

**AN INQUIRY INTO WHAT MOTIVATES STUDENT TEACHERS IN COLLEGES
OF EDUCATION IN ZAMBIA TO CHOOSE MATHEMATICS AS
THEIR TEACHING SUBJECT: THE CASE OF BASIC
AND HIGH SCHOOL STUDENT TEACHERS**

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By
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**A dissertation submitted in fulfilment of the
requirements for the degree of
Master of Education in Mathematics Education**

The University of Zambia

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Declaration

I, Mulenga George, do declare that the dissertation hereby submitted is my own work and it has not previously been submitted for a degree, diploma or other qualification at the University of Zambia or any other learning institution, and that all sources are acknowledged.

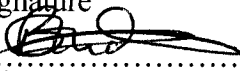
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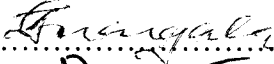
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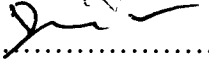
Certificate of Approval

This dissertation by George Mulenga is approved as a fulfillment of the requirements for the award of master of education in mathematics education of the University of Zambia

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ABSTRACT

This study investigated factors inspiring and motivating student teachers' choice of mathematics as their teaching subject. The research design used was cross sectional survey of mathematics student teachers in colleges of Education in Zambia. The target population was all student teachers training to teach mathematics at upper basic and high school levels in all Zambian Colleges of Education. The data for the study was provided by 83 male and 37 female mathematics student teachers (N = 120) from four purposively sampled Colleges of Education. The instruments used to collect data were questionnaires. Data were coded and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics including frequency accounts and means were used to report the results. Tables were used to summarize and condense the data. The findings of the study revealed that the most important factors inspiring and motivating student teachers to choose mathematics as their teaching subject were: (a) the former high school mathematics teacher, (b) expectation of success, interest and enjoyment value, utility value, attainment value and cost value, and (c) family support .The report concludes with recommendations for classroom practice of mathematics teachers, mathematics heads of departments, guidance and counselling teachers, lecturers and policy makers. Also the study suggests further research on factors inspiring and motivating student teachers' choice of mathematics as their teaching subject.

DEDICATION

To my wife, Edith, to my daughter Bwalya and to my sons Chanda and Mapalo I say you have made my life complete.

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LIST OF ACRONYMS

ECZ	Examination Council of Zambia
CDC	Curriculum Development Centre
SCCT	Social Cognitive Career Theory
COSETCO	Copperbelt Secondary Teachers' College
NISTCOL	National In service Teachers' College
TED	Department of Teacher Education
JETS	Junior Technicians Engineers and Scientists

CHAPTER ONE

INTRODUCTION

The study aimed at identifying and describing the factors that motivate upper basic and high school student teachers to choose mathematics as their teaching subject. This first chapter presents the background of the study, specifies the problem of the study, describes its significance, and presents the research objectives and research questions.

1.1 Background

Education in Zambia consists of nine years of basic school, three years of high school and two to seven years tertiary education. The basic school level is further subdivided into three sections namely lower basic (grades one to four), middle basic (grades five to seven) and upper basic (grades eight to nine). The high school level is from grade ten to grade twelve. Selection of courses, occupations, and fields of work are made at tertiary level which consists of trade institutions, colleges, and universities. There are three types of teacher education programmes at tertiary level; that is three years in the colleges to obtain either a primary or a secondary diploma and three to four years for a degree.

Mathematics is one of the core subjects in the curriculum in Zambian schools. At lower and middle basic level (grades one to seven) all pupils learn mathematics (Curriculum Development Centre [CDC], 2000) and all teachers of pupils in grades one to seven are expected to teach all subjects offered in the basic school curriculum. Therefore, all grades one to seven student teachers are expected to train to teach mathematics in a college of education. This enables them to acquire the basic mathematics teaching concepts, which they need in order to teach mathematics effectively at lower and middle basic levels. However, at upper basic and high school levels (grades eight to twelve) each teacher teaches specific subject content according to his/her field of specialisation. Selection to pursue teacher education is based on high school achievement.

The final examinations are written at the end of grade seven, grade nine and grade twelve. Therefore, progression from middle basic to upper basic and from upper basic to high school level depends upon an external examination directed by the Ministry of Education through the Examination Council of Zambia (ECZ). This means that not all children proceed to upper basic education and high school levels.

One of the aims of the mathematics curriculum at high school level is to provide pupils with mathematical knowledge and skills necessary for terminal and further education (Curriculum Development Centre, 2000). However, research has revealed that most pupils have low levels of self-confidence in learning mathematics (Phiri, 2006). Nkoya (2008) contended that general performance in mathematics at both grade 9 and 12 levels over the years has not been good. According to Nkoya (2008), 55 % of the candidates

who sat for 2007 grade nine examinations failed mathematics so were 52 % of the candidates who sat for 2007 grade twelve examinations. At grade 12 level the performance of females was worse than that of males in the same examination. That is 60.1% of the females who sat for the 2007 grade twelve examinations failed, while only 46.7% of the males did so. The data in Table 1 indicates the pass rates in mathematics for 1992, 1993 and 2000 grade 12 examinations.

Table 1: School certificate mathematics national examinations results for the year, 1992, 1993 and 2000

Year	Percentage for particular examination grade				
	Distinction (1 &2)	Merit (3&4)	Credit (5&6)	Pass (7&8)	Fail (9)
1992	5%	14%	16%	18%	47%
1993	5%	14%	19%	19%	43%
2000	5%	9%	14%	17%	55%

Source: Ministry of Education (2001)

The results in Table 1 show that 47 %, 43 % and 55 % of the candidates who sat for the examination failed mathematics in 1992, 1993 and 2000 respectively. These situations pose unacceptable levels of pupils' performance (Mulendema, 2007). This poor performance in mathematics has led to a situation whereby very few school leavers are ready to take up courses that require the study of it (Nkoya, 2008).

1.2 Statement of the Problem

Despite the general fear of mathematics and the general poor performance in mathematics during national examinations both at grades nine and twelve levels (Mwamba, 2005, Phiri, 2006 and Nkoya, 2008), some student teachers still prefer to train as mathematics teachers. To my knowledge no study has been done in Zambia to identify and describe factors that inspire and motivate student teachers to pursue training as mathematics teachers after completing high school. Thus, there is a knowledge gap which this study attempted to fill.

1.3 Purpose of Study

The purpose of the study was to identify and describe the factors that inspire and motivate upper basic and high school student teachers in colleges of education in Zambia to choose mathematics as their teaching subject.

1.4 Objectives of the study

The objectives of this study were as follows:

1. To identify experiences that inspired and motivated student teachers' choice of mathematics as their teaching subject.
2. To identify individuals such as their former school mathematics teacher who inspired and motivated their choice to become mathematics teachers.
3. To determine if their expectation of success, and subjective task values are related to their choice.
4. To determine at what point during their own schooling when student teachers made

their choice of becoming mathematics teachers.

5. To determine how satisfied mathematics student teachers were with the choice of mathematics as their teaching subject.

1.5 Research Questions

To address the above research objectives this study sought answers to the following questions:

General question

What factors inspire and motivate student teachers' choice of mathematics as their teaching subject?

Sub questions

1. What experiences inspired and motivated student teachers choice of mathematics as their teaching subject?
2. Who inspired and motivated student teachers' choice of mathematics as their teaching subject?
3. What expectations of success and subjective task values motivated student teachers' choice of training as mathematics teachers?
4. When did the student teachers make their choices of becoming mathematics teachers?
5. How satisfied were the student teachers with their choice of mathematics as their teaching subject?

1.6 Significance of the Study

It was anticipated that the findings of this study could be useful to: mathematics teachers

who may use the knowledge to sustain their pupils' confidence in learning mathematics, guidance and counselling teachers in schools who might use the information to provide guidance to pupils regarding career choices. Colleges of education authorities might use the information in defining and describing their current students. Other researchers might use the results of this research as a foundation for further research, and Policy makers and teacher trainers might also use the information to assess the level of commitment of the present crop of mathematics teachers.

1.7 Definition of terms

Expectancy of success: Refers to ones' belief about the chances of succeeding in a task-- based on past experiences, self image, and expectations from parents, teachers and other persons.

Subjective task values: There are four values which influence choice, namely:

Interest and enjoyment value: which refers to ones' belief and expectations - regarding to what extent one will enjoy and be interested in the study/profession.

Attainment value: refers to how important it is for one's self (self esteem, identity and so on) to reach the goal such as that of becoming a mathematics teacher.

Utility value (Extrinsic motivation): refers to one's belief and ideas on how things such as good salary, high job opportunities and the possibility to work abroad, would help individuals achieve the aims they have for education, career, leisure, lifestyle and so on.

Relative cost value: refers to how much it will cost an individual (in terms of time and resources, workload, economical expenditure and so on compared to alternative studies or professionals)

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This review of the literature is focussed on 1) factors that affect individuals' decision making process, 2) career choices, 3) choice of the teaching profession outside Africa, 4) choice of the teaching profession in Africa, 5) choice of teaching mathematics in Africa, 6) choice of some teaching subjects in Zambia, 7) the importance of teaching and learning mathematics, 8) avenues for pursuing mathematics at tertiary level, and 9) the theoretical framework. The review's focus is thematic, that is, it contains subtopics based upon factors that relate to the theme or issue (Robert, 2000).

2.2 Individual Decision Making Process

Choice to pursue training in mathematics teaching involves making decisions. Various scholars have studied the decision making process. Monroe (2009) asserted that the notion of helping learners to become active in making decisions that affect them is not just a function of preparing learners to start making meaningful decisions; it is a function of an appropriate participation system. Dempta (2005) noted that some variables related to individual's decision making process are nationality, religion, sex, age, education, employment, and personality.

Wober (1975) argued that learners, by and large, set realistic aspirations within the limits of information available to them. Studies in the academic achievement domain by Eccles and Wigfield (1998) indicated that both parents' beliefs and children's perceptions of their competence, expectations for success, task difficulty perceptions, and task value perceptions have critical influence on achievement behavior and choices among children in grades 5-12. Eccles and Wigfield (1998) also observed that individuals in whom the motive to achieve predominate tend to make more realistic choices than those in whom the motive to avoid failure is stronger. The latter are more likely to over aspire or under aspire. Vroom (1964) contended that success on a task is often instrumental in enabling the individual to choose the next task in the sequence. In a supportive view, Eccles and Wigfield (1998) pointed out that when making decisions such as selecting a college major people are more likely to choose a major that they think they can master and has a high task value for them. Expectations for success in turn depend on both the confidence that individuals have in their various intellectual capabilities and the individual estimations of the difficulty of the various options they are considering. It is in this regard that Fennema and Sherman (1978) have argued that professions demanding mathematics are dominated by men since males, as early as seventh and eighth, are more likely than females to perceive mathematics as important to their future career goals.

On the other hand, Montgomery (1992) conducted a study that ascertained that females talented in mathematics viewed their career choices as reflective interest that stemmed from early family and education opportunities. However, Montgomery (1992) investigated females talented in mathematics, whereas in this study we are investigating

factors motivating the choice of teaching mathematics by student teachers. Therefore, we cannot draw conclusions about the factors motivating choice of teaching mathematics based on Montgomery's (1992) research findings. Keeney (2007) contended that the process of choice making requires a balance between what one can do and what is worthwhile.

Bandura (1986) argued that individuals choose to engage in or avoid a specific task based on their self-judgment of their competence in accomplishing the task. Therefore, self-efficacy is task or domain specific confidence. Bandura (2001) also stated that four factors influence one's self efficacy: verbal persuasion, vicarious learning, task performance and physiological arousal. Among the four, task performance is the most powerful influencing factor.

2.3 Career Choices

One of the tasks of high school students is to explore and plan for their post secondary career options. Career selection is one of many important choices students will make in determining their future, a decision that will impact on them throughout their lives. Thus the essence of who the student is will revolve around what the student wants to do in their life-long work. Duncan (1967) observed that to better accomplish the mission of helping students achieve their educational and career goals in today's social, economic, and cultural context, school counselors need to be adequately informed about what factors influence high school students' career choices and what approaches would best facilitate their career decision-making process. Parsons (1990) in his three-step formula indicated

that in a wise choice of a vocation, knowledge of opportunities in different lines of work is one of the major factors that affect one's career decisions.

London (1990) described a model for understanding career motivation in later stages. He observed that career motivation in latter stages includes three dimensions: career identity, career insight, and career resilience. Career identity is the extent to which people identify themselves with their work role. Career insight is how realistic people are about themselves and their careers. Career resilience is the extent to which people resist career barriers. It determines a person's persistence in attaining career goals. Bachhuber (1990) studied the model proposed by London (1990) and found that career resilience is significantly higher in the later stages than in the first stages of a career, suggesting higher career motivation in later career stages. However, London (1990) investigated career motivation in latter stage, whereas in this study we are investigating the factors motivating the choice of teaching mathematics by student teachers. Therefore, since the majority of student teachers are in their first stage of career development, we cannot draw conclusions about the factors motivating choice of teaching mathematics based on London (1990) research findings.

Borchert (2002) used a cross sectional survey research design to conduct a research study entitled '*career choice factors of high school students*'. The study found that the history created, in part by the student's environment, personality, and opportunity, will determine how students make career choices. Borchert (2002) argued that the first factor in career choice (environment) may influence the career that students choose. For example,

students who have lived on an island may choose a career dealing with the water, or they may choose to leave the island altogether and never have anything to do with water again. Maybe someone in the student's life has made a significant impact or impression, leading to a definite career choice. Parents' educational background may influence student views *on whether or not to continue their education. Someone they saw on television may have* influenced the student. Borchert (2002) observed that how students see themselves in a role in which personality is a determining factor may influence a chosen career, with some careers demanding that personality should match with the qualities of the occupation. For example, sales people have to be outgoing.

In a supportive view Splaver (1977) observed that "personality" plays an important role in the choice of the right career. A student's personality must be a self-motivated type, to investigate career possibilities from early on in their lives, and not the procrastinating type that waits until they are compelled to decide. Students must take seriously the role that grades play in limiting opportunities in the future. Splaver went on to say, "It is important for you to have a good understanding of yourself, your personality, if you are to make intelligent career plans" (Splaver, 1977). Moreover, Splaver (1977) considered factors of mental abilities to be "verbal comprehension, word fluency ability, spatial ability, numerical ability, reasoning ability, and memory." Splaver matched careers with abilities in backing up her reasoning. She urged students to become familiar with their personality in order to guide their career choices. A developed career plan included evaluation of personality through self-assessment. One example would be a student's critical look at life's experiences to enhance their self-knowledge. Another example

would be students using problem-based learning to gain insight into self-knowledge (Lankard & Brown, 1996).

There have been numerous career clusters, as well as career clashers that coincide with abilities (Borchert, 2002). The student should become knowledgeable in these areas while searching for career interests. Once a career has been narrowed down, personality has played a role in obtaining and keeping employment in the field of choice. Attitudes used in interviews, along with compatible methods of working within teams and alongside co-workers have depended upon the right personality. Once a career has been secured, ambition and sincerity, along with promotions may determine an employee's future.

Moreover, Borchert (2002) asserted that opportunity is another factor which has shaped career choices for students. Opportunity may influence how students have perceived their future in terms of the reasonable probability of a future in particular career fields. The issue of poverty has played an important determining role in the opportunities available to all. The income level of high school families may determine what career a student chooses during a specific time in the student's life; choices that will determine a large part of that student's future. Some students will have to budget education according to their personal income. Thout (1969) addressed those in desperate needs, "Where necessary, these persons [Individuals described as living under the poverty level] must be assisted through special training programs to overcome educational and social handicaps so that minimum job standards can be met".

According to Super's (1990) developmental theory of career development, high school students are at the exploration stage of career development, which involves crystallizing and specifying their occupation preferences while also making preliminary decisions about their career choices. To better accomplish the mission of helping students achieve their educational and career goals in today's social, economic, and cultural context, guidance and counseling teachers need to be adequately informed about what factors influence high school students' career choices and what approaches would best facilitate their career decision-making process (Duncan, 1967). In a supportive view, Taylor (2009) admitted that it is important to understand the reasons that students have behind their choices because these factors influence the relationship between students and their learning environment, which in turn influences the quality of learning. Nonetheless, the extent to which guidance and counseling teachers in Zambia inspire and motivate mathematics student teachers to choose mathematics as their teaching subject is not known.

Becker (1961) and Duncan (1967) pointed out that career choice is the outcome of combined influences exerted by personal aspirations and one's character together with situational and social constructs. A similar observation was made by Dempta (2005) who noted that career choices are determined by a combination of personal and social forces.

A study conducted by Somerset (1968) in Kenya revealed that learners do form realistic attitudes towards themselves when they meet the test of 'real' life outside school or when they are adequately informed in schools. Kaswanga (2006) noted that the family also

influences career choices. A study on career choices conducted in Zambia by Kaswanga in 2006 indicated that lower levels of parents' education can have negative implications on career choices of learners. The lower level of parents' education can retard adolescents' career development, as it reduces the likely hood of going to college or achieving a professional occupational goal and essentially predetermines the child's likely vocational choices. Therefore, from the parents' educational level one gathers both negative and positive aspects of family influences (Kaswanga, 2006).

Another study that acknowledged the role of the family and friends on career choices was conducted by Ester and Bowen (2005). The study demonstrated that in making the decision to enter a particular line of work people are often influenced by their family and friends. For example, when asked about those individuals who encouraged them to pursue their line of work, 23 % of workers said that someone employed in their line of work encouraged them, while 18 % mentioned their mother and 16 % named their father as the sources of encouragement. Similarly, 20 % said that their friends encouraged them, while 18 % cited their relatives. Only 5 % cited their teacher.

One comprehensive and dynamic theory which attempts to explain influence on career choices is the Social Cognitive Career Theory (SCCT) advanced by Lent, Brown and Hackett (1994). The SCCT was derived from Bandura's (1977, 1986, 1997) Social Cognitive Theory, which stressed the importance of self-efficacy in one's choice of behavior. Lent, Brown and Hackett, (1994) proposed that career choice behavior is shaped by outcome expectancies, career interests and career self efficacy, and that career

self efficacy plays a mediating role between one's background and interests and one's outcome expectancies. Moreover, career self efficacy is influenced by both individual variants (i.e., predispositions, gender, race/ethnicity, health status) and by contextual factors such as family back ground and learning experiences. The theory emphasizes the interactive influence of contextual factors and cognitive personal variables on individual career development (Lent, Brown, & Hackett, 1994). In this career development model, one's background (or contextual factors) and individual characteristics would influence one's learning experiences and consequently, self-efficacy. Self-efficacy then would influence one's interest and outcome expectations, which eventually would influence one's career choices. In support of this, a number of other studies conclude that when young people explain their reasons for their Educational choice, they emphasise *personal interest* (Ester and Bowen, 2005).

Lent, Brown and Hackett (1994) asserted that objective and perceived aspects of the environment may have direct and moderating effects on career decision making. Examples of the environmental factors are the quality of educational experiences and the financial support available to individuals, whereas an example of perceived environmental factors is individuals reaction to an interpretation of their surrounding (i.e., whether they view their environment as a source of support or barrier).The mediating role of self-efficacy among background and interests, outcome expectations, and career choices in relation to career development has been supported by previous research (Betz, 1993, 1999; Lent, & Brown, 2003). Lent, Schmidt, Brenner, Lyons and Treistman (2003) found that environmental factors influence career choice only through their impact on

self-efficacy. Additionally, Lent, Schmidt, Brenner, Lyons and Treistman (2003) found that perceived social support and barriers significantly affected self-efficacy and indirectly had an effect on career choice through changes in self-efficacy.

Regarding the impact of objective background factors on self-efficacy and career choice, Nauta and Epperson (2003) found in a longitudinal study that years in school and the number of science and mathematics courses taken in high school were positively related to the choice of science and mathematics as majors when entering college. Understanding college requirements and self-efficacy in mathematics and science are found to be more positively related to remaining in the chosen field. Exposure to work experiences and learning environments also has been proven to measurably influence an individual's level of educational aspirations (Rottinghaus, Lindley, Green, & Borgen, 2002).

The tenets of the SCCT focusing on the interrelationship of one's personal characteristics, environmental support, and career interests and decisions have been found to apply to various populations by many studies (Bregman & Killen, 1999; Lent, Brown, Schmidt, Brenner, Lyons & Treistman, 2003). However, few studies have been conducted to investigate possible gender differences in factors related to the SCCT model among the high school population. Nonetheless, Byars and Hackett (1998) suggested that gender influences may affect career self-efficacy and outcome expectations and also impact career choice and adjustment. Although Lent, Brown, Schmidt, Brenner, Lyons and Treistman (2003) clearly tabulated the various factors that influence career choices, it is not clarified whether or not the factors apply to the Zambian context.

In an effort to explain why women were underrepresented in science and mathematics fields, Betz (1993) argued that women avoid male dominated occupations due to a lack of self-confidence in such occupations, and that this lack of confidence is rooted in a lack of encouragement, role models, or similar experiences in the field—the resources for self-efficacy proposed by Bandura (1978). Several studies have found that career self efficacy beliefs are critical in the choices made by and the persistence of females entering mathematical, scientific, and technological careers (Church, Teresa, Rosebrook, & Szendre, 1992).

Ester and Bowen (2005) used ex post facto correlation research design to conduct a research study based upon the Social Learning Theory of career decision-making which provides insight into the interactions of genetic factors, environmental conditions, learning experiences, and performance (task) skills that shape individuals' decisions about careers. Ester and Bowen (2005) study found that the factors that influenced students to choose a career in agriculture focused around several themes which included career opportunities, high school educational experiences, and work experiences. However, there was lack of generalizability in these findings (Ester and Bowen, 2005). Lowe and Simons (1997) used a cross sectional survey research design with a sample size of 551 to investigate the relative importance of 13 factors influencing the choice of business major. They found that the most important criteria influencing the choice of major across all business student majors were: future earnings, career options, initial earnings, and ability/aptitude. Moreover, they found distinguishable differences among majors. For example, accounting students were particularly influenced by external factors

such as long term earnings, initial earnings and career options, whereas marketing majors highlighted interesting subject matter, and management majors rated self-employment opportunities highly. However, the question is do the factors revealed in the study conducted by Lowe and Simons (1997) on the choice of business major also motivate mathematics student teachers to choose mathematics as their teaching subject?

Chuenyane (1983) noted that schooling played a significant role in career choice, especially the type of school attended. He observed that formerly White schools in South Africa had good resources and maintained awareness and understanding of most careers while the other government funded schools did not have these privileges. His study highlighted that students in traditionally African schools have always had difficulties when making decisions about their careers on account of the limited career options available to them. The quality of education still varied considerably, but this was not unique to South Africa (Chuenyane, 1983).

According to Wood (1974) place of residence has an influence on the choice of career. For example, he found that rural grade 12 pupils rated teaching and nursing as high jobs in contrast to urban grade 12 school leavers, who rated jobs like law and engineering as high prestige. This situation could be attributed to the fact that grade 12 pupils in rural areas were exposed only to jobs like teaching and nursing while those in urban areas were exposed to a wider range of jobs and had access to job information concerning different careers from which they could choose. While Wood (1974) acknowledged that area of residence play an important role in the choice of a career such as teaching, his study did

not reveal anything on the role of area of residence in the choice of a teaching subject such as mathematics.

Sukovieff (1989) conducted a study with the purpose of examining how teachers, peers, parents, and factors such as lack of money, past work experiences and high school class, influenced a student's career choice. Class materials, past work experiences and students personal interests were revealed to significantly influence a student's career decision. These results are in line with Jones and Larke (2005) study findings which indicated that agriculture students were highly influenced by prior work experience in a career field and experimental exposure to careers through experiences such as internships, career fairs and experience with a professional.

2.4 Choice of the teaching profession outside Africa

As Yong (1994) pointed out in his study of teacher trainees in Brunei, 'Teaching attracts different people for different reasons. For example in an American study Hayes (1990) found that university students entered teaching for a variety of reasons, mostly altruistic. She showed that these were, principally, to 'make a positive difference in the lives of children', because of a love of children and because teaching would 'allow them to express their creative abilities'. The majority of the students denied that the long school holidays had influenced their decisions to choose teaching as a career, and most were adamant that the rewards of teaching were not monetary. However another study conducted by Bastick (1999) revealed that people entering teaching have chosen the career for reasons relating to quality of life issues, such as permitting more time with

family, providing a secure income or providing opportunities to travel.

Previous researchers have reported that the type of motivation a student teacher enters the profession by has a close relationship with the degree of commitment the teacher displays towards the job in the future (Wang & Fwu 2001). In a supportive view Watt and Paul (2007) acknowledged that understanding teacher candidates' motivations for choosing teaching has implications for teacher education planning and curriculum design, teacher recruitment authorities, and government and intergovernmental planning and policy decisions-especially when many countries around the globe are struggling to attract and retain teachers in a climate of escalating teacher shortages. Researchers' interest in what motivates people to take on a teaching career has resulted in a steady flow of studies and reports from countries around the globe since the 1960s (Watt and Paul, 2007). Over the last half decade, education administrators have exerted considerable effort in the United Kingdom, United States, Europe, Australia, and Asia to attract people to and retain them in the teaching profession (Watt and Paul, 2007).

Moran, Kilpatrick, Abbot, Dallat, and McClune (2001) asserted that the factors influencing the choice of teaching as a career can be extrinsic (relating to material benefits and job security), intrinsic (to do with personal growth and working in school environment) and or altruistic (a liking for and a desire to work with children and young people, and a wish to serve society). Similarly, Freeman and Brousseau (1985) highlighted intrinsic, extrinsic, and altruistic motivations as the most important groups of reasons on the basis of studies predominantly using participant rankings of the various

reasons. Although many researchers have used surveys and open-ended questions with large samples in their studies (e.g., Alexander, Chant, & Cox, 1994; Bastick, 1999), the methods of analysis and reporting of results have not always been as sophisticated as they could have been, with an overreliance on single-item indicators, raw frequency counts, and the ranking of themes, resulting in a lack of consistency across studies (Watt and Paul, 2007). Researchers have developed and implemented survey instruments with no information regarding reliability or validity, and results have often been reported without inclusion of the survey instruments. This, combined with the absence of an agreed upon analytical and theoretical framework, has meant that researchers have not always concurred on what constitutes intrinsic, altruistic, extrinsic, or various other motivations that are examined by individual researchers (Watt and Paul, 2007). Additionally, Watt and Paul (2007) observed that various operationalizations of intrinsic, extrinsic, and altruistic motivations have resulted in a lack of definitional precision and overlapping categorizations from one study to another. For example, the desire to work with children has been frequently nominated as a form of intrinsic motivation and has also often been referred to as a form of altruistic motivation (e.g., Young, 1995). In a review of the research conducted up until the early 1990s, Young (1995) noted that "altruistic, service-oriented goals and other intrinsic motivations are the source of the primary reasons entering teacher candidates report for why they chose teaching as a career" (p. 46). Identified motivations have frequently included working with children and adolescents, making a social contribution, making a difference, job security, job benefits, enjoyment of teaching, compatibility with other interests and activities, compatibility with family life, and self-education (Young, 1995).

In relation to age, a strong personal commitment to teaching, in itself providing job satisfaction, was evident amongst the majority of the two groups of mature students in England pursuing different teacher training courses, the one full-time, the other part time, by distance learning (Whitehead, Harris, Maugham, & Menter, 1998). Very small number of each group cited financial reasons for entering teaching and, where this occurred, it was due to domestic circumstances. Similarly, Serow and Forrest (1994), in a study of late-entry teachers in America, found that all but a few respondents identified teaching's intrinsic rewards as a primary basis for its appeal. By contrast research carried out amongst final-year undergraduates in England, Scotland and Wales to determine their assessment of teaching as a profession showed that the criteria for so doing were essentially extrinsic. They related to salary, job satisfaction, the perceived status of teachers and career prospects (Unwin, 1990). In spite of this, the study showed that there were still a few dedicated and altruistic [geography] undergraduates who, going against the general trend, still aspire to become teachers. Unwin (1990) also found that having parents as teachers did not affect the student's intention to teach in fact the influence of parents, whether teachers or not, and of others has been shown not to be very great (Valentine, 1934; Betz, 1993). Some parents in the profession, however, had greater aspirations for their sons, especially in monetary terms, although others felt that 'the benefits were fine (Benton, Decorse and Vogtle, 1997). In a study of teachers in Caribbean countries, Benton, Decorse and Vogtle (1997) used three categories to identify the reasons for entering teaching among practitioners with one year's experience. The reasons given were mainly altruistic in nature and, generally, were in keeping with earlier studies such as that carried out by Lortie (1975). However, Benton, Decorse and Vogtle

(1997) warned that the duration of such altruism could be called into question, 'given the high attrition rate in the teaching profession'. Equally, Yong (1994), focusing especially on extrinsic reasons for teaching (such as career prospects, salaries and benefits), questioned the extent to which such factors would sustain teachers' commitment to teaching.

Concern was shown by Young (1995) that those who decide to teach might have a distorted view of what teaching entailed, leaving the job when that view became more realistic. She found that pre-service teachers in California had chosen to teach principally for altruistic reasons with fairly realistic views of their working conditions, but many planned to remain in teaching only if the expected satisfaction of working with children emerged. Gender differences in sixth-formers' perception of primary teaching were found to be that males were more likely than females to see it as a well paid job and they attached greater importance to extrinsic factors like its perceived status as a profession (Johnson and Keown, 1998). Similarly, Moran, Kilpatrick, Abbot, Dallat, and McClune (2001) noted that studies conducted more than six decades ago have demonstrated that each factor (extrinsic, intrinsic and or altruistic) may carry a different emphasis and that there may be gender differences. Edmonds, Sharp, and Benefield (2002) studied the recruitment and retention of teachers in the workforce. Their findings indicated that student teachers opt for teaching generally for intrinsic reasons such as the perception that teaching makes an important contribution to society. Their research also disclosed that people with different profiles are motivated by different reasons. For example, male student teachers placed more emphasis on extrinsic factors compared to their female

counterparts. Nonetheless, in a study of reasons why female and male students choose teaching profession, Kniveton (2004) found that the motivations for choosing teaching profession were similar for both males and females.

In this section it has been shown that studies conducted by Edmonds, Sharp and Benefield (2002), Johnson, and Keown, (1998), and Moran, Kilpatrick, Abbot, Dallat, and McClune (2001) present important findings on the role gender differences play in the choice of the teaching profession, nonetheless nothing has been said about the role gender differences play in the choice of a particular teaching subject such as mathematics.

Whilst using the 1978 O'Neil model and employing a qualitative research methodology for the study, Evans (1997) conducted a research on the factors influencing African Americans to select teaching careers in vocational education. The findings of the study revealed that the most significant influences behind the respondents choosing of vocational teaching careers were related to teacher role models, family support, altruism, the intangible benefits of teaching, and love for vocational professions. Most of the factors identified were related to the factors found in the O'Neil (1978) model. A factor, entitled the Spiritual Factor, emerged in addition to those identified in the original O'Neil model. Positive relationships with knowledgeable staff members, supportive peers, active participation in vocational organizations, and confidence in academic preparation, enhanced the progress of students in vocational licensure. Nonetheless, this study did not look at a specific subject such as mathematics and it was carried out in an environment which is very different from that of Zambia, therefore the question is whether the same

findings might be found in the Zambian context.

Book, Freeman and Brousseau (1985) claimed that some people regard teaching as a fallback career, where entrants may have failed to be accepted into their career of choice or otherwise been unable to pursue their first-choice career.

Although the above section describes various factors that entice people to join the teaching profession Watt (2006) observed that in Australia, the United States, the United Kingdom, and many European countries are experiencing difficulties in recruiting and retaining teachers.

In summary, the reasons for choosing the teaching profession as a career have been predominantly altruistic and intrinsic, although extrinsic rewards could take precedence. Concern has been expressed over teachers' long term commitment to the profession when motives for entry were extrinsic, although this could also apply to those who became teachers simply for the love of children

2.5 Choice of the teaching profession in Africa

A study in Ghana by Dempta (2005) found that some young people choose teaching because of vocational commitments, wanting to impart Knowledge or seeking to develop the young people for the development of their country. However, for many others, teaching was chosen on the basis of the possible benefits it offers notably salary, job security and opportunities for advancement (Akyeampong, 2002). On the other hand

Akyeampong (2002) noted that it is challenging to ensure that teaching is and still remains an attractive career option and attracts a sufficient number of high quality applicants in Africa. A study in Tanzania conducted by Towse (2002) found that only 10% of males and 15 % of females said that teaching was their first career choice while 37% of the registered student teachers said that they took up teacher training because their grades were too low to pursue their preferred choice. The same study by Towse (2002) found that others viewed teaching as a stepping stone to other more lucrative jobs. One respondent said that it was the only profession that would allow him to advance to the higher levels of education due to the availability of schemes that allowed teachers to avail themselves to paid study leave.

According to Chanduluka (2003), others joined the teaching profession owing to holiday opportunities which could be used to relax, pursue another job or internship for purposes of professional development. Dubbeldom (1970) observed that social economic status plays an important role in influencing student teachers to choose the teaching profession in many African countries. The study he conducted among primary school teachers in Mwanza district of Tanzania revealed that farming was the occupation of the parents of more than three quarters of the 303 teachers in the sample.

2.6 Choice of teaching mathematics in Africa

According to Clyde (2009) levels of mathematical background as well as levels of motivation is important for the choice of mathematics as a teaching subject by student teachers in many Africa countries. However, Chanduluka (2003) contended that in many

African countries such as Zambia there were no systematic ways of recruiting potential mathematics teachers into colleges of teacher education. This was left to chance. On the other hand Ngala (2005) complained that in many African countries several secondary schools lack well trained mathematics teachers, often teachers who never trained as mathematics teachers are forced to teach mathematics. Such a situation is worse at primary school level where teachers often teach many subjects. According to Ngala (2005) in some instances, teaching of mathematics in Africa faced the challenge of having a less qualified mathematics or social science teachers supervising the more qualified mathematics teachers. This alone discouraged many individuals with strong mathematics backgrounds from choosing the teaching of mathematics. It also discouraged most of those who were already serving mathematics teachers from being duty conscious. This also contributed seriously to the shortage of mathematics teachers in most African Schools.

Nonetheless, Chanduluka (2003) revealed that many countries had made attempts to retrain practicing teachers so that they could become better teachers of Mathematics in upper primary classes. In this connection, the Zambian Ministry of Education in 1990 established the Teacher Education Department (TED) with a mandate to spearhead the professional development of teachers.

2.7 Choice of some teaching subjects in Zambia

There might be different motives behind student teachers choice of their teaching subject. Some students' teachers may choose their subjects on the basis of content and others on

the basis of prospective professionals (Duncan, 1967). Research findings indicate that it is worth knowing the factors that motivate student teachers' choice of their teaching subject because these factors influence the relationship between students and their learning environment, which in turn influences the quality of learning and teaching (Taylor, 2009). Haambokoma (2008) used a cross sectional survey research design to conduct a research study with a sample size of 88 students which revealed that students' decisions to major in a particular science subject notably biology, chemistry or physics were influenced by the following: interest in the subject, examination results obtained in a subject at grade 12 final examinations and less mathematics requirements. This trend is analogous to the ability beliefs construct of the expectancy-value theory which asserts that an individual's perception of his or her current competence influences ones choices of engaging a given activity. In addition, the study conducted by Haambokoma (2008) revealed that if unpopular subjects had to attract more students at university level, then upper basic and high school teachers needed to make these subjects more interesting and easier to understand. Although the study carried out by Haambokoma, (2008) revealed that some students choose certain Science subjects due to fear of mathematics in some science subjects, there have been no corresponding researches in mathematics education to determine the factors that influence students' choice of mathematics as their teaching subject.

2.8 Importance of teaching and learning mathematics

Mark (2008) argues that everybody uses mathematics whether they realize it or not. Shoppers use mathematics to calculate change, tax, and sales prices. Cooks use

mathematics to modify the amount a recipe will make. Vacationers use mathematics to find time of arrivals and departures to plan their trips. Even homeowners use mathematics to determine the cost of materials when doing projects (Mark, 2008).

According to Mark (2008) some professionals that use mathematics include: Accountants assist businesses by working on their taxes and planning for upcoming years. They work with tax codes and forms, use formulas for measuring interest, and spend a considerable amount of energy organizing paper work. Agriculturists determine the proper amounts of fertilizers, pesticides, and water to produce bountiful foods. They must be familiar with mixture problems. Architects design buildings for structural integrity and beauty. They must know how to calculate loads for finding acceptable materials in design. Biologists study nature to act in concert with it since we are so closely tied to nature. They use proportions to count animals as well as use statistics/probability. Chemists find ways to use chemicals to assist us which entails purifying water, dealing with waste management, researching superconductors, analyzing crime scenes, making food products, Computer Programmers create complicated sets of instructions called programs/software to help us use computers to solve problems. They must have strong logic skills. Engineers (Chemical, Civil, Electrical, Industrial, and Material) build products/structures/systems like automobiles, buildings, computers, machines, and planes, to name just a few examples. They cannot escape the frequent use of calculus! Geologists use mathematical models to find oil and study earthquakes. Tradesmen (carpenters, electricians, mechanics, and plumbers) estimate job costs and use technical math skills specific to their field. They

deal with slopes, areas, volumes, distances and must have an excellent foundation in mathematics.

The literature review in this section clearly illustrates the significant role mathematics plays in different areas of life. It is therefore important to promote the learning and teaching of mathematics through inquiring what inspires and motivates individuals such as mathematics student teachers choice of learning mathematics in tertiary institutions despite the general fear of mathematics.

2.9 Avenues to pursue mathematics at tertiary level

According to Mark (2008) basically, there are four avenues of education to pursue mathematics in tertiary institutions: universities, colleges, trade schools, or the military.

Universities prepare students for highly professional careers. Mathematics is typically a strong component of their curricula due to the extreme technical nature of these professions. On the other hand, colleges assist students to either go on to universities or learn technical skills needed for data processors, electronic technicians, law enforcers, mechanics, nurses, and so on. In colleges mathematics is not as intense compared to the universities but is integrated throughout each program. Trade schools teach students the science of automotive maintenance, carpentry, computer repair, heating and air-conditioning, plumbing and so on. Mathematics related skills are integrated throughout each program. Even the military puts their people through school after basic training. These military schools are akin to trade schools. On the other hand, military officers, even though they must already have bachelor degrees, are put through further schooling

after basic training. In Zambia mathematics student teachers are trained either in Colleges or Universities. The colleges where mathematics student teachers are trained include Mufulira, Copper belt Secondary Teachers' College (COSETCO), National In service Teacher College (NISTCOL), David Livingstone, George Benson and Nkrumah college of Education and the universities where the mathematics teachers are trained from include the University of Zambia, the Copperbelt University and the Zambian Open University. George Benson College and Zambian Open University are private institutions whilst the others are public institutions.

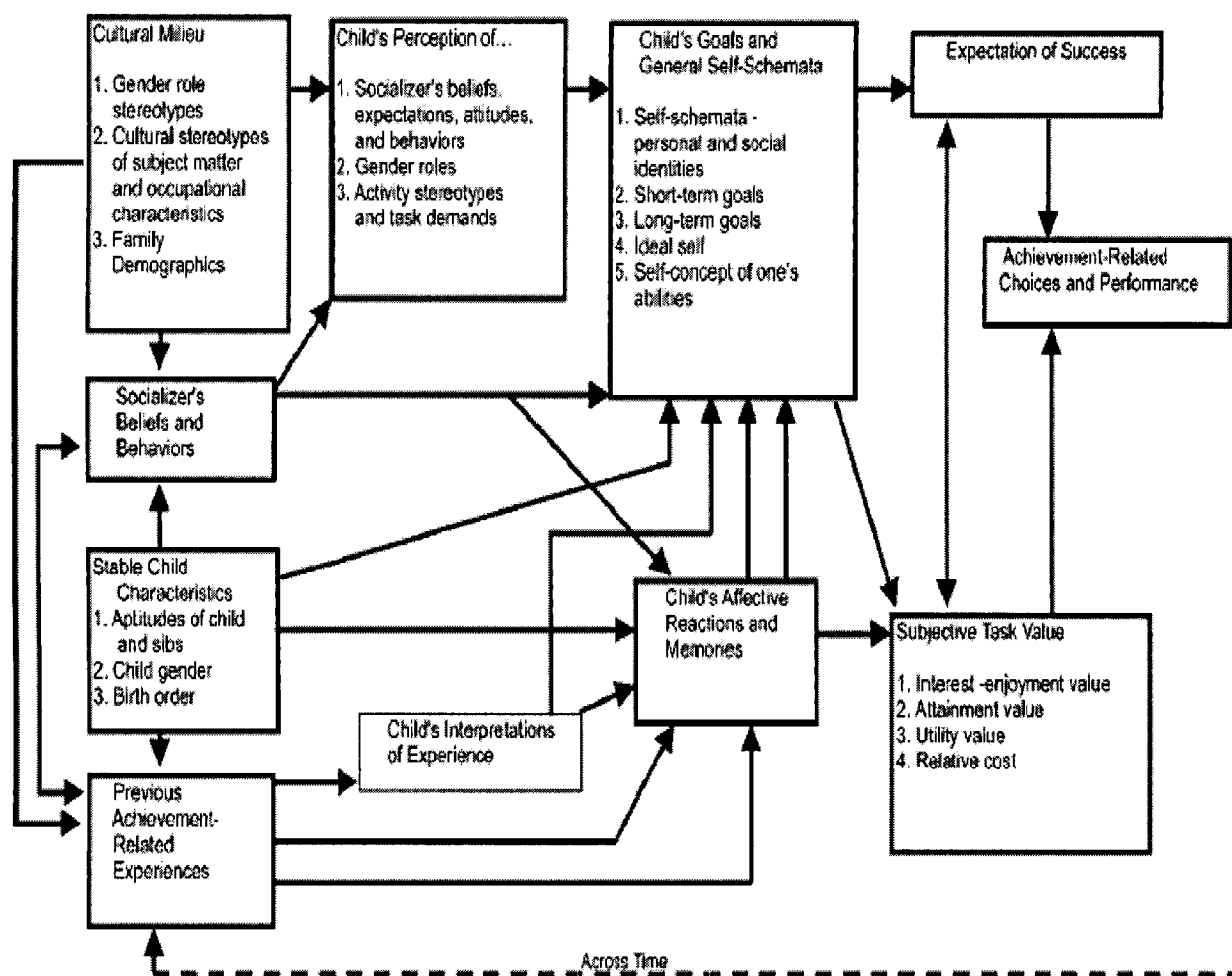
2.10 Theoretical Framework

This study utilised the expectancy–value theory of achievement motivation as a theoretical framework. The connection between the expectancy theory and this study is that they both address factors influencing decision making process. The expectancy–value model of achievement performance and choice was initially developed as a framework for explaining students' choices to participate in mathematics in high school by Eccles, Wig field, Addler, Futterman, Goff, Kaczala, Meece, and Midgley in 1983. Achievement motivation theorists attempt to explain peoples' choices of achievement tasks, persistence on those tasks, vigour in carrying them out and performance on them (Eccles, Wigfield, and Schiefele, 1998).

There are a variety of constructs posited by motivation theorists to explain how motivation influences choice, persistence, and performance. One long-standing perspective on motivation is expectancy–value theory. Theorists in this tradition argue

that individuals' choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity (Atkinson, 1957; Eccles, 1983; Wigfield, 1994; Wigfield & Eccles, 1992). The most recent statement of this model is represented in Figure 1.

Figure 1: Eccles, Wigfield, and colleagues' expectancy–value model of achievement motivation



Source: Wigfield & Eccles (2002)

As can be seen in Figure 1, expectancies and values are assumed to directly influence achievement related choices. They also influence performance, effort and persistence. Expectancies and values are assumed to be influenced by task specific beliefs such as ability and the perceived difficulty of different tasks and individual goals, self-schema, and effective memories. These social cognitive variables in turn are influenced by individual perceptions of their own previous experiences and variety of socialisation influences. Expectancy value theorists have argued that the incentive value of a task is another important determinant of task choice. Individuals will tend to do tasks they positively value and avoid tasks which they think are of no value (Wigfield and Eccles, 1983).

Three surveys were conducted by Eccles, Wigfield, Addler, Futterman, Goff, Kaczala, Meece and Midgley in 1983 to test aspects of the expectancy-value Model. The sample consisted of 5th through 12th graders who completed questionnaires once each year over a 2-year period (Eccles., 1983; Eccles & Wigfield, 1995; Meece, Wigfield, & Eccles, 1990). In each survey children completed questionnaires assessing their ability beliefs, expectancies for success and subjective valuing of different activities, along with a variety of other constructs. Most of the children participating in the studies were European-American, and they came from lower middle class to middle class backgrounds (Eccles., 1983; Eccles & Wigfield, 1995; Meece, Wigfield, & Eccles, 1990).

Wigfield and Eccles (1983) revised Atkinson's expectancy-value model by making it more social cognitive in nature to reflect the current cognitive paradigm of motivation. They focused on students' expectancy for success and perceptions of ability for academic

tasks in a number of large-scale longitudinal studies in schools. Pintrich and Schunk (1996) argued that students' expectancy beliefs about their capabilities to do a task and succeed at it are closely related to actual achievement on standardized tests as well as course grades. Teachers familiar with expectancy-value theory may foster the belief among their learners that competence or ability is a changeable, controllable aspect of development. The teacher could do this by stressing the importance of effort, the amount of time spent studying, and the use of different study strategies. In addition, the teacher could express his/her belief that all students can learn to do well in a given subject such as mathematics. This type of teacher talk about mathematics would communicate to students that the teacher has high expectations for all of them and that learning in mathematics is not a stable ability or trait that some students have or do not have (Pintrich, 1996). If students come to understand that they can master the material with some effort, they will be more likely to engage in the material. The teacher needs to communicate this type of positive high expectation for all students, high and low ability, females and males, and minority and others. Moreover, Pintrich (1996) claimed that students are motivated to engage in tasks and achieve when they believe they can accomplish the task. Therefore, teachers need to provide accurate feedback to students to help them develop reasonable perceptions of their competence but, at the same time, communicate that their actual competence and skills will continue to develop. Another application of the expectancy-theory to the learning and teaching process is that, children also need to be challenged by tasks in order to be motivated and to actually learn new skills. Tasks should be set at a level of difficulty where most children in the classroom can master the assignment with some effort. Thus, the relevance of the expectancy

theoretical framework to the context of the study is that the theoretical framework has wide range of applications in describing the standard of teaching and learning in mathematics domain (Eccles, Wig field, Addler, Futterman, Goff, Kaczala, Meece & Midgley in 1983). It describes issues which affect students' performances and choices and mathematics student teachers in Zambia are affected by such issues.

In this study the following constructs from the expectancy-value theory were measured: expectancies of success and the four values of interest-enjoyment, attainment, utility and relative cost (The three right most boxes in Figure 1). The expectancy-value theory also helped to develop categories for analysing data. This allowed findings to relate back to the theoretical foundation. While working with Wigfield and Eccles (1983) framework this research also explored the relevance of this decision-making theory in the Zambian context by using individuals with a culture different from the one originally used when the theory was just developed.

2.11 Summary

It is clear from the literature review that many studies involving career choices in general and the choice of the teaching profession in particular were conducted worldwide which suggested that various factors are important in making a career decision. However, not many studies have focused on the factors influencing the choice of a particular teaching subject such as mathematics. Hence, we cannot draw conclusions based on the literature reviewed in this chapter about what motivates student teachers in colleges of Education

in Zambia to choose mathematics as their teaching subject. Therefore, this research will be significant in that it will investigate the factors motivating and inspiring student teachers choice of mathematics as their teaching subject. The next chapter describes the methodology employed to carry out the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The study aimed at identifying and describing the factors that inspire and motivate upper basic and high school student teachers to choose mathematics as their teaching subject. This chapter presents information on the research design, research sites, study population, sampling procedures, research instruments used, data collection procedures, analysis of the data, and reflection on ethical issues.

3.2 Research Design

This was a quantitative study, that is, a study that uses objective measurement and numerical analysis of data to try and explain the causes of changes in social phenomena (Ary & Razavieh, 1996; Kumar, 1999). Among the strategies of inquiry found in a quantitative research, I used a survey as a strategy of inquiry. Surveys permit the researcher to summarize the characteristics of different groups or to measure their attitudes and opinions towards some issue (Ary & Razavieh, 1996), with the intent of generalizing from a sample to a population (Creswell, 2003; Borg & Gall, 1989). A survey was a preferred strategy of inquiry for the study because of its power in identifying attributes of a large population from a small group of individuals (Babbie, 2002; Fowler, 2002). Two types of surveys are cross-sectional and longitudinal studies using questionnaires or structural interviews for data collection. In a cross-sectional

survey data is collected at one point in time (Creswell, 2003; Ary & Razavieh, 1996). I used a cross sectional survey owing to its usefulness in obtaining an overall ‘picture’ as it stands at the time of the study (Babbie, 2002). Supporting this view, Kumar (1999) states that a cross sectional survey is best suited to studies aimed at finding out the prevalence of a phenomenon, situation, problem, attitude and issues by taking a cross section of a population.

3.3 Research site

The study was conducted in four colleges of Education training teachers to teach at grade 8 and 9 level. All the four colleges were co-educational and run by the government.

3.4 Target Population

The target population was all student teachers in Colleges of Education in Zambia training to teach mathematics at upper basic school level. Wallen and Fraenel, (2001); Ary and Razavieh, (1996) contend that the actual population (called the *target population*) to which the researcher would like to generalize is often not available and the researcher is entitled to generalize the findings from the population called *accessible population*. Since it was not possible to deal with the whole of the target population owing to financial constraints I had to identify the accessible population. The accessible population consisted of 360 mathematics student teachers.

3.5 Sample size

A sample is a subset of a statistical population whose properties are studied to gain

information about the whole (Ary & Razavieh, 1996; Kumar, 1999). A sample of 120 mathematics student teachers was involved in this study, a mixture of first, second and third year students. I used a sample because the time and money involved could not permit me to study all possible members of the population. Ary and Razavieh (1996) note that it is not always necessary to study an entire population to understand the phenomenon under consideration as the information required could be obtained from a representative cross section of participants in the population using statistical inference. Supporting this view, Wallen and Fraenel, (2001) state that in a survey research information can be collected from a sample rather than from every member of the population. To maintain confidentiality the following names were used to represent the actual names of the colleges: Tiger College, Lion College, Zebra College and Giraffe College. Out of 120 mathematics student teachers who participated, 25 were drawn from Tiger College, 44 from Zebra College, 10 from Lion College while the remaining 41 were drawn from Giraffe College. There were 41 females and 79 males who took part in the study. The variations in the sizes of the sample from College to College were due to the fact that different colleges enrolled different numbers of students. The average age of the respondents was 24 years.

3.6 Sampling Procedure

Sampling means selecting a given number of subjects from a defined population as representative of that population (Borg & Gall 1989). The study used purposive and systematic random sampling methods.

3.6.1 Sampling of Colleges

Purposive sampling was used to select four colleges of education, which represented the span and diversity among the respondents with respect to geographical location, culture, urban, and rural. Purposive sampling is a type of sampling that involves the use of judgment by the researcher as to who can provide the best information to achieve the objectives of the study (Kumar, 1999; Bless & Smith, 1995). Thus, sample elements judged to be typical, or representative, are chosen from the population, using purposive sampling (Ary & Razavieh, 1996; Cresswell, 2003). Purposive sampling is very useful when you want to construct a historical reality, describe a phenomenon or develop something about which only a little is known (Kumar, 1999). I used purposive sampling because of its power which lies in selecting information rich-cases for in-depth analysis related to the central issues being studied (Kombo & Tromp, 2006).

3.6.2 Sampling of students

Systematic random sampling was used to select mathematics student teachers from a list consisting of both male and female students at each of the four colleges of Education. Systematic random sampling is a type of probability sampling, which involves selecting one unit on a random basis and choosing additional elementary units at evenly spaced intervals until the desired number of units is obtained (Ary & Razavieh, 1996; Kumar, 1999). Kombo and Tromp (2006); Kumar (1999) note that systematic sampling is used in order for each participant to have an equal chance of inclusion in the study. I also used systematic sampling to enable each student teacher to have an equal chance of being selected. The sampling interval for each of the four colleges was three. Thus, every 3rd,

6th, 9th, 12th and so student teacher was selected from the list, so that a total of 120 mathematics student teachers were selected from an accessible population of 360.

3.7 Research instruments

3.7.1 Type of instrument used

The instrument used to collect the necessary data was a self-completion questionnaire. A questionnaire is a research instrument consisting of a series of questions asked to individuals to obtain statistically useful information about a given topic or issue (Mellenbergh, 2008; Kombo & Tromp, 2006). The questionnaire has weaknesses such as failure to notice behavior, gestures, reactions, emphases, assertions and emotions of the respondent (Gosh, 1992; Kumar, 1999). Nonetheless, I still used the questionnaire with close ended items because of its strength in obtaining a larger coverage of the population with little time and cost (Bless & Smith, 1995).

A five-point Likert Scale was used as a response format. A Likert Scale is an ordered, one-dimensional scale from which respondents choose one option that best aligns with their view (Ary & Razavieh, 1996; Best & Khan, 2008).

I used a Likert Scale because Likert scales are often found to provide data with relatively high reliability (Oppenheim, 1992; Kumar, 1999). In a Likert Scale, one cannot tell whether the intervals between each response category are equally sized (Ary & Razavieh, 1996). However, in accordance with common practice which involves approximations, I assumed equal distances between the categories in the scales. This means that I have regarded the Likert scales as quasi-interval scales.

Closed ended questionnaire have some weakness such as the greater possibility of investigator bias because the researcher may list only the response patterns he/she is interested in or those that come to mind (Kumar, 1999). In addition, even if the category of 'other' is offered, most people will usually select from the given responses, so the findings may still reflect the researcher's bias (Kumar, 1999). However, I still used the questionnaire items which consisted of highly structured close ended questions for generating frequencies of responses amenable to statistical treatment and analysis. This enabled me to secure standardized results that could be tabulated and treated statistically (Ghosh, 1992). This view is supported by Oppenheim, (1992) who asserted that another reason for using close ended questions is that they entail relatively low cost, since the data is rapidly collected and coded. In addition, the designing of the questionnaire in closed form is essential in ensuring that quantification and analysis of the results could be carried out efficiently (Borg & Gall 1989). Consequently, this helps to achieve success in collecting reliable and dependable data (William, 2006).

The following constructs from expectancy-value theoretical framework were used to come up with item 9 and item 13 of the questionnaire: expectancies of success, interest and enjoyment, attainment, utility and relative cost. This was in order to establish the relevance of the theory to the Zambian context. The questionnaire also included questions on demographic data such as age and sex of respondents. Other sections of the questionnaire included items related to individuals such as parents and teachers, who might have had played a role in inspiring and motivating student teachers' choice of mathematics as their teaching subject. There were also items related to how events or

experiences such as participation in mathematics clubs could have played a role in inspiring and motivating student teachers' choice of teaching mathematics. Refer to appendix A for the actual questionnaire.

3.7.1 Development of questionnaire

The development of the questionnaire firstly involved adoption of some items (Item 6, 8, and 9; see appendix A for the actual items) from the Vilie-con-valg questionnaire developed in Norway on a similar study. Vilie-con-valg is a Norwegian research project addressing the challenge that few young people (women in particular) choose education and career in sciences, technology or mathematics. I used this as a template for developing my questionnaire to suite the *Zambian* context of course. Authority to adopt some items was granted by the project coordinator when I visited her at Oslo University in 2008.

Secondly, the sample questionnaire was given to my Supervisor and co-supervisor to check whether or not the questions were phrased clearly to enhance validity (Best & Khan, 2008) and also in order to solicit new, relevant and important issues to include in the questionnaire.

Thirdly, a pilot study was carried out at one College of Education. The purpose of the pilot study was to detect difficult sentences, concepts and wordings as well as challenges in the collection of data as suggested by Ary and Razavieh, (1996) as well as by (Kumar, 1999). A total of 20 mathematics students took part in the pilot study. Borg and Gall

(1989) contended that you rarely need to include more than 20 subjects in a pilot study. The outcomes of the pilot study lead to some minor modifications such as correction of spellings, grammar, layout as well as addition of an example of how participants should fill in the questionnaire.

3.8 Data collection

Data were collected by means of questionnaires. I physically took the questionnaire to each college which participated in the study. At each college I first met the principal. Permission was requested from the principals of the respective Colleges of Education. When getting permission, I showed the Principal of the respective College an introductory letter from the University of Zambia indicating that I was a registered student in the programme of Masters of Education in Mathematics Education. Then, I explained the relevance and usefulness of the study as suggested by Kumar (1999). Once permission was granted the respective principals called on the head of mathematics department who escorted me to the mathematics student teachers' classrooms. I administered the questionnaires directly myself, so that I could provide assistance to participants or answer questions. Before I administered the questionnaire it was explained to the participants, what it was about. Participants received Informed Consent Forms (appendix B). The questionnaire was only administered after the students had signed Informed Consent Forms. I had to wait for the mathematics student teachers to complete the questionnaire so that I could provide assistance or answer questions as contended by Ary and Razavieh, (1996). It was possible for me to administer the questionnaires directly because in each of the four Colleges of Education visited I could access all the

mathematics student teachers in one place. I thanked respondents after completing the questionnaire.

3.9 Data analysis

Data were analysed using the Statistical Packages for the Social Sciences (SPSS). The means, frequency distribution and percentages for each factor in a Likert scale were used to report the results. Tables were used to summarize and condense the data.

3.10 Ethical Considerations

I communicated the aims of the research to the mathematics student teachers and to representatives of the institutions in which the study was conducted. Student teachers were not compelled to participate in the research. I also explained the practical significance of the research findings to the students, and assured them that the information they provided would be treated confidentially.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents findings of the study. The findings are presented according to research questions to make it easier for the readers to follow.

4.1 Research question one: What experiences inspired and motivated student teachers to choose mathematics as their teaching subject?

This question aimed at identifying the experiences that motivated student teachers to choose mathematics as their teaching subject as well as to determine the extent to which the identified experiences inspired and motivated student teachers. Table 2 shows the distribution of participant responses.

Table 2: Distribution of responses of student teachers regarding school experiences that inspired and motivated them to choose mathematics as their teaching subject

Experience	Very strong motivation N (%) 5	Strong motivation N (%) 4	Small motivation N (%) 3	Very small motivation N (%) 2	No motivation N (%) 1	Mean
Mathematics club	63 (52%)	28 (23%)	7 (6%)	7 (6%)	15 (13%)	3.91
JETS club	29 (27%)	33 (30%)	10 (9%)	13 (16%)	22 (18%)	3.30
Availability of mathematics text books	27 (25%)	36 (33%)	31 (28%)	9 (8%)	7 (6%)	3.44
Usage of calculators	25 (21%)	44 (37%)	22 (18%)	7 (6%)	21 (18%)	3.38

As can be seen in Table 2, the distribution of responses indicate that on average participation in the mathematics club ($M=3.91$) seems to have strongly inspired and motivated respondents to choose mathematics as their teaching. The distribution of responses also suggest that participation in JETS ($M=3.30$) had the least motivation and inspiration on student teachers choice of mathematics as a teaching subject. It can be concluded that different school experiences have different influences on the choice of teaching mathematics by student teachers, with participation in mathematics club being the most influential.

4.2 Research question two: Who inspired and motivated student teacher' choice?

This question aimed at identifying individuals who motivated student teachers to choose mathematics as their teaching subject. Table 3 shows the distribution of responses with respect to individuals who inspired and motivated student teachers to choose mathematics as their teaching subject.

Table 3: Responses by student teachers regarding individuals who inspired and motivated them to choose mathematics as their teaching subject

Individuals who motivated student teachers	Very strong motivation N (%) 5	Strong motivation N (%) 4	Small motivation N (%) 3	Very small motivation N (%) 2	No motivation N (%) 1	Mean
Guardian	46 (42 %)	31 (29%)	16 (15%)	4 (4%)	12 (10%)	3.86
Friends	33 (28%)	45 (38%)	24 (20%)	9 (8%)	7 (6%)	3.72
Mother	41 (39%)	31 (30%)	10 (10%)	7 (7%)	15 (14%)	3.72
Father	47(46%)	21 (20%)	7 (7%)	2 (2%)	26 (25%)	3.59
Career master	36 (32%)	31 (28%)	14 (13)	3 (3%)	27 (24%)	3.39
Brother	46(41%)	33 (30%)	14 (13%)	5 (5%)	12 (11%)	3.84
Sister	30 (28%)	34 (32%)	18 (16%)	12 (10%)	16 (14%)	3.43
Clergy or any church member	22 (20%)	25 (22%)	12 (11%)	9 (8.3%)	41 (37%)	2.8

As can be seen in Table 3, brothers (M=3.84), guardian (M=3.86), father (M=3.59), mother (M= 3.72), and friends (M=3.72), seem to have had a strong motivation on student teachers choice of mathematics as a teaching subject. One can also see that the guardian seemed to have more influence than any other individuals. It can be concluded that family members play an important role in the choice of mathematics as a teaching subject by student teachers.

The mathematics student teachers were given an opportunity to state any other individual not assumed in the questionnaire but who had a significant inspiration and motivation on

their choice of teaching mathematics. The distribution of responses is presented in Table 4.

Table 4: Responses by student teachers regarding individuals not mentioned in the questionnaire, who had a significant inspiration and motivation on their choice of teaching mathematics

Individuals not assumed in the questionnaire but had a significant inspiration on the choice of mathematics	Frequency	Percentages of respondents
Workmate	1	0.8
Wife	1	0.8
Mathematics teacher	40	33.6
Neighbor	1	0.8
Lecturer	1	0.8
Husband	3	2.5
Grandmother	1	0.8
Fiancé	1	0.8
Employer	1	0.8
Deputy head	2	1.7
Cousin	1	0.8
Auntie	1	0.8
No response	66	55

As can be seen in Table 4, it appears that most participants indicated that the mathematics teacher (33.6 %) had a very strong inspiration and motivation on the choice of mathematics as their teaching subject. So the mathematics teacher compared to other individuals had a greater influence on student teachers choice of mathematics as a teaching subject. These findings indicate that the mathematics teacher was very important in inspiring and motivating student teachers choice of mathematics as their teaching subject. What were the qualities of this teacher? And how did this teacher motivate or inspire student teachers choice of mathematics as their teaching subject?

Table 5 shows the distribution of responses regarding the inspiring and motivating qualities of a mathematics teacher as reported by student teachers.

Table 5: Responses by student teachers regarding the extent to which certain qualities of the former high school mathematics teacher inspired and motivated them to choose mathematics as their teaching subject

Qualities demonstrated by former high school mathematics teachers	Very great extent (%) 5	Great extent N (%) 4	Small extent N (%) 3	Very small extent N (%) 2	No extent N (%) 1	Mean
Encouraged pupil participation	55 (47%)	49(41%)	10 (9%)	4 (3%)	0 (0%)	4.30
Allowed opportunities by asking questions	55 (45%)	38 (32%)	11 (9%)	9 (8%)	7 (6%)	4.22
Ability to teach well	46 (38%)	41 (34%)	18 (15%)	9 (8%)	6 (5%)	4.14
Friendliness with pupils	57(507%)	35 (31%)	14 (12%)	6 (5%)	2 (2%)	4.21
Enthusiasm about the subject	54 (47%)	39 (32)	18 (15%)	4 (3%)	2 (2%)	4.19
Respect to pupils	51(42%)	47 (40%)	12 (10%)	5 (4%)	5 (4%)	4.20
Relationship with pupils	54(45%)	36 (30%)	23(19%)	4 (3%)	1 (1%)	4.14
Was clear and audible	48 (40%)	51 (42%)	16 (13%)	3 (3%)	2 (2%)	4.15
Gave varied and lively lessons	47(41%)	44(37%)	21(17%)	3(3%)	1(1%)	4.14
Maintained pupils Interest	47(42%)	47(39%)	14(12%)	7(6%)	1(1%)	4.12
Good attendance of scheduled lessons	44(38%)	53(44%)	15(13%)	5 (4%)	1(1%)	4.14
Knowledge of mathematics	69(60%)	35(29%)	8(7%)	3(3%)	1(1%)	4.43
Punctuality	49(41%)	37(31%)	24(20%)	7(6%)	1(2%)	4.05
Enabled easy notes taking	43(37%)	38(34%)	24(20%)	5(4%)	6(5%)	3.95
Provided handouts	17(14%)	32(26%)	28(25%)	9(8%)	32(27%)	2.93
Stimulated Interest in Mathematics	49 (43%)	48 (41%)	16 (13%)	3 (2%)	1 (1 %)	4.18

As can be seen in Table 5, on average knowledge of the subject (M=4.45) seems to have been the most important motivating quality of a mathematics teacher, followed by the quality of encouraging pupil participation (M=4.31), and the ability to teach at the high school level (M=4.31). The attributes rated as the least important were: ability to enable easy notes taking (M=3.92) and to provide useful handouts (M=2.95).

4.3 Research question three: How is their expectation of success and their subjective task values related to their choice? The goal of this question was to find out the way the expectation of success and subjective values of mathematics student teachers contributed to their choice of teaching mathematics.

4.3.1 Expectation of success

Table 6 shows the distribution of responses with respect to how the expectation of success construct inspired and motivated student teachers to choose mathematics as their teaching subject.

Table 6: Responses by student teachers regarding how certain expectations of success inspired and motivated them to choose mathematics as their teaching subject

Expectation	Very strong motivation N (%) 5	Strong motivation N (%) 4	Small motivation N (%) 3	Very small motivation N (%) 2	No motivation N (%) 1	Mean
Self esteem to solve mathematics	75 (62%)	44(37%)	1 (1%)	0 (0%)	0 (0%)	4.62
Performance at grade 12 final examinations	53 (44%)	59 (49%)	7 (6%)	1 (1%)	0 (0%)	4.38
Belief of the ability to perform well	85 (70%)	31 (26%)	3(3%)	1 (1%)	0 (0%)	4.67
General performance during high school	51(43%)	59 (49%)	8 (7%)	1 (1%)	0 (0%)	4.35

As can be seen in Table 7, interest in mathematics ($M=4.85$), willingness to help others to pass mathematics ($M=4.65$), conviction of enjoying teaching mathematics ($M=4.58$), and the filling of making useful contributions to the teaching and learning of mathematics ($M=4.52$) all appear to have very strong inspiration and motivation on the student teachers' choice of mathematics as their teaching subject.

4.3.3 Utility value

Questionnaire items under this construct were: Ambition to use mathematics as a stepping stone, possibility of getting employed faster, easily getting a scholarship for further studies after finishing studies, and possibility of getting a job outside the country easily. Table 8 shows the distribution of responses with respect to how utility values inspired and motivated student teachers to choose mathematics as their teaching subject.

Table 8: Responses by student teachers regarding how utility values inspired and motivated them to choose mathematics as their teaching subject

Utility values	Very strong motivation N (%) 5	Strong motivation N (%) 4	Small motivation N (%) 3	Very small motivation N (%) 2	No motivation N (%) 1	Mean
Ambition to use mathematics as a stepping stone	60 (50%)	26(24%)	10 (8%)	11 (9%)	11 (9%)	3.96
Easily getting a scholarship for further studies	42 (35%)	43 (34%)	20 (16%)	3 (3%)	11 (9%)	3.88
Possibility of getting employed faster	66 (55%)	38 (33%)	8 (7%)	4 (3%)	3 (2%)	4.32
Easily getting a job outside the country	30(27%)	36 (33%)	23 (19)	4 (3%)	22 (18%)	3.86

In Table 8 it can be seen that on average with regards to the utility value of getting employed faster ($M=4.34$), ambition to use mathematics as a stepping stone to other jobs

(M=3.96), possibility of easily getting a scholarship for further studies (M=3.86), and easily getting a job outside the country (M=3.86) there seem to have been strong inspiration and motivation on the student teachers' choice of mathematics as their teaching subject.

4.3.4 Attainment value and relative cost values

The questionnaire item under this construct was: Possibility of acquiring a higher social status than teachers of other subjects and that the cost of doing mathematics will be manageable in terms of time and resources. The data in Table 9 shows distribution of responses by student teachers regarding how attainment and relative cost values inspired and motivated them to choose mathematics as their teaching subject.

Table 9: Responses by student teachers regarding how attainment and relative cost values inspired and motivated them to choose mathematics as their teaching subject

Attainment and Relative cost value	Very strong motivation N (%) 5	Strong motivation N (%) 4	Strong motivation N (%) 3	Very small motivation N (%) 2	No motivation N (%) 1	Mean
Possibility of getting a higher social status than teachers of other subjects	60 (50%)	26(24%)	10 (8%)	11 (9%)	11 (9%)	3.91
Cost of doing mathematics will be manageable in terms of time and resources	30 (27%)	41(34%)	26 (25%)	8 (7%)	11 (9%)	3.61

As can be seen in Table 9, the attainment value of obtaining a higher social status (M=3.91) and the cost value, that of asserting that the cost of doing mathematics would be manageable in terms of time and resources (M=3.61), both appear to have strong inspiration and motivation on the choice of mathematics as a teaching subject.

4.4 Research Question 4: When did student teachers make their choice to become mathematics teachers?

This question attempted to review the grade level when student teachers made the choice to become mathematics teachers. The distribution of responses in this regard are summarized in Table 10

Table 10: Responses by student teachers regarding the level in the Education system when they made their choice of becoming mathematics teachers

Education level	Frequency	Percent
Primary school	8	6.7
Junior secondary school	16	13.5
High school	31	26.1
Post high school	60	50.4
After having studied something	4	3.3
Total	119	100

The data in Table 10 shows that slightly more than half (50.4 %) of the respondents indicated that they decided to become mathematics teachers after completing high school. It can be considered that the decision of becoming a mathematics teacher appears to be made relatively late in young peoples' education path. Nonetheless, you cannot compare mathematics students to the students of other subjects because data was not collected for the other students.

4.5 Research Question 5: How satisfied were the student teachers with the choice of mathematics as their teaching subject?

The goal of this question was to determine if the student teachers were satisfied with their choice of teaching mathematics, since the level of satisfaction an individual has when entering a particular profession is related to the level of commitment an individual possesses when working. Table 11 shows the distribution of responses regarding the levels of satisfaction.

Table 11: Responses by student teachers regarding how satisfied they were with the choice of mathematics as their teaching subject

Level of satisfaction	Very satisfied N (%) 4	Satisfied N (%) 3	Dissatisfied N (%) 3	Very dissatisfied N(%) 2	Mean
Frequency/ percentage	68 (58%)	45(39%)	4 (3%)	0 (0%)	3.56

As can be seen in Table 11, it appears that on average the level of satisfaction (Mean=3.56) was very high.

4.6 Summary

The results of this study indicated that the most important factors inspiring and motivating student teachers to choose mathematics as their teaching subject were: 1) the former high school mathematics teacher, 2) expectation of success, interest and enjoyment value, utility value, attainment value and cost value, and 3) family support. The next chapter discusses the findings of the study.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

This chapter discusses the findings of the research which sought to identify the factors inspiring and motivating student teachers in Colleges of Education in Zambia to choose mathematics as their teaching subject.

5.2 Factors that inspired and motivated student teachers' choice of mathematics as their teaching subject

The study has demonstrated that the experience of participating in mathematics clubs, served as crucial elements in inspiring and motivating students' to choose mathematics as their teaching subject. This finding is in line with Eccles and Wigfield (1983) study, findings which provided insight into the interactions of genetic factors, environmental conditions, learning experiences, and performance (task) skills that shape individuals' decisions about careers. One implication of this finding is that mathematics clubs should be strengthened in all high schools. It was found that calculators which are the new aspect of technology recently introduced in Zambian high schools had some influence on the choice of teaching mathematics by student teachers. This finding is supported by Steinberg (2008), who argued that technology is an important part of today's society despite the notion that it spoils children. For example, instead of being able to add a long column of numbers in their heads they turn to a calculator. Steinberg (2008) also observed that by incorporating technology into the classroom, students will be better

equipped to transition from the classroom to the work place. This result suggests the need for the Ministry of Education to continue allowing pupils to use calculators at high school level.

5.3 Individuals who inspired and motivated mathematics student teachers' choice of mathematics as a teaching subject.

The strong motivation by their brothers, guardian, father and mother indicated in this study on student teachers' choice of mathematics as their teaching subject is similar to that described in other studies. For instance, the Blau and Duncan (1967) study identified the family as having an important bearing on the occupational life of individuals. Supporting this view Ester (2005) found that parents or guardians and friends were the primary individuals who influenced career choices. This finding also adds credence to the Byler (1987), Fisher and Griggs (1995), and Shipp (1992) studies which pointed out that support and influence of family members played a vital role in students' career choices. Family members seem to play an important role in inspiring and motivating mathematics students to choose mathematics as a teaching subject. Nonetheless, it appears that school guidance and counseling teachers did not have very strong impact on the choices of the mathematics student teachers. This trend is in contrast with Duncan (1997) who cautioned that to better accomplish the mission of helping students achieve their educational and career goals in today's social, economic, and cultural context, school counselors need to be adequately informed about what factors influence high school students' career choices and what approaches would best facilitate their career decision-making process. Brousseau and Driver (1994) argued that: "Chief among the factors that

appear to cause poor job choices is fanciful stereotypes that depict opportunity and reality inaccurately.” This could be as a result of not receiving enough career information from school guidance and counseling teachers during high school. One possible reason on why guidance and career masters had low motivation on student teachers choice of mathematics as their teaching subject could be that most of the guidance and counseling teachers are not trained, and therefore could not offer enough career information to the students.

Based on the number of responses on any other individual/s not assumed in the questionnaire but who had a significant inspiration and motivation on mathematics student teacher choice of teaching mathematics, it can be concluded that mathematics teachers’ inspiration and motivation ran deeper than that of any other individual. Mathematics teachers served as vital links to the recruitment of mathematics student teachers. This conclusion is supported by Berry (1989) and Gordon (1993), who argued that teachers provided a great amount of influence on career choices in education. Indeed, teachers are critical in the promotion of the teaching profession (Berry, 1989). Also teachers indirectly influence vocational career choices through their actions inside and outside of the classroom (Gordon, 1993). This is because the teacher can affect all the five constructs from Eccles model: expectation of success, interest and enjoyment value, utility value and attainment value, and the relative costs. These study results which have demonstrated the important role teachers play in inspiring and motivating their students may help mathematics teachers to foster the belief among their learners that competence or ability is a changeable, controllable aspect of development. The teacher could do this

by reemphasizing the importance of effort, the amount of time spent studying, and the use of different study strategies. In addition, the teacher could express his/her belief that all students can learn to do well in a given subject such as mathematics. This type of teacher talk about mathematics would communicate to students that the teacher has high expectations for all of them and that learning in mathematics is not a stable ability or trait that some students have or do not have (Pintrich and Schunk, 1996).

5.4 How is their expectation of success and their subjective task values related to their choice?

5.4.1 Expectation of success

The study has demonstrated that expectations of success very strongly motivated the student teachers to choose mathematics as their teaching subject. These findings are supported by Atkinson, (1957), Eccles and Wigfield, (1983) and Wigfield and Eccles, (1998), who argued that individuals' choice, persistence and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity. One implication of this finding is that mathematics teachers should ensure that the utilized methodologies and activities would help students improve their academic self-concept as well as positive attitudes toward school subjects including mathematics. In order to achieve this objective teachers need to provide accurate feedback to students to help them develop reasonable perceptions of their competence but, at the same time, communicate that their actual competence and skills will continue to develop.

5.4.2 Interest and enjoyment value

This study has demonstrated that interest in mathematics highly motivated student teachers' to choose mathematics as their teaching subject. This is in line with Lent, Brown and Hacket (1994) who demonstrated that career choice behaviour is shaped by outcome expectancies, career interests, and career self-efficacy, and that career self efficacy plays a mediating role in ones background and interest and ones outcome expectancies. The findings of this study are also in line with those of Strasser, Ozgur, and Schroeder (2002) who used a cross sectional survey design to conduct a study with a sample size of 101 and the statistical test used was a t-test. Their survey revealed that students value the interest they have in the major as far more important than the career benefits of a major or someone else's influence on them to choose a particular major. It is pleasing to note that the majority of the mathematics student teachers had strong levels of interest in mathematics. Previous researchers have reported that the type of motivation a student teacher enters the profession by has a close relationship with the degree of commitment the teacher displays towards the job in the future (Wang & Fwu 2001). They found that those who were decisive about their choice for entering the profession and had a great deal of enthusiasm ultimately outlasted their peers in staying in the profession. Thus the mathematics student teachers' high levels of interest in learning mathematics indicate that the majority are likely to be committed mathematics teachers and this is good for the teaching profession in general and for the teaching of mathematic in particular.

5.4.3 Utility value

The study has shown that utility values very strongly motivated student teachers' to choose

mathematics as their teaching subject. These findings are in line with Lent, Brown and Hackett (1994) who regarded the subjective value of task valuation as a major determinant of motivation for academic choices. However, these findings which indicate that majority of the students were motivated to choose teaching of mathematics because of their belief about the usefulness of mathematics outside classroom and feeling of making useful contribution to the teaching of mathematics are contrary to the assertions of Bastick (1999) who conducted a study using a cross sectional survey design and found that people entering teaching profession have frequently chosen this career for reasons independent of the career content. Rather, they have chosen the career for reasons relating to quality of life issues, such as permitting more time with family, providing a secure income, or providing opportunities to travel.

5.4.4 Attainment and relative cost values

The study has demonstrated that the attainment value of obtaining a higher social status strongly inspired and motivated the student teachers to choose mathematics as their teaching subject. This finding adds credence to Lowe and Simons (1997) assertions that social status is related to career choices. Lowe and Simons (1997) conducted a study using a cross sectional survey design and data was collected by using questionnaires. This finding also supports Gatta (2002) who found that a strong correlation exists between socioeconomic status and student choice of curriculum emphasis. Also, Gatta (2002) observed that socioeconomic factors such as occupational status play a critical role in the career development of students. This finding is an indication that most of the mathematics student teachers are likely to appreciate their choice of teaching mathematics. It is also interesting to note that the cost value had strong inspiration and motivation on the student teachers' choice of mathematics as their teaching subject. This

finding indicates that most of the mathematics students are likely to be committed and hard working.

5.5 When the student teachers made their choices of becoming mathematics teachers

The study has shown that the majority of the respondents decided to become mathematics teachers after completing high school. The findings of this study are in line with those of Mitchell (1993) who conducted a study which investigated the factors related to the enrollment and retention of students in the College of Agriculture. Mitchell (1993) study revealed that most students often decide to select an agriculture career at a later stage in their lives. From my study findings it can be considered that the decision of becoming a mathematics teacher appears to be made relatively late in young peoples' education path. Nonetheless, you cannot compare mathematics students to the students of other subjects because data was not collected for the other students. I would assume that one implication from this finding could be that if one wants to direct initiatives towards young skilled persons in order to recruit them to mathematics teaching, high school would be a good stage for this, since this is the time many young people make up their minds.

5.6 Level of satisfaction of student teachers with the choice of mathematics as their teaching subject

The study has shown that the majority of the student teachers were very satisfied with the choice of mathematics as their teaching subject. It appears that teaching of mathematics is by and large a career of choice and not something that people fall back on when their

other choices are not realized (i.e., the notion canvassed by Atkinson (1957) and identified by Larcey (1977) as the "mattress" factor or "something to fall back on"). However, the findings of this study are similar to those of Watt and Paul (2007) who reported high levels of satisfaction among 1st-year preservice teacher education candidates, for their choice of teaching as a career in Australia. The findings of this study are also in line with those Kaynama and Smith (1996) who conducted a survey that revealed that Job satisfaction and interest in the subject were the most important influences to each choice of the teaching subject. This finding of the current study shows that the majority of the mathematics teachers were satisfied with the choice of mathematics as their teaching subject is suggesting that they were more likely to be committed to their work as teachers.

5.7 Summary

In this chapter I discussed the findings of the research which sought to identify the factors inspiring and motivating student teachers in Colleges of Education in Zambia to choose mathematics as their teaching subject. The discussion included issues of agreement or disagreement with other studies on the factors that influence student teachers to choose mathematics as their teaching subject. The factors discussed were 1) the family, 2) the teacher, and 3) utility value, expectation of success, interest and enjoyment value and the attainment construct. The discussion of similarities or differences between the results of my study and others were based on sample size, time frame of the study, geographic location, methodology, and statistics. The next chapter looks at the recommendations and conclusions of the study based on the research results.

CHAPTER SIX

CONCLUSIONS AND RECOMENDATIONS

6.1 Introduction

This chapter presents the conclusions and the recommendations based on the findings of the study.

6.2 Conclusions

The findings of this study show that with regard to experiences that inspired student teachers' to choose mathematics as their teaching subject, participation in mathematics clubs was the most important factor that influenced student teachers to choose mathematics as their teaching subject. With regards to individuals other than the mathematics teacher, guardians had the strongest motivation on student teachers' choice of mathematics as their teaching subject.

As for the interest and enjoyment values (interest in mathematics, willingness to helping others to pass mathematics, conviction of enjoying learning mathematics, filling of making useful contributions to the teaching and learning of mathematics), the study found that they all had very strong motivation on the choice of mathematics by student teachers. With regard to the attainment value the findings of this study show that the attainment value of obtaining a higher social status than teachers of other subjects had

strong inspiration and motivation on the choice of mathematics as their teaching subject.

More importantly, the study has shown that a mathematics teacher who encourages pupil participation and allows pupils to ask questions strongly inspires students to choose mathematics as their teaching subject. Therefore, it can be concluded that teachers should ensure that children are challenged by tasks in order to be motivated and to actually learn new skills. Tasks should be set at a level of difficulty where most children in the classroom can master the assignment with some effort. Also, teachers need to provide accurate feedback to students to help them develop reasonable perceptions of their competence but, at the same time, communicate that their actual competence and skills will continue to develop.

In general, there were several factors that influenced students' decisions to enroll as mathematics student teachers in colleges of education. All the five concepts from Eccles model namely expectation of success, interest and enjoyment value, utility value and attainment value, and the relative costs have been tested and found to have played a key role in inspiring and motivating student teachers choice of mathematics as their teaching subject. These findings support the relevance of the expectancy-value theory in the Zambian contexts, which contends that the two factors that best explain an individual academic choices and performances are: their perceptions of the task's value and the expectations they hold for the task (Eccles, Parson, Adler and Kaczala, 1983; Eccles, Adler and Meece, 1984).

6.3 Recommendations

Based on the study's findings and conclusions, the following recommendations are made:

(a) The most important motivating qualities of a mathematics teacher were found to be demonstration of excellent knowledge of the subject, followed by the quality of encouraging pupil participation. In view of this, mathematics teachers should demonstrate these qualities in the classroom.

(b) The research findings indicate that Mathematics clubs strongly motivated student teachers to choose mathematics as their teaching subject. It is therefore important for heads of mathematics departments in particular and mathematics teachers in general to encourage students to take part in mathematics clubs activities.

(c) The study revealed that guidance and counseling teachers had a very small impact on the choices of mathematics student teachers. Because of this, guidance and counseling teachers should be sensitized to be encouraging pupils to become mathematics teachers by explaining the benefits of doing so.

(d) The utility and interest value were found to have strong motivation on student teachers' choice of mathematics as their teaching subject. Therefore mathematics teachers should be explaining the benefits of learning and teaching mathematics to their students. Equally, expectation of success played an important role in student teachers choice of mathematics as their teaching subject. In this view teachers should be ensuring that their students develop high self-esteem by providing accurate feedback to students,

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Appendix A. Questionnaire

Title

An inquiry into what motivates student teachers in colleges of Education in Zambia to choose as their teaching subject.

Introduction

My name is George Mulenga. I am a student pursuing Masters of Education in Mathematics Education at the University of Zambia. I would like to ask you some questions about your choice of mathematics as a teaching subject. Your answers will help me to determine the factors motivating upper basic and high school student teacher's choice of mathematics as their teaching subject in colleges of education in Zambia and how these factors motivate them. I would appreciate your answering these questions as the information you provide will be very useful to us and I would immensely appreciate your answering all questions. However if you feel that you do not want to answer a particular question, I gladly appreciate your decision. I can assure you that your responses will be completely anonymous and will only be used for research purposes. Please tick (✓) the response that you think is most appropriate to each statement. If you wish to make any comments in addition to these ratings please do so on the back page.

1. I am a Female Male
2. I am----- years old
3. Name of institution you are at.....
4. Your Grade in Mathematics in the final Grade 12 o'levels Examinations was.....

5. How satisfied are you with your choice of mathematics as a teaching

- subject? Very satisfied Satisfied
- Disatisfied Very dissatisfied

6. Approximately when did you decide on studying Mathematics as your teaching subject?

- In Primary school
- During Junior secondary school
- During High school
- After completing High School.
- After having studied something else. Please specify?.

7 How would you describe your performance in Mathematics during High school.

- Very good Good Fair Poor Very poor

To answer question 8, 9, 11 and 12 put a tick (✓) in the appropriate box that suits your response to a given statement.

Example:

To what degree did your father motivate you to choose mathematics? If your answer is very strong motivation put a tick underneath ‘Very strong motivation’, as shown below.

Statement	Very Strong motivation	Strong motivation	small motivation	Very Small motivation	No Motivation
Father	✓				

8. To what degree have you been inspired and motivated by the following in your choice of Mathematics as a teaching subject?

Individual	Very Strong Motivation	Strong motivation	small motivation	Very Small motivation	No Motivation
1.Clergy or any other church member					
2.Friends					
3.Guardian					
4.Mother					
5.Father					

6. Career Masters					
7. Brothers					
8. Sisters					
9. Any other people. Please specify					

9. To what degree have you been inspired and motivated by the following in your choice of Mathematics as a teaching subject?

Factor	Very Strong motivation	Strong Motivation	small motivation	Very Small Motivation	No motivation
1. Mathematics club					
2. Jets club					
3. Availability of mathematics textbooks					
4. Usage of					

calculators in the High school section					
5. Your general performance in mathematics during high school					
6. Self esteem to solve mathematics					
7. Your grade in mathematics during the final grade 12 examinations					
8. Ambition to use Mathematics as a Stepping stone to other jobs.					

10. To what degree have you been inspired and motivated by your expectation of the following in your choice of Mathematics as a teaching subject?

Expectation	Very Strong	Strong Motivation	small motivation	Very Small	No motivation
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	motivation			motivation	
1. Possibility of getting employed faster.					
2.Easily getting a scholarship for further studies after finishing your training.					
3.Possibility of acquiring a higher social status than teachers of other subjects					
4. Helping others to pass mathematics.					
5.Easily getting a job outside the country					
6.That the cost of doing mathematics will be manageable in terms of time and resources					

11. In what extent did your former high school mathematics teacher/s

The Teacher	Very great extent	Great extent	small extent	Very Small Extent	no extent
1. encouraged pupil participation.					
2. allowed opportunities for asking questions.					
3. demonstrated ability to teach mathematics well					
4.had good rapport (relationship) with pupils.					
5. was approachable and friendly.					
6. was respectful towards students.					
7. was able to teach at the pupils' level.					
8. enabled easy note-taking.					
9. Provided useful handouts of notes.					
10. Knowledge of the Mathematics subject.					
11. Maintained student interest during lessons.					
12. Gave varied and lively lessons.					

13. Was clear and comprehensible in lectures.					
14. Attendance of scheduled mathematics lessons.					
15. Gave audible lectures.					
16. Punctuality.					
18. Stimulated interest in mathematics					
19 Was enthusiastic about the subject.					

12. To what degree did the following factors inspire and motivate your choice of mathematics as your

Teaching subject?

Factor	Very Strong motivation	Strong motivation	small motivation	Very Small Motivation	No motivation
1. Your belief about your ability to perform well in mathematics					
2. Conviction that you will enjoy learning mathematics					

3. Feeling of making a useful contribution to the teaching and learning of mathematics in the country					
4. Belief that mathematics is useful outside classroom.					
5. Interest in mathematics					

I thank you very much for completing the questionnaire

Appendix B. Informed Consent Form for Students

You are invited to participate in a research project being conducted by George Mulenga. I am a student pursuing Masters of Education in Mathematics Education at the University of Zambia. I would like to ask you some questions about your choice of mathematics as a teaching subject. Your answers will help me to determine the factors influencing secondary teacher's choice of mathematics as their teaching subject in colleges of education in Zambia and how these factors influence them. This research may be valuable in the future as mathematics teachers make decision about the teaching and learning of mathematics. The questionnaire takes approximately 15 minutes to complete and would be completed during a class.

Risks

Except for your time and inconvenience, there are no foreseeable risks to you participating in this study.

Benefits

There are no direct benefits to the students; however this study may provide valuable education Mathematics Heads of department and mathematics teachers as they struggle to make decision about mathematics curricula and teaching practices.

Confidentiality

Your name will not appear on any of the documents on any of the documents. Student's questionnaire will be completed anonymously and will be identified only with an identification number. Please do not write your name on the questionnaire.

Voluntary

Participation is voluntary. If you choose to take part in this study you may stop any time during the study. You may skip any question you do not wish to answer on the questionnaire.

Contact Information

If you have any question about this study please contact Mr. Mulenga at 0977223207 or email gcmulengachanda@yahoo.com.

Thank you very much for your consideration.

Yours sincerely,