issues during the entire study process.

The findings of the study from the research Objective 1 indicated that students' from S1 had more negative attitude towards science subject than students from S2. The study found that majority of students had negative attitude towards science subjects because the school had fewer science teachers, inadequate teaching and learning materials, previous experiences, lack of teaching and learning resources and unconvincing examination scores in the previous years. Contrary, students from S2 had slightly positive attitudes towards science subjects compared to students from S1 because the school had more science teachers compared to S1, enough

teaching and learning materials and availability of teaching and learning resources. On the other hand the findings of the study indicated that female students from both S1 and S2 had more negative attitude compared with male students.

The findings of the study from the research Objective 2 indicated that students' attitude towards science subjects was influenced by gender. The study revealed that female students from S1 and S2 had negative attitude towards science subjects and gender had significant effect on their attitude. Other factors which influenced students' attitudes towards science subjects were: expected achievements; previous science experiences; anxiety over career opportunities; inadequate teaching and learning materials; shortage of science teachers; teaching approaches; knowledge of available career; students examinations scores; school resources; and commitment and support provided by the subject teachers.

The findings from research Objective 3 revealed that schools solutions to the problem of students' negative attitudes towards science subjects proposed. With this regard, teachers and students from both S1 and S2 proposed the following measures to be taken as solutions to students' negative attitudes towards science subjects: encouraging guidance and counselling programmes in secondary schools; providing enough teaching and learning materials; increasing the number of science teachers; making science subjects more relevant to the learner; raising science teachers' morale; and using learner centred approach to present the content.

5.3 Conclusions

There are key conclusions which can be drawn from this particular study regarding the challenges that affect primary school pupils' mastery of the basic 3Rs. The conclusions are based on the objectives of this study (see Section 1.4.2).

First, negative attitudes towards science subjects had an impact on students' mastery of science subjects. As found in this study, negative attitude towards science subjects hindered some students from mastering science subjects. This conclusion is underpinned by the evidence in S1 and S2 whereby most students' from S1 had negative attitude towards science subject than students from S2. The study found out that Science Streams in S1 had fewer students compared to Art Streams because students had developed negative attitudes towards science subjects due to shortage of science teachers, inadequate teaching and learning materials and lack of teaching and learning resources. Contrary, in S2 the number of

students in Science Streams was slightly higher than that of students in Arts Streams because the school had more science teachers compared to S1, enough teaching and learning materials and availability of teaching and learning resources.

Second, the findings of the present study establish that the factors that influence students' attitude towards science subjects are not well conceived among educational stakeholders. As evidenced in this study, these factors could influence a student negatively or positively. Availability of teaching and learning materials could influence student's positive attitude towards science subjects whereas absence or lack of it could influence student's negative attitude towards science subjects. If educational stakeholders would work on these factors would help students to reduce negative attitudes and develop positive attitudes towards science subjects.

Third, there are solutions to the problem of students' negative attitude towards science subjects. As it was evidenced in this study, such solutions include encouraging guidance and counselling programmes in secondary schools; providing enough teaching and learning materials; increasing the number of science teachers; making science subjects more relevant to the learner; raising science teachers' morale; and using learner centred approach to present the content.

It could therefore be established that the study on the factors influencing students' attitudes towards science subjects was crucial as its findings would help both teachers and students to identify their areas of strength and weaknesses and make necessary adjustments to fill the gaps in their roles.

5.4 Recommendations

From the findings and the conclusions of this study, two sets of recommendations are going to be presented. One is a set of recommendations for practice and the other one is a set of recommendations for further research studies.

5.4.1 Recommendation for Practice

- There is a need to improve school infrastructures such as classrooms, libraries and laboratories.
- Capacity building programmes should be carried out for teachers to help them understand the need for improvisation of teaching and learning materials.

- In service training should be carried out in schools to help teachers use learner centred approach to present the content.
- The government should equip schools with all necessary teaching and learning resources in order to help students to have equal access for education.
- Guidance and counselling programmes should be established in each secondary school.

5.4.2 Recommendation for Further Research

- Since the current study only explored the factors influencing student's attitudes towards science subjects in secondary schools, a similar study should focus on other areas, such as effects of students' negative attitudes towards science subjects, such study would help in devising strategies for promoting the development of science subjects.

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APPENDICES

APPENDIX A: INTERVIEW GUIDE FOR TEACHERS AND DEOs

I am conducting a research which main objective is to explore the factors influencing student's attitudes towards science subjects in secondary schools. I am kindly requesting you to give out your opinions and views without hesitation. The information you will give will be treated with utmost confidentiality and used purely for academic purposes. The ultimate results of this study will help to reduce students' negative attitude towards science subjects.

A: Background Information

- i. Name (optional)
- ii. Gender (male or female)
- iii. Education level, e.g. Form Four
- iv. Status (Teacher or DEO)

B: Questions

- i. What would you consider to be student's attitude towards science subject?
- ii. What could be the factors influencing students' attitudes towards science subjects?
- iii. What would you consider to be the best ways of addressing the problem of students' negative attitudes towards science subjects?

Thank you for your cooperation

APPENDIX B: CHECKLIST FOR FGDs

Name of the facilitator.....

1. Number of participants.....

2. School.....

3. Date..... Time.....

Brief explanation on the purpose of FGD to secondary school students

Guideline of FGD to Students

- i. The students' attitude towards science subject;
- ii. The factors influencing students' attitudes towards science subjects;
- iii. The best ways of addressing the problem of students' negative attitude towards science subjects;

APPENDIX C: DOCUMENTARY REVIEW CHECKLIST

Name of school.....

Class.....

Students' Subject Option

Stream	Number of Students who Opt for Science Subjects	Number of Students who Opt for Arts Subjects	Number of Students who Opt for Commercial Subjects
Stream A			
Stream B			
Stream C			
Stream D			
Stream E			
TOTAL			

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PO Box 47
DODOMA
Tanzania

Date: 18th 02. 2016

TO WHOM IT MAY CONCERN

Graduate Student's Research Clearance

This letter serves to introduce JAPHET DAMAS (Registration Number M/2014/5090), who is a bona fide student of St John's University of Tanzania in the Faculty of Humanities and Education.

He is currently in the research stage of her Masters studies and is required to collect data. He has already obtained ethical clearance from SJUT Internal Review Committee/

His approved research topic is:

FACTORS INFLUENCING STUDENTS ATTITUDES TOWARDS SCIENCE SUBJECTS IN SECONDARY SCHOOLS: A CASE OF MVOMERO DISTRICT.

I request that you grant this student all possible assistance to facilitate the completion of his research study.

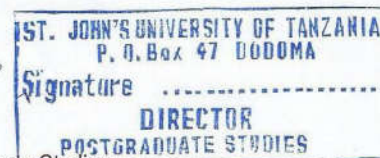
Should you need further clarification please contact my office.

I wish to thank you for your kind assistance for this student.

Yours sincerely

A handwritten signature in blue ink, appearing to read "Michael Msendekwa".

Dr. Michael Msendekwa
Ag, Director of Research, Consultancy and Postgraduate Studies
Email asavage@sjut.ac.tz





ST JOHN'S UNIVERSITY OF TANZANIA
DIRECTORATE OF RESEARCH AND CONSULTANCY
INTERNAL REVIEW COMMITTEE

RESEARCH CLEARANCE CERTIFICATE

FOR MASTER'S AND DOCTORAL STUDENTS

Date of meeting: 17th, February 2016

Project title: Factors Influencing Students Attitudes towards
Science Subjects in Secondary Schools. The Case of Mvomero
District, Tanzania

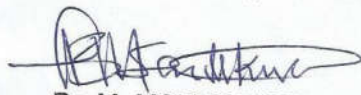
Researcher: JAPHET DAMAS

Supervisor: Dr. Martha J. Nhembo

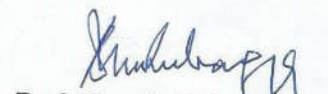
Faculty / Institute / School: Faculty of Arts Humanities and Education

Degree being studied for: MA In EDUCATION

This is to certify that the research proposal herein detailed has been
examined and approved by the Internal Review Committee of St
John's University of Tanzania


Dr. M. MSENDEKWA

A.g. Director, DRCPGS


Prof. Casmir Rubagumya

DVCA